ROUTLEDGE ENVIRONMENT AND SUSTAINABILITY HANDBOOKS










# Routledge Handbook of Water Diplomacy

Edited by Shafiqul Islam, Kevin Smith, Martina Klimes, and Aaron Salzberg

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# ROUTLEDGE HANDBOOK OF WATER DIPLOMACY

The *Routledge Handbook of Water Diplomacy* is a comprehensive guide to understanding and practicing water diplomacy – a framework for building relationships, negotiating shared interests, and managing complex water challenges across physical, political, and societal boundaries.

In an era marked by rising scarcity, deepening uncertainty, and growing geopolitical tension, this timely volume offers actionable insights for negotiated problem-solving grounded in both scientific understanding and diplomatic skill. Moving beyond abstract theory and technical fixes, the Handbook introduces a dual-pathway structure designed to meet the diverse needs of its users. The "Working Together" pathway invites readers to engage with water diplomacy through the lens of their roles, whether as professionals, decision-makers, funders, researchers, or affected communities. The "What Matters and Why" pathway highlights key thematic dimensions, including process design, adaptive learning, trust-building, divergent worldviews, and the management of uncertainty. Together, these pathways guide readers through a wide range of case studies, from transboundary river basins to subnational disputes and community-scale water systems, demonstrating how water diplomacy can resolve conflict, enable cooperation, and support adaptive, context-sensitive 'learning by doing' under conditions of complexity and change. Whether addressing a transboundary dispute or a local allocation challenge, this book provides guiding principles, practical tools, and real-world cases to support water solutions that are scientifically credible, socially inclusive, and politically feasible.

The *Routledge Handbook of Water Diplomacy* serves as an essential reference volume for students and scholars of water diplomacy, water governance and water resource management, as well as for policymakers and water professionals who are seeking actionable insights into the nuanced challenges they encounter as they work to promote a more sustainable and equitable water future.

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# FOREWORD

Perhaps no single issue is more important to human health, economic development, and peace and security than water. The centrality of water to almost everything we do can both divide and unite us. In many respects, this is a simple problem. Ensuring safe, reliable, and sustainable supply of water – a clean stream, a protected borehole, an engineering system to treat and safely return water back into the environment – all this has been done by people everywhere and was likely one of the first community cooperative activities.

But the world is changing. Growing demand, pollution, and mismanagement are increasing threats to our individual and collective water security. Dealing with water challenges requires working across physical, technical, and political boundaries with uncertain information under constantly changing conditions. It is a process – a process based on the ability of stakeholders to work across these boundaries, uncertainties, and complexities to make collective decisions for the benefit of all.

During my long career, I have witnessed the tensions that can arise from sharing water as well as the opportunities that can come from water that bring communities and countries together. I have seen how cooperative action can expand benefits, reduce risks, and strengthen relationships. I have also learned, that getting there may not be easy. In the most challenging cases, water disputes may be driven by long-standing animosities or embedded within a complex set of broader economic, political, or security concerns – issues not traditionally within the domain of the water engineer. These challenges require bringing together unique skill sets and perspectives that may not normally be present.

This Handbook helps fill these gaps. In this thought-provoking edited volume, the editors and authors embark on a journey to explore the intricate intersections of science, policy, and politics in the field of water diplomacy. Drawing upon their expertise and experiences, they present a compelling case for a nuanced and inclusive approach to water governance that is sensitive and responsive to the different needs and interests of the stakeholders. The Handbook further supports innovative pathways and collaborative frameworks that promise to reshape our understanding of water as a source of cooperation rather than conflict.

Most of the authors have direct experience with negotiating across borders and sectors in diverse fields of the wider water sector and beyond. Whether it is managing a project within a

community, leading an integrated water management process within a water body or government, or working across governments – these examples and tools can help.

As we navigate an era marked by unprecedented transformation, the importance of integrating diplomatic tools and approaches to strengthen sustainable water management cannot be overstated. In this regard, timing of this Handbook could not be better. Now, more than ever before, is the time to move from dialogue to action. At the end of the day, it is the building and institutionalizing of these relationships that will sustain cooperation. We need to introduce this knowledge and experience into our dialogues on water and promote water as a diplomatic tool for bringing communities together. This Handbook is a guide for all of us – policymakers, practitioners, scientists, and concerned citizens alike – offering insights and recommendations that transcend borders and bridge disciplines.

Perhaps most importantly, the knowledge shared here will help strengthen our efforts across all of the United Nations Sustainable Development Goals. This was our vision when I, working closely with many others across the globe, helped to advance water as a global sustainable development priority.

It is my sincere hope that this Handbook will not only inspire, inform, and educate but also encourage all of us to commit to the important process of relationship building around water. This would be a great step forward in building a world where water is managed equitably and sustainably for the benefit of all and becomes the foundation for a more peaceful and prosperous world.

Jan Eliasson
*Former Deputy Secretary-General of the United Nations,*
*and a longtime advocate for a water-secure,*
*sustainable, and peaceful world*

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# SECTION I

# Overview



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# 1

# WHY WE NEED A WATER DIPLOMACY HANDBOOK

*Aaron Salzberg, Martina Klimes, Kevin M. Smith, and Shafiqul Islam*

**Key Takeaways**

- While predictions of "water wars" from the 1990s have not materialized, shared waters continue to present significant governance and management challenges, especially in the face of growing unilateral actions, weakening global norms, increasing population growth and development pressures, and climate-driven uncertainties.
- Addressing these complex water challenges will require us to build enduring relationships that foster collaborative, negotiated, creative problem-solving for mutual gains.
- This relationship building is at the heart of the growing field of water diplomacy, which offers a framework for addressing these challenges at whatever scale they arise, from the transnational to the community scale.
- While it cannot offer prescriptive advice, we hope this handbook provides insights into common challenges, tools, and conceptual frameworks to help you better understand your unique water challenges and how to build the relationships necessary to address them.

## Water Wars or Collaborative Relationships?

In 1995, World Bank Vice President Ismail Serageldin famously suggested that "many of the wars in this century were about oil, but wars of the next century will be over water" (Crossette 1995). With this stark declaration, Serageldin positioned water as an inherently scarce resource that would inevitably bring conflict through competition. This ominous prediction caught popular media attention and added fuel to debates about the relationship between water and conflict that continue to this day.

Nearly three decades later, the reality is more nuanced. While kinetic conflicts between or among states over water have not materialized, concerns of state-on-state conflict persist, and local conflicts over water and the use of water as a weapon of war or in conflict settings have risen. These concerns have shifted the common characterization of water as a "technical" or "environmental" issue to a foreign policy priority with major economic, national security, and regional/geopolitical implications. At the same time, discussions over water have also occasionally challenged the

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inevitability of water scarcity and focused on the flexible management of water that can optimize collective benefits. This framing of opportunities for mutual gain encourages multilateralism and seeks to offer a compelling alternative in a world trending toward unilateral action and zero-sum thinking. Given the central importance of water in meeting basic human needs, we've also seen a growing appreciation for water's use as a tool to promote peacebuilding and restore relationships in post-conflict settings.

This shift has paved the way for water diplomacy, a collaborative approach to transforming how parties engage over water. Water diplomacy goes beyond technical solutions; it strengthens and institutionalizes relationships, builds political will, facilitates the development of arrangements and agreements, and fosters cooperation. It recognizes that water is not merely a zero-sum resource to be allocated but a shared necessity that can bring stakeholders together when managed effectively (Farnum 2018).

While Serageldin's predictions of water wars have not materialized, the need for water diplomacy has never been greater. The world is becoming more interconnected, populated, and developed. Human influence on the water cycle shapes its capacity to sustain life and its potential for destruction. Attempting to navigate this complexity through siloed framings (whether technical, political, or social) is a recipe for failure. Rather, to achieve actionable outcomes, we must work cooperatively—across physical, political, legal, social, and sectoral boundaries. In short, we need to build enduring relationships over water: relationships that facilitate creative opportunities for mutual gain; relationships that share benefits equitably and sustainably; relationships that prevent conflicts and resolve disputes (whether over water or other matters); and relationships that foster the dynamic cooperation required to adapt to the changing realities of our world.

## The Challenge of Shared Waters

During a heated debate, a minister asked one of this handbook's editors why a downstream country could not accept a permanent fixed allocation of water. In response, the minister was asked how much money he would need to retire. The minister, seeming at first confused by the question, reflected for a moment, then said: *well, it depends—it depends on how long I'll live, whether I stay healthy or not, how much I may travel, the needs of my children, the state of the future economy, and so on*. When pressed to give a specific number, the minister replied with an extremely conservative estimate based on an assumption that everything would go wrong. After all, the well-being of him and his family was at stake, and he had to protect them. After giving his answer, he recognized why the downstream country was hesitant—how can they commit when so much is uncertain? His goal in the conversation shifted from *what is our share* to *how do we develop a process of working together* that ensures our mutual security as our needs and conditions change.

Water transcends borders, sectors, economies, and political ideologies. *The core challenge is how we meet our current and future needs—in a fair, equitable, and sustainable manner*—in light of increasing pressures (e.g., population growth, pollution, climate change, and potential reparations for past harms). In most cases, we do not know how much water we will have or need in the future. We may have an idea, but the uncertainties associated with changing climate, the development of new technologies (e.g., drought-resistant crops, alternative sources of protein production, and shifting energy generation), and shifting demographics make accurate forecasts difficult.

What we do know is that issues related to availability, access, and allocation of water will lead to competition, and that competition can lead to increasing tensions and possible conflict. These are not well-established causal relationships. Some scholars argued that the civil war in

Syria in 2011 began as a drought-induced water-related conflict. Yet neighboring Jordan suffered from the same drought without the same implications. What is clear is that conflict is multifaceted, and while water may be one factor, many other factors, including social cohesion and how governments respond to a water challenge, are likely larger determinants of the outcomes. We also know that intrastate water conflicts are different than interstate water conflicts. Historically, state-on-state conflicts over water are exceptionally rare, but localized tensions over water within countries may be increasing and, in some cases, may be intertwined with regional water disputes—something we explore in this handbook through case studies.

That said, the world is changing, and the past may not be a good predictor of the future. The rise of authoritarianism and unilateralism, the decline of multilateralism, the changing landscape of finance (away from traditional international financial institutions toward venture capital or self-financing, which are not subject to the same safeguards), and the potential of crossing a climate tipping point which redistributes water across the world may nullify existing agreements and contribute to increased tensions. The nature of conflict also changes as countries move away from overt kinetic conflict engagement to more covert methods intended to disrupt functioning or encourage political change. So, while traditional wars like those envisioned by Serageldin and others before him seem unlikely, the combination of new challenges with declining trust in global norms and the ease of engaging in covert conflicts poses a growing risk. While there is always a risk in generalizing, there are two lessons from the Grand Ethiopian Renaissance Dam: (1) the costs of overt kinetic conflict over water are too high (Egypt, despite the rhetoric, has not launched a military attack on Ethiopia for building the dam— yet) and (2) seeing this, more upstream countries may do what they want and seek forgiveness later.

Not all shared water challenges are alike. Some are simple, where reliable data, strong political will, and a history of cooperation allow for effective management. Others are more complicated, with missing data, competing interests, and unclear cost–benefit distributions that make agreements harder to reach. At the most challenging end of the spectrum are complex water conflicts, entangled with disputes over rights, sovereignty, and security, often exacerbated by weak institutional relationships, historical animosities, and the spread of misinformation or disinformation (Klimes et al. 2023). In many cases, asymmetries in power and capacity further entrench zero-sum thinking, making resolution of water issues difficult. The absence of binding international legal frameworks for shared water resources only adds to the uncertainty, leaving disputes to be shaped by political maneuvering rather than structured governance. Addressing these challenges requires a shift from rigid allocation models to more collaborative and adaptive approaches that recognize the flexible nature of water governance and the evolving realities of cooperation and conflict.

## Why Water Diplomacy?

Can we address an ever-increasing supply–demand gap through the lens of water scarcity? Can we provide access to water in urban slums through the lens of water security? Can we develop adaptation and mitigation strategies for a changing climate through the lens of sustainability?

For each of these questions, some say "yes," some say "no," and others say, "it depends." Of course, it depends. But it depends on what? Why (and how) are we able to arrive at *yes* and *no* answers to the same question? Much of this response variation arises from the human tendency to seek certainty and definitive solutions to complex problems. When cause-and-effect relationships are well understood, we can develop clear solutions. However, for many water challenges, certainty

is elusive—scientific knowledge may be incomplete, our future needs and resources unknown, and stakeholders may lack consensus on what the problem is (or if it even exists), let alone agreement on what actions should be taken to address it.

This is where water diplomacy becomes essential.

As water challenges move from simple to complex, the need for strong relationships increases. In the absence of relationships, conflicting interests often drive actors toward unilateral actions, reinforcing zero-sum dynamics. However, through sustained engagement, stakeholders can move beyond narrow disputes over rights and allocations toward broader discussions of shared interests—including sovereignty, national security, public health, environmental sustainability, social justice, food security, and economic development. These shared values provide the foundation for durable cooperation on governance and management of shared waters.

*Water diplomacy is not a static framework but an ongoing process of building and strengthening relationships, institutions, and agreements that enable cooperative governance.* It integrates scientific rigor with creative problem-solving skill, recognizing that solutions must be tailored to the specific needs, capacities, and constraints of each context.

## What Does This Handbook Offer?

This handbook brings together the latest insights from water diplomacy thinking and practice. It is grounded in practical tools, techniques, and advice for establishing and nurturing relationships over water. The handbook offers a creative synthesis of theory and practice intended to support all those involved in water negotiations and dialogue—from engineers and policymakers to negotiators and affected community members—regardless of their background or experience. It does not presume prior knowledge and aims to serve as an accessible resource for anyone, at any stage, who is seeking negotiated resolutions to water conflicts. Its contributors have diverse voices and insights but seek to present those insights in clear, actionable language.

Despite our effort to provide clarity in theory–practice synthesis, be aware that you may not find a simple answer to the water challenge you face. There are no prescriptive guidelines on what you should or should not do. There is no advice that will match your circumstances exactly. Rather, our purpose is to draw upon diverse experiences to help you better understand your unique problem space and inform your own thinking on how you might approach your specific problem. We want to alert you of common challenges and offer tools and techniques for addressing them. We encourage you to view the problem context through multiple lenses. We want to bring you into conversation with a global community of professionals seeking to enhance effective collaboration on the unique water challenges they face. We draw heavily on case studies and examples. This is not because they provide a specific pathway for your problem but because understanding what's worked and what hasn't, where and why, can help shape your own approaches.

Water diplomacy is relevant not only for high-profile transboundary rivers like the Nile, Euphrates-Tigris, or Mekong but also for community-scale water disputes, urban planning, and local governance. That also means it is not merely something that happens in formal spaces between ministries of foreign affairs but also in impromptu spaces where citizens and civic leaders happen to be gathered. Actionable water diplomacy requires collaboration across sectors and scales, from local watershed groups to national governments and international organizations. Our hope is that this handbook serves not only as a reference but also as a catalyst for the kind of relationship-building and collaborative problem-solving that will be essential for sustainable and equitable water governance and management in our interconnected world.

In the following chapters, we will explore the key cross-cutting themes and ideas (Chapter 2) and provide additional guidance on how to effectively navigate the handbook's structure based on your background, expertise, and needs (Chapter 3).

We invite you to join us on this water diplomacy journey of co-discovery, where we seek to resolve water problems that are not only scientifically sound but also socially inclusive, ethically grounded, and politically viable. Through collaboration, negotiation, and adaptive problem-solving, we can navigate the complexities of water governance and build pathways toward sustainable and equitable outcomes.

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# 2

# KEY THEMES, CONCEPTS, AND IDEAS OF WATER DIPLOMACY

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**Key Takeaways**

- The most challenging water problems resist universal solutions, requiring context-specific approaches that acknowledge water as a boundary-crossing force connecting natural, political, and societal systems at community, subnational, and transnational scales.
- Water diplomacy is an essential framework that serves three essential functions: addressing water as a source of conflict, promoting water as an incentive for cooperation and peacebuilding, and facilitating adaptive water governance and management in the face of scientific uncertainty and competing worldviews.
- Water diplomacy offers a principled yet pragmatic approach to water challenges by embracing complexity, taking a negotiated approach to problem-solving, and building sustained relationships across boundaries—moving beyond metrics and crisis narratives toward adaptive, collaborative solutions that respect both scientific facts and diverse social values.

## Introduction

The most challenging water problems cross scales and boundaries. These boundaries are not just natural (e.g., between ecosystems); they are also societal (e.g., between cultures and sectors) and political (e.g., between states and communities). Water flows downhill by gravity in one moment, only to be drawn uphill toward money and power in the next. Steam is released from a power plant in one region, only to condense and acidify a sacred river in another. Floodwaters are seen as an agricultural boon by one community, only to be deemed a residential hazard a few kilometers further downstream.

The traditional "water cycle" found in textbooks tells an incomplete story. Water does not just cycle through natural processes; it also transforms as it moves through human systems, shaped by governance, politics, economics, and cultural values. A more comprehensive picture of the water cycle would show the complex couplings that water creates as it crosses natural, societal, and political boundaries. Such couplings are at the heart of many of our most pressing water challenges, but they cannot simply be undone, nor can they be ignored without peril.


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The most well-publicized of these issues arise in the context of managing and governing shared waters on the international scale (e.g., Chapter 44). However, complex couplings are also implicated in conflicts at other scales, from legal disputes arising from the independent management of groundwater and surface waters at the subnational scale (Chapter 48) to community-scale tensions between subsistence farmers and downstream water users (Chapter 49).

At the same time, the boundary-crossing nature of water does not always lead to conflict; it can incentivize cooperation and peacebuilding. For example, enhancing transportation on internationally shared waterways can catalyze regional economic cooperation (Chapter 42). At the subnational level, water markets can incentivize cooperation on pooled risk management and joint investment (Chapter 23). Additionally, the livelihood-driven need to actively govern and manage community-scale water resources can lead to relationships and institutions capable of addressing other collective action problems or even providing temporary cessations of hostility during armed conflict unrelated to water (see Chapter 50).

Whether addressing water as a source of conflict, promoting water as an incentive for cooperation, or just hoping to govern and manage shared water more effectively, we need to be wary of the complex couplings that water creates as it crosses boundaries. It is easy to take actions that have unanticipated consequences, some of which may harm those we hope to serve. Nevertheless, we often can't afford to wait for scientific certainty or political unanimity on the best course of action. So, we must find a middle ground that offers a principled and pragmatic way of moving forward.

Such is the aim of this handbook on *water diplomacy*.

The notion of water diplomacy refers not only to the official state-sanctioned diplomacy that happens in official meetings but also to *being diplomatic* in the ordinary, local, and often informal circumstances in which water is governed and managed. In this broader view, *diplomacy* refers to a problem-solving approach that is both principled (e.g., accepts the rigor and fallibility of scientific methods; rejects options that compromise or ignore values) and pragmatic (e.g., acknowledges that contextual constraints may limit the generalization of solutions; explores negotiated problem-solving methods to resolve conflicting perspectives). This broader notion of diplomacy is aligned with both its traditional and contemporary conceptualizations (e.g., multi-track diplomacy) but extends its reach to problems on smaller scales and in local contexts. In the same vein, we regard water diplomacy as an inclusive interdisciplinary field that bridges institutional governance and operational management of shared waters at every scale, helping to build enduring boundary-crossing relationships that can effectively operate in a changing world.

The urgency of today's water challenges has created the narrative of a "global water crisis," a framing that, while successfully drawing much-needed attention, often overshadows the fact that water problems are inherently local and demand context-specific solutions. More than 150 numeric measures have been proposed to quantify this crisis (Vörösmarty et al. 2005), yet such metrics—e.g., water scarcity indices—offer only broad heuristics, failing to capture the lived realities of those affected. To address water challenges effectively, we must move beyond simplified narratives and embrace the complexity of boundary-crossing problems that resist generalizations and require adaptive, deliberative, and locally grounded approaches.

## Beyond Generalizations

### *A Global Water Crisis*

The opening line of the 2024 United Nations World Water Development Report puts it bluntly: "We are currently facing a water crisis that can be seen and felt in a multitude of ways" (UNESCO

2024, p. xi). UNESCO is not alone in its assessment. More than 1,500 other publications published in 2024 invoked the exact phrase "global water crisis," a 25-fold increase from the year 2000.[1] While not all of these publications promote the global crisis narrative, many take the existence or imminent emergence of a crisis as a given. Many publications locate this crisis at the confluence of multiple global trends (e.g., growing population, changing climate, and deepening inequalities) that we have also acknowledged throughout this handbook.

While these trends are clear, framing water issues as a "global crisis" can be misleading. Water challenges unfold at the community, subnational, and transnational scales, each requiring context-specific solutions. While the rhetoric of a global crisis may attract media attention, real progress depends on targeted, problem-specific engagement at the scale where challenges arise. Instead of debating whether a global crisis exists, water diplomacy prioritizes actionable solutions that lead to meaningful and desirable outcomes for a given problem for a defined set of people.

### *A Closer Look at Water Scarcity as a Metric*

Water scarcity is a widely used concept that seeks to quantify the availability of renewable supplies of water relative to either measured demand or an assumed per capita minimum. Many frameworks attempt to create objective indicators of water scarcity, yet these measures often fail to account for social, economic, and governance factors that influence water access and allocation (Damkjaer and Taylor 2017). The appeal of such a metric is that it might serve as an objective indicator of where water problems might exist (or might emerge) or the inequitable distribution of water resources, enabling evidence- or rights-based prioritization of investments and interventions and enabling us to track progress over time. For example, Target 6.4 of the Sustainable Development Goals aims to "substantially reduce the number of people suffering from water scarcity" by 2030. However, this goal blends objective measures (such as population counts) with subjective terms (such as suffering), making it difficult to implement and assess progress consistently and meaningfully.

Since a numeric quantification of water scarcity is not very compelling on its own, a jump is often made to link *water scarcity* (an objective measure) to its impacts (what is sometimes called *water stress*).[2] However, the consequence of scarcity on individuals reflects a subjective, lived experience rather than something that can be objectively measured. Likewise, while ecosystem responses to water scarcity can be measured, simplistic mappings seldom account for the variation in habitat types, seasonal patterns, and the specific water requirements of different ecological communities.

Nevertheless, indicators of scarcity are often coupled with a mapping of numeric values to descriptive experiences or ecological impacts. This mapping facilitates dramatic statements such as "four billion people facing severe water scarcity." Such headlines are far catchier than the literal meaning of their scarcity indicators; in this case, *4 billion people live in basins where the monthly consumptive demand (i.e., withdrawals that are not returned to the Basin) exceeds 40% of the monthly available surface runoff at least one month a year* (Hoekstra et al. 2012; Mekonnen and Hoekstra 2016). Even the earliest developed water scarcity indicators, such as the still commonly referenced "Falkenmark index," use evocative terms "absolute" and "chronic" to describe the conditions where the *annual renewable freshwater in a region, divided by its total population, is less than 1,000 m$^3$* (Falkenmark et al. 1989).

The disconnect between scarcity metrics and lived experiences becomes clear when we examine specific cases. For example, by many measures, Singapore ranks among the most water-scarce countries in the world, with a meager 110 m$^3$ of renewable freshwater per capita. Yet, the lived experience of Singaporeans is not necessarily one of water *stress*. For example, Singapore

is actively meeting water demand for domestic (i.e., household) use on the order of 143 liters per capita per day (Biswas and Tortajada 2019). While far from reflecting carefree consumption, this means per capita domestic water use in Singapore exceeds that of Denmark (105 liters per capita per day) (DANVA 2022), which has access to nearly ten times Singapore's renewable freshwater per capita at 1,024 $m^3$ per person (World Bank 2021). At the same time, the Democratic Republic of the Congo has nearly nine times the renewable freshwater availability of Denmark at 9,077 $m^3$ per person (World Bank 2021), but only 12% of its population have access to safely managed drinking water services (World Bank, 2022).

You could argue that these are arbitrary examples—and you'd be right. You might also object that these examples overlook other key factors, and that would be precisely the point. No matter how refined, quantitative metrics alone cannot capture the full complexity of water challenges. While such metrics can serve as useful heuristics when applied thoughtfully, they often obscure the deeper social, political, and economic forces that shape water access and allocation. Water diplomacy prioritizes this contextual approach, ensuring that interventions are grounded in local realities, capacities, and constraints rather than relying solely on numerical metrics.

## Embracing the Mess

Most water professionals recognize that they live in a world of messy problems, but too few acknowledge the implications of this mess. When asked to name the most challenging water problems of our time, they will likely answer that *it depends*. It depends on whom you ask, who decides the answer, and why you are asking. Many will acknowledge correctly that *one size does not fit all* but fail to put this thinking into practice. There's often insufficient recognition that water problems evolve in emergent and unpredictable ways, requiring spatially and temporally adaptive interventions. What succeeds in one location may fail in another, and what works today may not work tomorrow as technological capabilities, capacities, constraints, and contexts shift over time. Even the characterization of water problems as "problems" can be problematic since it is generally assumed that "problems" can be solved at a discrete point in time. However, the "problems" we are discussing are seldom resolved with finality and require ongoing management (indefinitely).

Whether by sidestepping difficult stakeholder conversations, rushing to adopt new technologies, or failing to anticipate consequences, many water professionals find themselves caught in recurring traps of complex problems. This is not for lack of effort; these challenges are not easily avoided because of their emergent nature (i.e., arising from unforeseen interactions among complex systems). They may be foreseeable yet unpredictable. The urgency to act often creates a false sense of clarity, pushing us toward seemingly obvious solutions while blinding us to underlying risks. In our haste, we may overlook the long-term consequences of short-term fixes, not only jeopardizing our efforts but also jeopardizing the livelihoods of those we aim to serve. The path forward requires more than technical expertise; it demands humility, patience, and a commitment to collaboration. Only through sustained partnerships and adaptive "learning by doing" can we navigate the evolving complexities of water governance.

Before we dive into some examples of these messy problems, we want to provide a few signposts of cross-cutting themes, concepts, and ideas that you will encounter. The first is that these problems are *boundary-crossing problems*: they arise because water crosses natural, political, cultural, and sectoral boundaries. This framing extends beyond that of *transboundary problems*, which involve administrative borders, to capture the full range of physical, economic, and spiritual transformations water undertakes as it flows from source to sink.[3] Equipped with this broader view, we can see more clearly the complex couplings that lead to *emergent* phenomena

that are not predictable in any meaningful sense. We need to *embrace complexity* in our approach to these problems. Failing to do so is to unnecessarily increase the risk of ineffective, wasteful, or even harmful interventions. However, traditional problem-solving frameworks are often unable to cope with complexity because they often employ a project-based approach that assumes a one-time application of technical expertise to solve a problem. In the face of complexity, the best we can hope for is to institutionalize the relationships required to indefinitely govern and manage the situation adaptively as it evolves.

Rather than seeking a fixed and generalizable solution, we seek a commitment to process—i.e., the establishment and institutionalization of a set of relationships that ensure cooperation and collaboration to deliver sustainable and equitable water outcomes in light of constant change. In this sense, water diplomacy is a *negotiated approach to problem-solving*. As a framework, it is useful not only when water is a *source of conflict* (Chapter 6) but also when water is an *incentive for cooperation* (Chapter 7) as part of broader relationship-building and peacebuilding efforts. It also provides essential tools and techniques for operationalizing adaptive governance and management in the face of scientific uncertainties and interpretational ambiguities (Chapter 36). Despite this common framework, the application of water diplomacy will look different depending on the nature of the problem. One of the biggest defining and distinguishing features is the *scale* at which the problem needs to be addressed. There are no well-defined categories here, but we find it helpful to arrange our thinking in terms of the community, subnational, and transnational scales. Let us proceed with a few examples to understand how these key themes, concepts, and ideas function at different scales in designing and implementing actionable interventions.

### *Sukhomajri: A Story of Evolving Complexity at the Community Scale*

Sukhomajri is a community at the foothills of the Himalayas located in the Panchkula district of Haryana state near Punjab in India. Prior to the 1970s, this poor agricultural community—situated in a semi-arid region with significant climatic variability—primarily relied on rain-fed irrigation. The gradual degradation of agricultural lands was forcing farmers to bring more hill slopes under cultivation and grazing. Consequently, their indiscriminate practices of free grazing and land clearance created a vicious cycle of unending land degradation and poverty. The continued degradation of land and increase in sedimentation created problems downstream through the silting of the man-made Sukhna Lake in the city of Chandigarh (Sukhomajri is about 15 km upstream of Chandigarh, a planned city). During the 1970s, it was becoming clear that the fates of Sukhomajri and Chandigarh were intertwined. The city of Chandigarh was spending over $200,000 per year on dredging operations to keep the Sukhna Lake functional, and this effort was increasing in cost while becoming technologically less effective. In 1975, the city officials turned to the Central Soil and Water Conservation Research and Training Institute.

The Conservation Institute treated the situation as a technical problem of downstream sedimentation and siltation and implemented an engineering solution by building erosion control structures in upstream Sukhomajri. However, this structure was insufficient to handle the increased sediment load from Sukhomajri. The increased load was not because of the topography of the Shivalik mountains but due to the human interventions of the people living in Sukhomajri, which gradually depleted the vegetation due to their unplanned water use. The recognition of this socio-economic factor and its interaction with the topographical factors focused attention on the people of Sukhomajri to solve the problem of siltation. From the villagers' point of view, they saw no reason to be concerned about the deterioration of the Sukhna Lake. Their principal concern was their economic survival, which depended on the continued use of the watershed for agriculture and

animal grazing. This created a bottleneck in terms of what to do and how to find a solution for the dying lake.

The breakthrough came when the Conservation Institute suggested a small earthen dam to control water and sediment runoff that would also create a reliable source of water for the farmers. In essence, farmers, city officials, and the Conservation Institute found an integrated management option of mutual gain that created flexibility in the use of the existing resources, which was negotiated to create opportunities for a mutually beneficial solution. This is an example of recognizing and managing a problem as a coupled and connected system. This change in the framing of the problem led to the need to identify a creative mixture of technical, financial, social, and institutional measures to address the water problem in terms of satisfying the competing and conflicting needs of multiple stakeholders. The initial stages of the project transformed people's lives and enhanced the sustainability of the watershed and ecosystem.

In Sukhomajri, a simple system existed at the initial stage of intervention when sediment accumulation was significantly reduced by building a dam and enhancing water conservation practices. The initiatives were supported by the city, outside funders, and the collaboration of different governmental departments. Following the success of the Sukhomajri model, the Forest Department of Haryana constructed 102 water harvesting structures in 61 villages.

As the Sukhomajri system evolved, more variables came into play—either by extending known causal connections or experimenting with new connections—to make the system more efficient. In systems where interacting variables operate in different levels and domains, their relationship becomes gradually ambiguous and often leads to unpredictable (i.e., emergent) outcomes. These contextual and somewhat unanticipated developments shift the system's underlying dynamics. For example, the increase in the water table from the introduction of the dams drove the introduction of shallow tube wells for farmers to extract water for free. This led them to withdraw from the water user association and its collective decision-making process, which created a revenue issue due to a lack of fees. Furthermore, the over-extraction of groundwater led to the depletion of the source. This development was not intended, nor could it be anticipated when the well-intentioned initial interventions were made. This is when the diagnosis of the dynamics of the underlying system needs to be adaptive by re-examining the efficacy of the initial interventions and exploring other intervention options. Chapter 49 provides more details on this case and how to examine the evolution of a coupled system through the lens of water diplomacy.

### *Groundwater Grab: A Boundary-Crossing Story at the Subnational Scale*

The Great Basin Carbonate and Alluvial Aquifer System (GBCAAS) underlies multiple states in the western United States, including two of its most arid states, Nevada and Utah. This valuable water resource has been the target of rival pipeline development plans to extract and transport groundwater for use in other jurisdictions. These two projects constitute the Great Basin Groundwater Grab. The first of these is the Southern Nevada Water Authority's Groundwater Development Project. First proposed in 1989, the project proposed drilling dozens of wells in rural areas of Nevada and pumping the extracted groundwater to the city of Las Vegas through more than 400 km of pipelines. The project, estimated to cost $15 billion, was canceled in 2020 after $330 million was spent on planning and permitting. In Utah, the Central Iron County Water Conservancy District's (CICWCD) Pine Valley Water Supply Project seeks to build out $260 million worth of infrastructure to leverage groundwater rights that it has claimed in neighboring Beaver County. The project would extract 18 million cubic meters of groundwater annually from 15 production wells and pump through 113 km of pipeline to serve Cedar City and neighboring rural communities in the

CICWCD. The CICWCD first filed applications to appropriate the water in Pine Valley (Beaver County) in 2006, but the Utah Division of Water Rights did not approve the rights until 2014.

The complexity of the Great Basin Groundwater Grab can then be seen as arising from its boundary-crossing nature. As water crosses physical boundaries (e.g., aquifers), political boundaries (e.g., jurisdictions), and community boundaries (e.g., cultures and sectors), it is transformed, whether that is in terms of its quality, its ownership, or its role as a sacred object or agricultural input. While states have established agreements like the Colorado River Compact to share surface water across borders, no similar agreements exist for aquifers that cross state lines. While the US's western states generally follow the Prior Appropriation Doctrine (*first in time, first in right*), every state has unique water rights enforcement. Groundwater rights in the region cut across a kaleidoscope of property ownership, including federal, state, tribal, municipal, and private lands that intersect with national parks, wildlife refuges, and large agricultural holdings of the Church of Jesus Christ of Latter-day Saints. Indigenous tribes throughout the western United States hold their own water rights, established through various treaties and compacts. Both projects threaten to worsen the conditions of several groundwater-dependent systems, such as the Great Salt Lake, which are already at historically low levels. Tribal governments have raised concerns about impacts on sacred lands, particularly the Bahsahwahbee (home to groundwater-dependent swamp cedars), and agricultural communities worry about their water rights and livelihoods. There is ongoing scientific debate about the impacts these projects would have. The hydrogeologic complexity of the GBCAAS means that rigorous, good-faith scientific assessments can come to diverging interpretations of the hydrogeology and the hydraulic response to different pumping scenarios. This leads to a situation of "dueling experts," magnifying the uncertainties about the *scientific facts* of each case.

However, the problem is not simply about the uncertainties of *scientific facts*; it is also about the *social facts* and the ambiguity that arises when these are in conflict. Social facts are those that are true within particular social, cultural, or institutional contexts. These differ from opinions because they emerge from and are sustained by established social practices, legal frameworks, and cultural systems rather than individual preferences. *Water is sacred. Water is a commodity*. *Water is a public good*. *Water is owed to those who develop it first.* Each of these statements is a *social fact* recognized by some communities but not by others. We afford them the weight of *facts* because they structure and constrain social action in ways that are often just as real and binding as physical laws. While scientific facts are contingent on our best understanding of physical reality and the methods we use to study it, social facts are contingent on historical processes through which institutions emerged and evolved. When water cuts across multiple communities and contexts, these facts can come into conflict, creating unresolvable ambiguity about *what is right*.

In complex problems, the best available scientific findings remain uncertain, and the right course of action remains ambiguous. Water diplomacy embraces this complexity by adopting a negotiated approach to action that is both principled and pragmatic. In the case of the Great Basin Groundwater Grab, it means a principled commitment to scientific mediation coupled with a pragmatic approach to "pore space diplomacy," which you can read more about in Chapter 48.

### *Basins in Transition: Transnational Relationship Building after Geopolitical Change*

Another dimension to the boundary-crossing nature of these problems is what to do when the geopolitical boundaries are redrawn. In this section, we will explore several stories of geopolitical change and their divergent outcomes. We begin with the Sava River Basin, a major drainage

basin of South-Eastern Europe with an area of 97,700 km$^2$ and the second largest sub-basin of the Danube. In former Yugoslavia, the Sava River used to be the largest national river, and its water resources were managed at the basin scale. However, the geopolitical changes in the region in the early 1990s transformed the Sava into an international river to be shared by multiple independent countries: Bosnia and Herzegovina, Croatia, Slovenia, and the Federal Republic of Yugoslavia, which was further divided into Montenegro and Serbia.

The Sava River Basin story illustrates that water can incentivize cooperation even in post-conflict situations. The aftermath of the transition from a national to an international basin meant the collapse of the underlying services and infrastructure that supported economic activity and public safety along the river. Infrastructure for monitoring, data exchange, early warning systems, and emergency coordination was now fractured and largely dysfunctional. Unexploded ordnance and damaged ports brought new risks and challenges that made it difficult to leverage the Sava as an inland waterway for the transport of goods. Basin countries saw the economic potential of the river that could be tapped through the restoration of these essential services and infrastructure. Their desire to accede to the EU incentivized them to do so within a cooperative framework that emphasized environmental protection, sustainable use, and joint governance and management.

The signing of the *Dayton Peace Agreement* in 1995 ended the conflict in the region, and attention turned toward the European Union (EU) accession, which became a top priority for all basin countries. The establishment of the Stability Pact for South-Eastern Europe in 1999, at the initiative of the EU, created space to facilitate dialogue between the Sava countries. While facilitated by the Stability Pact, these conversations were sustained in large part by a vision of the mutual benefits that could arise from shared basin governance and management. While initially focused on the rehabilitation and development of navigation on the river, additional opportunities to serve each country's specific interests became apparent through the evolving dialogues. The enlarged scope included concerns over water quality, environmental flows, flood management, tourism, and hydropower and led to the *Framework Agreement on the Sava River Basin* (FASRB), as well as the establishment of the International Sava River Basin Commission (ISRBC) responsible for its coordination and implementation.

ISRBC serves a dual capacity, providing legally binding decisions on questions of navigation and recommendations on other topics. Recommendations are provided to the Meeting of the Parties, a ministerial-level body that makes the final decisions with regard to the adoption of these recommendations. Decisions of the Meeting of the Parties, as well as decisions and recommendations of ISRBC, are made solely by consensus. The cooperative relationships institutionalized in the FASRB and sustained by the collaborative activities of the parties have led to remarkable accomplishments. The restoration of key infrastructure, such as the Sava River's waterway marking system and the flood forecasting system, has revitalized navigation and improved public safety. Maintaining the flood forecasting system requires ongoing collaboration and information exchange, including the joint development of geographic information systems, hydrologic and hydraulic models, and joint hydrometric measurements taken at the country borders. With this early warning system in place, ISRBC is now finalizing joint emergency protocols and shifting attention toward other shared concerns, such as sediment management. The steadiness and strength of these relationships have provided the confidence necessary to attract outside funding, sometimes covering as much as 87% of total project costs. You can read more about the Sava River Basin in Chapter 42.

The countries of the Sava are not alone in finding reasons to collaborate in the wake of geopolitical change and shifting political boundaries. Emerging from colonialism, newly independent

countries are faced with questions of how to handle existing transboundary arrangements while asserting their newfound sovereignty. Across post-colonial and post-conflict landscapes alike, engagement in river basin organizations (RBOs) provides a space where countries can express their autonomy while opening the door to the benefits of regional unity. For example, since independence in 1990, Namibia has become a partner in five different RBOs, three of which are described in greater detail in Chapter 53. Other noteworthy examples of basins that have emerged with strong RBOs in the wake of geopolitical change include the Mekong River Basin, the Cuenca del Plata Basin, the Senegal River Basin, and the Lake Chad Basin.[4]

However, other basins have not always taken such a cooperative trajectory after major political changes. This is perhaps not unexpected in cases where transitions occurred more than a century ago, such as in the Helmand and Hari Rud Basins (Chapter 39), which became transboundary after colonial border agreements, or the Tigris-Euphrates which became transboundary after the dissolution of the Ottoman Empire (Chapter 38). However, more recent examples have also failed to achieve the level of cooperation exhibited by the Sava—for example, the Indus Basin after the partition of India (1947) (Chapter 4) or the Jordan River Basin after the creation of Israel (1948) (Chapter 41). Focusing on these more recent examples, we see that complex political tensions, conflicts, and low trust among riparians made transboundary cooperation challenging. As discussed earlier, the Sava Basin adopted a comprehensive legal framework (FASRB) early through the negotiation process and created a joint body (ISRBC) with a mandate for coordination and project implementation. Mechanisms for stakeholder involvement and public participation were built into the framework. The Indus Basin adopted a bilateral Indus Waters Treaty to allocate water between India and Pakistan, with a limited scope focused primarily on water sharing and not a broader integrated framework. No provisions for stakeholder involvement or public participation processes were included. Tensions and disputes between India and Pakistan over treaty implementation remain persistent. On the other hand, there are no comprehensive basin-wide agreements involving all riparians of the Jordan River Basin (Israel, Jordan, Palestine, Syria, and Lebanon). While all three basins were confronted with strained relationships post-partition, only the Sava Basin managed to leverage water as a means of building broader cooperation among basin countries.

Another point of comparison is the Nile River Basin, whose 11 countries have emerged from a patchwork of colonial histories. The balance of power during the colonial era favored downstream control, particularly for Egypt and Sudan. The 1929 Nile Waters Agreement, which was reaffirmed and prolonged in 1959, assumed, and many believe guaranteed, Egypt and Sudan an allocation of the majority of the river's flow and left the upstream countries like Ethiopia, Uganda, and Kenya with little entitlement to the resource. With independence, upstream countries started working to renegotiate or annul these colonial treaties, claiming them to be inequitable to their needs and restrictive of their development goals. Egypt has, however, stridently asserted its "historic rights," citing a near-total dependence on the Nile for agriculture, industry, and domestic use. Still, efforts at collaboration, such as the Nile Basin Initiative (NBI) launched in 1999, reflect a latent desire to create space for productive transnational relationships. The NBI has fostered technical cooperation, data sharing, and joint investment projects through its two Subsidiary Action Programs, which have included hydropower and irrigation schemes that benefit multiple riparians. However, the NBI was established by political commitments from basin water ministers rather than a formal treaty. From the start, the NBI has been framed as a "transitional" arrangement toward a formal cooperative framework that would provide a more permanent and legal basis. The development of a formal Cooperative Framework Agreement has been underway for decades and has been ratified

by a majority of basin countries. However, because of the Agreement's potential impacts on existing water allocations, Egypt and Sudan have refused to be parties to the Agreement, leaving the future of the Basin's cooperative relationships uncertain.

## Key Themes, Concepts, and Ideas: A Closer Look

In this section, we take a closer look at the key themes, concepts, and ideas that shape water diplomacy, examining how they manifest across the three scales discussed earlier. As you navigate the handbook, we encourage you to engage with these themes critically, considering how they apply to your specific challenges. The goal is not to prescribe universal solutions but to provide insights that can be adapted to diverse contexts. Pay close attention to how these concepts unfold in different chapters, as they offer practical guidance for developing actionable, context-specific strategies in operationalizing water diplomacy.

### *Boundary-Crossing Problems*

The most challenging water issues arise as boundary-crossing problems, where water moves between natural, political, and societal systems, creating tensions and opportunities at multiple levels. Boundaries are often understood in terms of geography, such as the division between watersheds or administrative borders. However, boundary-crossing problems are not solely defined by physical or political boundaries. They also extend to cultural, economic, and institutional domains, where different stakeholders hold competing values, rights, and priorities regarding water use, governance, and sustainability.

The Sukhomajri case illustrates how local ecological boundaries intersect with socioeconomic systems. Initially framed as a technical issue of sediment control, the problem was soon recognized as being deeply embedded in land-use practices, governance structures, and economic survival strategies. What started as an environmental management challenge became a negotiated process of aligning the interests of upstream villagers and downstream urban stakeholders, showing that water's impact does not stop at ecological or administrative lines—it influences livelihoods, governance, and cooperation at multiple levels.

Similarly, the Great Basin Groundwater Grab highlights how hydrological, political, and social boundaries are interwoven in groundwater conflicts. While aquifers do not respect state or jurisdictional lines, governance structures do, leading to contested claims over extraction rights and resource sustainability. The challenge here is not only scientific uncertainty about groundwater depletion but also the competing legal, economic, and cultural interpretations of water—as a sacred resource for Indigenous communities, a commodity for urban growth, or a shared public good. The dispute underscores how boundary-crossing problems demand negotiation between multiple worldviews, not just between governments or water agencies.

At a broader scale, basins in transition, like the Sava River Basin, demonstrate how political fragmentation reshapes water governance. Once managed as a national river within Yugoslavia, the Sava became an international waterway shared by multiple newly independent states after the breakup of the country. The challenge was not only rebuilding water infrastructure but also reconstructing relationships and institutions that had been dismantled by geopolitical change. The successful transition of the Sava from a fragmented, post-conflict system to a cooperative framework required crossing historical, political, and institutional boundaries, showing how water diplomacy can be a means of fostering stability and cooperation across contested spaces.

Across these cases, a common theme emerges: water is not just a physical resource but a boundary-crossing force that shapes and is shaped by human interactions. *Whether at the community, subnational, or transnational scale, water diplomacy must address not only the movement of water itself but also the movement of ideas, policies, and values that influence how water is governed.* Recognizing and navigating these overlapping boundaries is essential to crafting scientifically credible, politically feasible, and socially equitable outcomes.

### *Embracing Complexity*

The boundary-crossing nature of many water challenges leads to a complex coupling between natural and human systems. Roughly speaking, we are referring to the traditional distinction made between systems governed by invariant physical laws (natural systems) and those involving norms and behaviors (human systems). For all of human history, water has connected natural and human systems. However, we have primarily treated these as coexistent but separable concerns when managing and governing water. A growing body of literature on the coupling of natural and human systems suggests that this assumption of separability is misplaced and increasingly untenable.

With greater and greater frequency, scholars and practitioners are identifying phenomena that defy the dichotomous description of natural or human. These phenomena also resist description by parts: they cannot merely be "built up" from natural or societal components. In short, such phenomena are said to be *emergent*, a defining attribute of the behavior of *complex* systems, where cause–effect relationships are ambiguous and non-prospective, and predictive uncertainty is often broad and irreducible. Traditional problem-solving approaches, which rely on purely technical solutions, frequently fall short when confronted with the complexity of water governance. Embracing complexity requires moving beyond rigid frameworks and embracing adaptive, negotiated approaches that account for uncertainty, competing interests, and shifting environmental and political conditions.[5]

The case of Sukhomajri demonstrates how an initially simple technical intervention—reducing sedimentation to protect downstream infrastructure—evolved into a much more complex challenge. The project began with an engineering solution, but as the social and economic dimensions of the problem became apparent, the focus shifted toward engaging local communities in co-managing the watershed. Over time, new, unforeseen challenges emerged, including the overuse of groundwater due to increased availability. The situation in Sukhomajri underscores how water problems cannot be addressed with static, one-time solutions. Instead, they require continuous monitoring, adaptation, and renegotiation as conditions change.

The Great Basin Groundwater Grab illustrates complexity at the subnational scale, where hydrological uncertainty is compounded by legal, economic, and cultural tensions. Scientific assessments of groundwater availability vary widely, creating a situation where different stakeholders can produce conflicting expert opinions to support their positions. The problem is not just about understanding the physical properties of the aquifer but also about navigating the social and political dynamics that influence decision-making. Indigenous communities, environmental groups, and water utilities all hold different perspectives on the role of groundwater—whether as a sacred entity, a commodity, or a shared public good. This case highlights the need for adaptive governance approaches that do not assume a single correct answer but instead facilitate ongoing negotiation and knowledge-sharing among stakeholders.

At the transnational level, the Sava River Basin case demonstrates how complexity emerges when political change disrupts long-standing water governance arrangements. The fragmentation of Yugoslavia transformed the Sava from a national river into an international one, requiring the

creation of new governance structures among newly independent states. The establishment of the ISRBC was not a simple or immediate solution but rather the result of sustained negotiation and institution-building over time. The case illustrates how embracing complexity means recognizing that solutions to water governance issues are often incremental and require long-term investment in relationships, trust, and cooperative frameworks.

*These examples show that embracing complexity is not just about acknowledging that water problems are difficult—it is about developing governance approaches that are flexible, inclusive, and responsive to changing conditions.* Rather than seeking definitive, one-size-fits-all solutions, water diplomacy focuses on building adaptive institutions and fostering relationships that can evolve alongside the challenges they aim to address.

## *Diplomacy as Negotiated Problem-Solving*

Traditional problem-solving frameworks are adequate to address many simple or even complicated water problems where reasonable scientific certainty and consensus about appropriate interventions exist. However, many of our most challenging complex water problems arise in complex contexts that lack scientific certainty and societal consensus. Addressing these challenges requires a negotiated approach to problem-solving that involves interdisciplinary collaboration, fact-value discussion, and joint fact-finding with a broad array of stakeholders. This approach must recognize the uncertainty and limitation of *scientific facts,* which often offer us a fuzzy picture of what the future *could* be, as well as the ambiguity of *social facts*, which often offer competing visions of what the future *should* be. Since robust management in complex contexts requires ongoing re-evaluation and adaptation, these stakeholder collaborations must be sustained long after initial agreements are reached. In other words, they require us to establish cooperative or collaborative *relationships* that are not simply transactional or project-based. Traditional reductionist and expert-led problem-solving frames are often inadequate and counterproductive in such situations. Water diplomacy is a framework that aims to address this shortfall.

Water diplomacy adopts a notion of *diplomacy* that extends beyond the official state-sanctioned diplomacy that happens in formal meetings and is inclusive of *being diplomatic* in the ordinary, local, and often informal circumstances in which water is contested. Here, diplomacy describes a negotiated approach to problem-solving that is both principled and pragmatic. Water diplomacy is *principled* because it rejects options that entail a compromise of *values*; it is *pragmatic* because it recognizes that actionable outcomes may entail compromises in *positions*; and it is *negotiated* because it identifies acceptable interventions through inclusive dialogue. In this sense, water diplomacy adopts a middle path in addressing complex water problems, avoiding uncompromising dogma on the one hand and the uncontextualized application of science and technology on the other hand. It recognizes both the objectivity of scientific methods and the plurality of subjective interpretations while seeking actionable outcomes consistent with local capacities, constraints, and cultural values.

## *One Framework, Three Uses*

### *Address Water as a Source of Conflict*

Water diplomacy finds its most immediate application when water is a source of tension or conflict (as in the Great Basin Groundwater Grab). For example, conflicting priorities for water use can lead to *value conflicts*, disproportionate harm borne by marginalized communities can

create *identity conflicts*, and disagreement over water rights can lead to *distributional conflicts*. In these cases, water diplomacy is motivated by the notion that sustainable and equitable resolutions to these water conflicts can best be addressed through a negotiated problem-solving approach.

### *Promote Water as an Incentive for Cooperation*

Water diplomacy is also useful when water is an incentive for cooperation (as in the post-conflict restoration of the Sava). Even in cases where water is not intrinsic to an ongoing or recent conflict, introducing water-based incentives into negotiations can offer expanded opportunities for cooperation. Water is a flexible resource that is connected across sectors and subject to seasonally changing availability and demands. Creative options that leverage these factors can incentivize multi-party cooperation within larger peacebuilding processes or even in contexts where conflict is absent.

### *Govern and Manage Water Adaptively*

Complex water challenges are rarely resolved with finality and often require an ongoing process of adaptive water management and governance (a need that was eventually realized in Sukhomajri). Such processes must often proceed in light of deep uncertainties about the future. Any shared vision for long-term adaptive management and governance must be attentive to a plurality of interests, values, and perspectives, and navigating this pluralism requires the convergence of principles and pragmatism in an inclusive negotiated approach to problem-solving.

## ***Scales***

Water diplomacy provides a flexible framework for addressing complex water challenges across different scales, from international negotiations to local disputes. It applies to transboundary conflicts between nations, resource allocation tensions within a state, and even the competing needs of endangered species and Indigenous communities. While the lessons of the water diplomacy framework remain consistent, their application varies based on scale, context, and stakeholders involved.

Rather than rigid classifications, we use transnational, subnational, and community scales as a way to organize case studies and structure guidance throughout the handbook. Transnational issues often involve multiple sovereign states navigating political, legal, and environmental complexities. Subnational challenges emerge within a country's administrative boundaries, often requiring coordination across sectors and jurisdictions. Community-scale problems, though localized, can reflect broader governance tensions and provide insights into developing adaptive solutions. Recognizing these interconnected scales allows for a more nuanced approach to water diplomacy, ensuring that strategies are tailored to the realities of each problem context.

## Seven Propositions

We hope you would agree with us that despite significant differences in their scales, context, and dynamics these cases illustrate that *context matters* and *no one-size-fits-all intervention exists.* Sadly, such a diagnosis – although pervasive among water users, producers, and decision-makers – is not useful in arriving at actionable interventions. Without a shared understanding to organize

findings, isolated knowledge does not accumulate. We close this section with seven propositions that synthesize the theory and practice of water diplomacy to achieve desirable outcomes.

1 Acknowledge water access, allocation, and use problems arise from the coupling of natural and human systems. For these problems, observation-based technical (what is) cannot be easily separated from the value-based sociopolitical (what ought to be) plurality of the problem description.
2 Recognize that water problems cross boundaries, scales, and sectors. Categorize water problems as simple, complicated, and complex.
3 Appreciate that a definitive solution space for these problems – with interdependent variables, processes, agents, and institutions – can't be pre-stated and, in fact, may never be known. Dichotomous representations (numbers or narratives; facts or values; objective or subjective) of these problems are inadequate.
4 Differentiate and clarify the sources of uncertainty and ambiguity that are influencing the decision-making and search for the enabling conditions, rather than a root cause or causes, for emergent patterns.
5 Explore and adapt shared vocabulary and methods from appropriate disciplines and domains that are rooted in and bounded by scientific rationality and interpretive plurality.
6 Synthesize scientific and social facts. Leverage the rigor of scientific methods as the principle to derive scientific facts while adhering to a negotiated application of sustainability and equity as guiding values to design and implement pragmatic interventions that align with social facts.
7 Develop and institutionalize a process to identify, implement, monitor, and adapt technologically efficient, societally relevant, ethically responsible, and politically feasible solutions given the context, constraints, and capacity of a given water problem.

Not all of these propositions may resonate equally with your current challenges, but we encourage you to revisit them as you engage with the key themes, concepts, and tools in this handbook. Over time, as your understanding deepens and your experiences evolve, these propositions may take on new significance, offering fresh insights and practical strategies for navigating complex water issues. Our goal is to provide a foundational framework that adapts to diverse contexts rather than prescribing fixed solutions. In Chapter 3, we outline the structure of the handbook and offer guidance on how to tailor its use to your background, expertise, and the specific problems you seek to address.

## Notes

1 As indexed by Google Scholar in early 2025.
2 Note that the terms "water scarcity" and "stress" are often used interchangeably but at other times are explicitly distinguished. In some contexts, stress is used to describe a *degree* or *kind* of scarcity. At other times, as we are using it here, stress refers to the impact of scarcity (sometimes combined with other factors) on people or the environment. In some cases, the words are used in an opposite sense altogether. The risk of leaving the terms undefined or using them interchangeably is to mistake a quantifiable measure of relative water availability with the subjective experience of communities or the distinct needs of diverse ecosystems.
3 Importantly, we are not attempting to redefine the meaning of the word "transboundary." The use of this term throughout this handbook is generally consistent with its common use to describe water that crosses or is shared by multiple administrative units. Usually, these administrative units are countries, but at smaller scales, *transboundary* is sometimes used to describe water shared between subnational states (e.g., Chapter 48) or municipal jurisdictions. In those cases, we believe the word's intended meaning

is clear in its contextual usage. When referring to concerns beyond formal administrative units, we use "boundary-crossing" as the broader, more encompassing term that includes natural, political, cultural, and sectoral boundaries. For additional discussion, see the Glossary.

4 We should note that not every basin's RBO includes all riparians. For example, China and Myanmar are not members of the Mekong River Commission, but they have sometimes joined in the Commission's dialogues.

5 Note our use of *negotiated* seeks to describe a mode of problem-solving that recognizes the inability of top-down, prescribed, or unilateral action to address complex problems. While it does not exclude formal state-sanctioned negotiations that might happen among diplomats, our use of the word *negotiated* is broader, encompassing the continuous process of collective sense-making, trust-building, and adaptive collaboration required to address boundary-crossing water problems. Often, there is neither scientific, societal, nor political agreement on the best course of action. Of course, parties can act unilaterally on their desires and beliefs, or they can try to convince others that they are right. However, this can lead to short-sighted action on the one hand or indefinite delay on the other hand. Rather than act alone or try to reach unanimity, we suggest that inclusive dialogue can help clarify the space of plausible, acceptable interventions and help build the relationships necessary to implement and adapt them to ever-changing circumstances. We describe this process of deliberation and adaptation as a *negotiated* approach since it involves ongoing exchange, accommodation, and mutual adjustment among diverse stakeholders with varying perspectives, priorities, and forms of expertise.

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# 3

# NAVIGATING THE WATER DIPLOMACY HANDBOOK

*Shafiqul Islam, Kevin M. Smith, Martina Klimes, and Aaron Salzberg*

**Key Takeaways**

- This handbook is intended to be a helpful reference; we do not expect you to read it cover-to-cover.
- This chapter offers pathways to navigate this handbook—"Working Together" and "What Matters and Why"—that allow you to quickly access relevant content based on your role in water diplomacy or the specific challenges you face.
- The "Working Together" pathway describes the handbook's content in terms of how it can help you work more effectively with four key water diplomacy communities: the knowledge community, the decision-making community, the resource community, and the impacted community.
- The "What Matters and Why" pathway organizes chapters around the critical factors that influence water diplomacy outcomes, including flexibility, process design, shared heritage, and divergent worldviews, making extensive connections to the handbook's case studies.

## Overview

This handbook brings together actionable insights from water diplomacy thinking and practice. It builds on guiding principles and processes, practical tools, techniques, and advice for establishing and nurturing relationships to govern and manage water. Our motivations for writing it are provided in greater detail in Chapter 1. Designed as an accessible reference for anyone seeking negotiated resolutions to water problems and dialogue opportunities—whether at transnational, subnational, or community scales—it fills the gap left by publications that address these issues primarily at a theoretical level. Our approach is deliberately practice-oriented in content and structure. We proceed from the recognition that water problems often resist universal solutions. Instead, we emphasize how context shapes the space of actionable strategies in each instance.

We see water diplomacy as a domain of actionable knowledge that will continue to evolve and adapt to address changing challenges, so our aim was not to create a final volume on water diplomacy that was definitive or comprehensive. Instead, we have prioritized topics and voices that we felt were lacking elsewhere and have assembled them into what we believe can be the foundation of a living resource, as described in greater detail in Chapter 4. The handbook's structure

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*Table 3.1* Overview of handbook structure and the primary purpose of each section

| *Sections* | *Purpose* |
|---|---|
| Overview | Articulate the urgent need for actionable water diplomacy in improving water management and addressing water challenges, and champion the creation of accessible, living resources that capture case studies and disseminate evolving knowledge on water diplomacy through theory-practice synthesis. |
| Themes, Concepts, and Ideas | Equip readers with the foundational knowledge and shared vocabulary essential for effective collaboration in water diplomacy and enable them to delve deeper into this handbook's resources. |
| Challenges | Identify and analyze common obstacles encountered throughout the lifecycle of a water diplomacy process. |
| Tools | Present practical tools for effective water diplomacy, detailing their application in appropriate contexts. |
| Perspectives | Showcase diverse viewpoints on water diplomacy from different backgrounds, including international and humanitarian law, non-governmental and intergovernmental organizations, engineering, hydrogeology, and social sciences. |
| Case Studies | Illustrate real-world applications of water diplomacy tools and address specific challenges organized by scale: transnational, subnational, and community. |
| Reflections | Offer insights and lessons learned from experienced ministers, diplomats and practitioners, which are particularly valuable for young professionals or those considering a career path dedicated to seeking negotiated outcomes to water and other related resource challenges. |
| Annotated Glossary | Clarify commonly used terminology related to water issues, acknowledging the diverse backgrounds of contributors and readers. |

combines a broad introductory survey with concise topical chapters contextualized by a series of case studies. The purpose of each section is provided in Table 3.1. However, the book is intended to be a reference, not as a textbook to be read sequentially, cover-to-cover. In support of this vision of being a practical reference, this chapter is dedicated to helping you efficiently navigate the handbook and find the resources you need.

## How to Navigate through This Handbook?

Water diplomacy requires navigating complex, boundary-crossing problems that operate across different scales and sectors, involve diverse stakeholders, and evolve under conditions of uncertainty. This handbook is designed to help readers identify actionable insights for their specific water challenges, whether they involve competing and conflicting needs, cooperation, or other governance and management issues.

Rather than following a linear structure, this handbook allows readers to engage with content in two distinct but complementary pathways. The first is anchored in the interdisciplinary nature of water diplomacy and reflects the diversity of its audience. This pathway, called *Working Together*, suggests chapters based on your role in a water diplomacy process, as well as the roles of those you need to collaborate with. The second pathway is grounded in the context-dependent nature of complex water challenges. This pathway, called *What Matters and Why*, organizes chapters, especially the handbook's case studies, based on general themes that were important to a particular water diplomacy context.

- Are you focused on your role in a water diplomacy process and how to collaborate with others? → Follow the *Working Together* pathway.
- Are you trying to understand the key themes that shape water diplomacy and how they influence outcomes? → Follow the *What Matters and Why* pathway.

These two pathways are not mutually exclusive—many readers will find value in exploring them simultaneously. We begin with an overview of the handbook structure and the primary purpose of each section.

## Pathway 1: Working Together

We noted in Chapter 2 that many water issues are boundary-crossing in nature. As it flows, water cuts across political jurisdictions, cultural contexts, sectoral and economic interests, and natural systems alike. Effective, equitable, and sustainable solutions to challenges arising from this tangled web of coupled interactions cannot be addressed by one group working in isolation, regardless of whether you define that group by its shared knowledge, interests, or authority. Achieving positive outcomes for these kinds of problems requires:

1 Leveraging the best available scientific information while understanding and being clear about their limits.
2 Designing and implementing a problem-solving process that synthesizes scientific and social facts to build political will for achieving desirable outcomes.
3 Gathering resources to support the process while recognizing how local capacities and constraints will shape the discourse and implementation.
4 Engaging broadly with all impacted groups to identify actionable interventions that are responsive to their divergent interests and consistent with their values.
5 Implementing interventions with plans, procedures, and agreed-upon metrics to continuously monitor, reassess, adjust, and adapt to changing circumstances to achieve desirable outcomes.
6. Institutionalizing cooperative relationships and actions within agreements, arrangements, and governing institutions.

In short, water diplomacy is both problem-focused and process-oriented. It requires the creation of an enabling environment that allows us to work together across our differences and backgrounds to address shared challenges. The nature and intensity of these interactions will depend on the type of problem (simple, complicated, and complex) to be addressed, the stakeholders themselves, as well as the maturity of the negotiated process of problem-solving (Smith and Islam 2019).

### *Four Communities*

Water diplomacy is not just about technical expertise—it is a collaborative process that requires engagement across different stakeholder groups. The *Working Together* pathway focuses on four key communities that play distinct but interconnected roles in water diplomacy in achieving the six requirements outlined above. The first is the *knowledge community*, which comprises experts who can contribute to scientific, legal, or process knowledge; research; technical analysis; and stakeholder education. The second is the *decision-making community*, which is made up of those often with the process experience and with the authority to create and prioritize policy, make decisions, and establish formal arrangements, agreements,

or regulations. The third is the *resource community*, which encompasses all who want to bring resources to the table to support water diplomacy processes. The fourth is the *impacted community*, that is, those who will be affected by the decision and will ultimately need to adapt to any implemented changes.

Note that we use the word *community* to describe a broad category of actors and organizations involved in water diplomacy rather than rigidly defined homogeneous groups. We acknowledge these are not monolithic groups, and we expect variations within groups and between groups for these communities. For example, within the *impacted community,* there may be distinct groups with divergent interests. Nevertheless, as a community, they are collectively characterized as a group that is impacted by the outcomes of an intervention, albeit to different degrees. Our goal is not to define strict or theoretical categories but to clarify commonalities in backgrounds, motivating factors, and the roles played in water diplomacy processes. When trying to identify your membership within a community, you may feel like you are affiliated with more than one. Our approach does not exclude such a possibility, and you are welcome to place yourself into multiple communities when navigating the handbook.

However, we expect that when you think about a particular water diplomacy process, you will likely find yourself more solidly in one "primary" community than another. Likewise, when you are thinking about the groups you need to work with and how to approach them, we believe it is helpful to be able to paint, in broad strokes, the backgrounds, motivations, and roles of those you will be working with. The nature and intensity of your engagement with these groups will vary depending on the specific goals to be achieved and the stage of the water diplomacy process. However, successful collaboration requires understanding how to engage effectively with other communities and within different groups in your primary community.

**Which Community Do You Belong to?**

- *Knowledge Community:* You generate and analyze information that informs water decisions. (Scientists, engineers, economists, analysts, legal experts, and so on)
- *Decision-Making Community:* You hold decision-making authority, power or influence in decision-making processes. (Ministers, bureaucrats, policymakers, judges, diplomats, etc.)
- *Resource Community:* You provide funding, infrastructure, or logistical/process support. (Development banks, investors, NGOs, technical assistance providers, so on)
- *Impacted Community:* You are directly affected by water decisions and must advocate for your needs. (Local communities, Indigenous groups, farmers, fishers, and so on)

### *Knowledge Community*

The knowledge community serves water diplomacy processes by providing decision support through expert advice, research, and analysis. Its members include scientists (natural, social, and political), engineers, economists, lawyers, strategic consultants, analysts, and technologists. The knowledge community itself tends to be fractured along tight disciplinary lines, and members of the knowledge community often struggle to communicate and work with one another across these disciplinary boundaries. Working within their own discipline, they may be less aware and shielded from some of the intersectoral or emergent aspects of complex problems.

If you identify as a member of the knowledge community looking to work effectively with other knowledge community members, we encourage you to pay special attention to Chapters 12 and 37. These chapters challenge the conventional reliance on rigid, cause–effect framings that often

dominate technical approaches to water problems, offering a more nuanced lens for collaboration instead. Chapter 12 clarifies the importance of mapping the problem space collaboratively and helps readers appreciate the distinct attributes and demands imposed by simple, complicated, and complex problem contexts. For example, in complex contexts, causal relationships are not well defined, and desired outcomes cannot be obtained simply by fulfilling a checklist of prerequisites. However, as Chapter 37 outlines, enabling conditions—such as an active recognition of interdependencies, mutual value creation, and adaptive governance—provide a contingent, context-sensitive basis for achieving resilient water outcomes. Together, these chapters provide readers with a shared vocabulary that can help bridge disciplines within the knowledge community and foster collaboration on complex problems.

When working with the resource community, you will often be asked to provide decision support by ranking possible interventions and projects according to specific criteria. As prospective investors in a negotiated process and its outcomes, they want to understand the likely return on their investment in terms of its ability to create and distribute benefits. Chapter 16 clarifies and emphasizes the diversity of potential benefits one needs to consider in a strong analysis. This includes tangible benefits like increased agricultural yield and intangible benefits like improved quality of life. While harder to quantify and value, these intangible benefits can often be the deciding factor in whether to pursue an investment. In addition to the direct benefits that arise from the investment itself, you should also seek to understand potential indirect benefits, such as improved regional stability, that arise simultaneously from the relationships built and nurtured in the negotiation process. You should also be familiar with water markets, discussed in Chapter 23, and the role they play in discussions about distributing resources and costs.

Unlike working with resource communities, where reports may suffice, effective partnerships with impacted communities need to involve active dialogue and engagement. Knowledge community members can benefit from a more nuanced understanding of the theory and practice of knowledge transmission and the importance of properly communicating uncertainty, as described in Chapter 17. As part of your role, you may be asked to faithfully represent the community's qualitative interests in quantitative, technical terms. For example, you may be asked to participate in shared modeling exercises, where you will need to balance your desire for detail and the community's need for accessible representations. As Chapter 21 illustrates, engaging in these exercises can be a rewarding but humbling experience.

Our recommended chapters for the knowledge community are summarized in Table 3.2 as they work together within their community as well as across the other three communities.

### *Decision-Making Community*

The decision-making community is characterized by their capacity to influence the direction and outcomes of a process or an authority they hold that is relevant to a water diplomacy process, often their authority to negotiate and make decisions. Appointed ministers, deputized negotiators, elected representatives, judges, and bureaucrats may be found in this group. To be effective, this community needs to make informed decisions that are defensible to others, especially their superiors, constituents, and other relevant stakeholders. To reach an agreement, they need to build relationships with other decision-making community members representing differing positions and potentially different interests. Those participating in informal diplomacy processes (Tracks 1.5 and 2, Chapter 10), including well-connected individuals without formal roles (retired ministers, advisors, and well-connected individuals), are also part of this community and can play an

*Table 3.2* Chapter recommendations for knowledge community members, categorized by how they can effectively work among themselves and with other communities

| *Knowledge Community Research & Analyze* | *Decision-Making Community Negotiate & Decide* | *Resource Community Support & Invest* | *Impacted Community Advocate & Adapt* |
|---|---|---|---|
| Foster interdisciplinary collaboration and move beyond traditional root cause analysis. | Understand the variety of political actors and the implications of scientific uncertainty. | Develop creative options and investment rationale for both tangible and intangible benefits. | Effectively transmit knowledge and engage stakeholders in active technical dialogues, including modeling exercises. |
| (12) Diagnosing the Problem | (11) Actors | (16) Creating and Distributing Benefits | (17) Knowledge Transmission |
| (37) Enabling Conditions | (14) Scientific Uncertainties | (23) Water Markets | (21) Modeling |

important role in creating an enabling environment or opening communication channels and initiating processes leading to actionable outcomes.

When building relationships or negotiating with other decision-making community members, it is important to understand their motivations. Chapter 24 shows how game theory can clarify our peers' sometimes seemingly paradoxical or irrational actions. It also forces us to examine how our actions, which we believe to be rational, may counter our own interests. Game theory reveals that our intuitions may not be our best guide to finding mutually beneficial outcomes. Fortunately, it also offers insights into a structured approach for discovering mutually beneficial opportunities and building stable and equitable agreements. Such agreements don't necessarily require trust as a prerequisite. Indeed, as Chapter 15 clarifies, distrust can be constructive: it can drive cooperation by pushing parties to codify clear, enforceable agreements that can address uncertainty.

However, to be confident in their decisions, members of the decision-making community need to be sufficiently informed about the consequences of decisions they may face. This includes an appreciation for the nature and risks of any technologies, interventions, arrangements, or agreements that they or others might propose. The knowledge community can be a great resource for this information, but decision-making community members may struggle to interpret the reports and findings of the knowledge community if they lack certain foundational understandings. We recommend Chapters 5 and 32 to ensure that decision-making community members grasp the essential aspects of the water cycle, the technical terms and measures used to quantify and qualify water, and the interconnected nature of atmospheric, surface, and groundwater resources.

Although decision-making community members may have the authority to make decisions, they may not always have the authority to commit the resources required to move a project forward. Organizations within the resource community, especially those with a regional focus, can provide financing and in-kind support. However, decision-making community members need to understand the highly varied structures, capacities, and missions of these organizations. For example, Chapter 35 shares the perspectives of the Organization for Security and Co-operation in Europe (OSCE). OSCE approaches water diplomacy through a security lens and is committed to a particular set of water governance principles. Other organizations may have very different expectations or conditions attached to their support. For example, financing commitments from

*Table 3.3* Chapter recommendations for decision-making community members, categorized by how they can effectively work amongst themselves and with other communities

| *Knowledge Community Research & Analyze* | *Decision-Making Community Negotiate & Decide* | *Resource Community Support & Invest* | *Impacted Community Advocate & Adapt* |
|---|---|---|---|
| Acquire the understanding and language to communicate effectively with water experts. | Appreciate the motivations of other political actors and how trust isn't necessary for cooperative action. | Recognize the diverse structures and expectations of organizations offering resources. | Seek the underlying interests of impacted communities and be aware of disinformation risks. |
| (5) Hydrology Primer<br>(32) Unseen Resources | (24) Game Theory<br>(15) Role of Distrust | (35) Regional Perspectives<br>(23) Water Markets | (22) Mutual Gains Negotiation<br>(18) Disinformation |

international banks have sometimes been contingent on commitments to pricing water resources efficiently. This has come in the form of policy mechanisms such as water markets, which are discussed in Chapter 23, or through privatization.

Ultimately, any decision made by the decision-making community will stand the best chance of long-term success if it satisfies the underlying *interests* of the impacted communities. The stated *positions* of these communities may be impossible to reconcile with any of the possible courses of action. Instead, decision-making community members need to understand and speak to how a particular decision serves the impacted communities' desires, concerns, and needs. This is one of the foundational ideas of mutual gains negotiation, which is explored in greater detail in Chapter 22. While a mutual gains approach is an effective way to build consensus and broad support, care must still be taken in communicating and justifying your decisions to impacted communities. Increasingly, representations made by decision-making communities are twisted by mis- and disinformation. Chapter 18 clarifies these risks and offers strategies to mitigate them.

Our chapter recommendations for the decision-making community are summarized in Table 3.3 as they work together within their community as well as across the other three communities.

### *Resource Community*

The resource community comprises individuals and organizations capable of mobilizing financial, technical, or logistical support to advance water diplomacy processes and their outcomes. This group includes international organizations, international financial institutions, private investors, regional financing bodies, NGOs, think tanks, and technical assistance providers. Their role is pivotal in the entire process lifecycle, supporting the convening of parties, sustaining and managing the process, and bridging the gap between negotiation and implementation, ensuring that agreed-upon solutions are feasible and sustainable. To be effective, members of the resource community must align their investments with the needs of the process while navigating the expectations and constraints of other communities.

Organizations within the resource community often co-sponsor projects and relationship-building initiatives to build political will, pool funds, and share risk. Representatives of these organizations often take on the role of third parties in water diplomacy processes. In doing so, they routinely coordinate representatives from other resource community organizations with different priorities. To work effectively together, they need to understand and clarify their specific

third-party roles and how these roles can support each other in managing a negotiated process. To learn more, we recommend Chapters 10 and 13.

As a member of the resource community, you will be expected to justify prospective investments using the best available data, even when the future is uncertain. You will also need to go beyond those numbers and tell a compelling narrative about how the future could be different. This is where the knowledge community can be helpful by conducting background research, conflict analyses, risk assessments, and scenario planning on your behalf. Chapters 28 and 9 give some ideas of the types of systematic analysis partners in the knowledge community can provide to support investment decisions.

When working with the decision-making community, you must actively build political will if you want to see change. This goes beyond simply supporting negotiated processes and sponsoring events to convene parties; it means incentivizing those with authority to make decisions and commitments to do so. As Chapter 19 explores, there are multiple tools at your disposal. Beyond making funding commitments, you can apply pressure based on emerging international consensus and norms, such as those embodied in the Watercourses Convention described in Chapter 31. Such conventions can effectively motivate action even when few states are formal parties to them, though it's important to recognize their limitations.

One of the most direct ways the resource community engages with the impacted community is by investing in capacity development. Capacity development is a process whereby individuals and groups obtain, strengthen, and maintain the capabilities necessary to set and achieve their own development objectives over time. The needs for specific capabilities will vary by impacted community, but as a good rule of thumb, processes where participants are expected to receive information passively are rarely effective. They also reinforce unproductive power dynamics. We recommend approaches to capacity development that are more participatory and interactive, such as the use of gameplay described in Chapter 26 and the experience exchange approach discussed in Chapter 29.

Our chapter recommendations for the resource community are summarized in Table 3.4 as they work together within their community as well as across the other three communities.

*Table 3.4* Chapter recommendations for resource community members, categorized by how they can effectively work amongst themselves and with other communities

| *Knowledge Community Research & Analyze* | *Decision-Making Community Negotiate & Decide* | *Resource Community Support & Invest* | *Impacted Community Advocate & Adapt* |
|---|---|---|---|
| Clarify how research partners can help undertake risk assessments and scenario analysis. | Discern the limits of international conventions and understand the need to build political will for effective action. | Work effectively with other third parties to support and manage negotiated processes. | Explore creative options for capacity development through experience exchange and gameplay. |
| (28) Conflict Analysis and Climate Risk<br>(9) Water Diplomacy Paths | (19) Building Political Will<br>(31) Watercourses Convention | (10) Third-Party Engagement<br>(13) Managing the Process | (26) Use of Games<br>(29) Capacity Development |

### *Impacted Community*

While all the groups discussed so far may have a "stake" or interest in the negotiated process and its outcomes, the impacted community is distinct since the outcomes of the process—both positive and negative—will directly and materially change some aspect of their lives. Negative impacts can range from increased costs of living to loss of traditional rights or uses or restrictions on livelihood-sustaining activities. Positive impacts mirror these negative possibilities, from greater or more equitable access to water resources, formal recognition and protection of traditional ways of living, and new economic opportunities. Different groups within the impacted community may hold divergent positions on what constitutes a positive or a negative, may have competing interests, and stand to suffer or benefit unequally. Achieving the best possible outcomes requires this community to understand the risks and opportunities presented by each option, advocate effectively for their needs, form effective coalitions and partnerships, and adequately prepare to adapt to the proposed changes.

To advocate effectively for their needs, impacted community members will often need to build coalitions and form lasting relationships. This is especially the case when working with other groups within the impacted community. Moving from the entanglement of competing positions to a clear, unified message can be transformative for the process. The power of the message is further amplified if the community leverages multiple channels of communication, from formal statements to directly engaging the public through, for example, public art exhibitions and demonstrations. These movement-building approaches to water diplomacy are explored in more detail in Chapter 30. However, groups from impacted communities need to continue to effectively work together to monitor, reassess, adjust, and adapt to changing circumstances. They must balance consistency in their commitments—like sustainability and equity—with the need to adapt to a changing world. As described in Chapter 36, principled pragmatism offers a framework for impacted communities not only to advocate for change but also to adaptively manage and govern the resources they share.

Of course, to advocate, manage, and govern effectively, the impacted community needs to be aware of the emerging opportunities and risks to their ways of life. Often, this means quantifying aspects of their lives—like water use and environmental or economic impacts—that were previously unmeasured or implicitly valued. Too often, this quantification comes in the form of desk research conducted by members of the knowledge community. While often well-intentioned, these studies often fail to adequately engage the impacted community in assessing the true costs (economic, social, and otherwise) and designing interventions. Such results are seldom convincing because they lack connection with lived realities and can be easily dismissed as supporting a particular agenda. However, the knowledge community can still be an important asset to the impacted community when the two come together in effective conversation. Such conversations can co-produce shared understandings that would not have been possible by either community in isolation. As described in Chapters 8 and 20, synthesizing lived experiences, local expertise, and cultural norms with the best available science, technology, and analysis techniques can be transformative for impacted communities at every scale.

As an impacted community member, forging relationships with the decision-making community is a smart way to safeguard your interests. However, decision-making community members—whether elected officials, appointed ministers, or career bureaucrats—are often constrained by an existing agenda or mandate. If your concerns are not clearly aligned with this existing narrative, convincing them to champion your cause will be harder, even if they are sympathetic. As a practical concern, you must build narratives around your interests that are politically compelling. As

*Table 3.5* Chapter recommendations for impacted community members, categorized by how they can effectively work amongst themselves and with other communities

| *Knowledge Community Research & Analyze* | *Decision-Making Community Negotiate & Decide* | *Resource Community Support & Invest* | *Impacted Community Advocate & Adapt* |
|---|---|---|---|
| Embrace the transformative potential of knowledge co-production and the value of innovative action at every scale. | Understand your political leverage under international law and the status of water as a human right. | Learn the tradeoffs of engaging organizations and understand their expectations and support for broad stakeholder representation. | Build coalitions to protect your interests and establish lasting relationships for their adaptive governance and management. |
| (8) Scales of Water Diplomacy | (27) International Water Law | (33) Organizations as Third Parties | (30) Movement Building |
| (20) Joint Fact-Finding | (34) Water as a Human Right | (25) Gender Mainstreaming | (36) Principled Pragmatism |

mentioned previously, emerging global norms can be a potent mechanism for increasing political will. Chapters 27 and 34 provide an overview of the status of international water law and the human right to water. As an impacted community, reframing your interests by aligning them with norms like these can create pressure to motivate political action. However, it is not all about wielding a stick; these tools also provide a carrot by offering decision-making community members a convenient and popular narrative they can use to partner with you and support your cause.

Relationships with the resource community can provide the financial and in-kind support required to initiate and sustain a negotiated process, sponsor research and analysis activities, and implement decisions. The involvement of reputable resource community organizations as third parties can lend legitimacy to a process and can attract and encourage other sources of support. However, involving organizations can have drawbacks. The involvement of particular organizations may be met with suspicion or resistance. An organization's mission can be subtly misaligned with your objectives, leading to unanticipated friction late in the process. These considerations are described in greater detail in Chapter 33. As part of your decision to engage with an organization, you should consider their demonstrated support for broad stakeholder engagement, not just their stated policies or expectations. Avoid organizations that treat representation as a checklist and seek those that explicitly support the engagement and mainstreaming of underrepresented groups. More details on how to assess the depth of this representation from the perspective of gender are provided in Chapter 25.

Our chapter recommendations for the impacted community are summarized in Table 3.5 as they work together within their community as well as across the other three communities.

In many instances the lines between these communities can become blurred: the resource community can become part of the knowledge community; the impacted community can become part of the decision-making community; and many other combinations. So, while the above serves as a guide, you may find yourself moving among different communities as your role within a problem-context and problem-solving process shifts.

While the *Working Together* pathway helps identify key actors and roles, the *What Matters and Why* pathway provides insights into factors and conditions shaping water diplomacy. Many readers

will find it useful to explore both pathways to understand who is involved and what key factors and conditions may influence their decisions and expected outcomes. The following section highlights key features of this second pathway and how it shapes water diplomacy processes and outcomes.

## Pathway 2: What Matters and Why

This section offers a second pathway for exploring handbook chapters grouped together based on factors and conditions that may impact the water diplomacy processes and outcomes and the reasons why they may be consequential for a particular case. We begin with the following four factors that appeared frequently in the case studies examined in this handbook. Then, we introduce six other factors (scales, uncertainty, metrics, trust and legitimacy, power asymmetry, and technology and infrastructure) and show how they influence and shape the water diplomacy processes and outcomes.

- *Flexibility and Adaptability:* How do we craft agreements that can adjust to changing natural, societal, and political conditions?
- *Process Design and Management:* What steps enable and ensure that negotiated problem-solving and related processes remain inclusive and effective over time? How do we capture what's been done (i.e., institutionalize progress) in arrangements, agreements, or institutions that preserve commitment, allow continued progress and growth, and ensure sustainability?
- *Heritage and Shared Narratives:* How do we account for historical relationships among stakeholders that shape water diplomacy efforts?
- *Divergent Worldviews and Framing:* How can we reconcile conflicting perspectives on water as an object, a resource, a right, a property, a risk, or a spiritual entity?

Understanding how these factors influence water diplomacy processes and outcomes can help practitioners identify leverage points for intervention and create more durable agreements across diverse contexts.

### *Flexibility and Adaptability Matter*

Flexibility and adaptability matter when it comes to building and sustaining relationships over water. Acts of flexibility ensure acknowledgment of interdependence. When riparians adjust allocations, postpone domestic development milestones, or make their infrastructure available for their neighbors in response to emergent needs, it recognizes the uncertainty within hydrological systems and expresses a recognition of shared vulnerability and hope for collective prosperity. Such acts humanize the relationship and demonstrate that it is not merely a forum for quid pro quo transactions but for understanding and meeting critical needs at critical times. However, these actions also embody the belief that cooperation can be a source of mutual benefit in the future, extending to issues beyond water governance and management. Amidst a background of contention and conflict over other matters, these acts of water flexibility seed the enabling conditions for creating, nurturing, and sustaining lasting relationships: an active recognition of interdependence, a willingness to be adaptive, and a shared vision of mutual prosperity (Choudhury and Islam 2018). These enabling conditions are discussed in greater detail in Chapter 37, while the chapters described below provide specific examples of how flexibility helped sustain relationships.

Our first example centers on the deferred filling of Türkiye's Ilısu Dam on the Tigris River, which is 60 kilometers north of the Iraqi border. The dam was completed in 2018 and was

scheduled to begin the filling phase in March of the same year. However, Iraq depends on the naturally higher springtime flows of the Tigris to fill its own reservoirs and, at the time, was facing a severe drought. Delaying the dam's filling phase would mean a delay in hydropower benefits to Türkiye, potentially on the order of millions of dollars. On the other hand, moving forward with the scheduled filling would come at a real human cost to Iraq. It would also contribute to economic conditions in Iraq that could jeopardize regional trade, of which Türkiye is the primary beneficiary. Ultimately, Türkiye delayed the filling of the dam twice at Iraq's request. Then, once the drought gave way to an extremely wet winter and spring in 2019, Türkiye was able to utilize the filling of the dam to mitigate flooding in Iraq. Chapters 38 and 52 provide perspectives from both countries on this story. While these perspectives differ slightly, both portray these acts of flexibility as beneficial to the relationship between the two countries. In addition, Chapter 15 describes this story in the context of persistent political distrust.

The 1994 Jordan–Israel Peace Treaty offers another example of flexibility in responding to seasonal variability. Jordan faces seasonal water availability that contrasts with its needs: abundant winter flows but critical shortages during the summer growing seasons. Ideally, Jordan would be able to store excess winter flows and release them to meet peak demands in the summer. While Jordan lacked the infrastructure necessary to make this a reality, Israel had ample storage capacity in Lake Tiberias. As a part of the treaty, Israel agreed to divert 20 million cubic meters of winter flow from the Yarmouk River and release an equivalent amount of flow to Jordan in the summer season. This flexible concession contributed to the acceptability of a larger cooperative agreement and improved relations (Susskind and Islam 2012). A Jordanian perspective on this agreement is provided in Chapter 41.

Another example of a flexible approach to storage is the International Boundary and Water Commission's (IBWC) response to the April 2010 earthquake in Mexico. The IBWC is the bilateral agency responsible for carrying out the requirements of the various boundary and water treaties between Mexico and the United States and settling any differences that arise in doing so. When the earthquake struck, it damaged the infrastructure critical to the distribution of the Colorado flows within Mexico. Under existing agreements, the United States had certain obligations to supply water to Mexico based on scheduled requests, and Mexico began to cancel those requests due to a lack of storage or distribution infrastructure. Existing agreements offered no mechanism for Mexico to store its allotted water in US reservoirs when deliveries were disrupted. However, just two months later, the IBWC signed Minute 317, establishing a council with the purview of exploring cooperative actions, including the possibility of allowing Mexico to store water in reservoirs of the United States. This was followed by Minute 318 in December 2010 to adjust delivery schedules in response to the earthquake and led to Minute 319 in 2012, which allowed Mexico to store water in Lake Mead and set guidelines for sharing shortages during low flows, while Minute 323 in 2017 refined and expanded these measures. As Chapter 43 notes, this demonstration of flexibility has led to changes in treaty implementation that "has served the two countries well."

### *Process Design and Management Matter*

The specific ways in which parties engage, communicate, negotiate, and make decisions influence the likelihood of reaching agreements and their durability. That is to say, *process matters*. The dialogue forum and format must be carefully selected. Negotiators need to be well-prepared. Process spoilers must be identified. Appropriate communication channels need to remain open. Stakeholders must be meaningfully engaged. Media relations must be managed. Attention to

these details does not guarantee success, but inattention virtually guarantees failure. The architecture of dialogue shapes outcomes far more than what is commonly acknowledged. When process elements are misaligned with substantive goals, even the most promising negotiations can collapse. Effective processes create spaces where parties can explore interests rather than merely exchange positions. They allow for creative problem-solving while preserving the face of all involved. Properly designed processes build relationships incrementally through joint projects, data sharing, smaller arrangements or agreements before tackling more contentious issues. Chapter 13 provides an overview of some of these critical dimensions to the question of why process matters.

The chapters in Section IX, the handbook's Reflections section, provide additional details on specific aspects of the process. Chapter 51 clarifies the ground rules negotiators can set for themselves and their teams to ensure they are prepared. Chapter 52 details the need to anticipate and mitigate potential process spoilers if they cannot be avoided. Chapter 53 reflects on the value of maintaining open technical communication channels alongside formal and non-technical ministerial communication. Chapter 39 reflects on how and when to expand the scope of the process and the positive and negative impacts it can have. Chapter 54 documents trends in the inclusion of youth voices alongside those from other marginalized groups in stakeholder engagement. It also reflects on the impact of trends in digital communications on media relations and public diplomacy. Attention to all of these process elements is critical. The Silala dispute between Chile and Bolivia exemplifies how deficiencies in the process can undermine attempts to reach agreements and inflict lasting damage to relationships.

The Silala conflict concerns a small but valuable water system flowing from Bolivia to Chile in one of the world's driest regions, complicated by historical tensions, artificial channelization, and competing claims over water usage rights dating back to early 20th-century concessions. In June 2016, Chile initiated a process with the International Court of Justice to rule on the question of whether the Silala was an "international watercourse," a designation that would link it to principles of customary international water law, including equitable and reasonable utilization and the obligation not to cause significant harm. Prior to Chile invoking this judicial intervention, the parties had tried for years to reach a shared understanding among themselves. A draft agreement was produced in 2009 but never entered into force. While it enjoyed some support, there was significant frustration on the Bolivian side about how the stakeholder engagement process had been carried out. Some regional populations felt like they had been inadequately consulted. Others felt like the process failed to acknowledge their historical grievances against Chile's use of the Silala, leading some to resort to hunger strikes in protest. Influential scholars and writers weighed in with their own opinions, stoking discontent. As Chapter 44 notes, the process failures around stakeholder engagement and media management did more than just hinder an initial agreement. The fallout from these failures, including Chile's decision to pursue court proceedings, has likely caused lasting damage that will make future cooperative agreements even more challenging. This case is also discussed in Chapter 31 in the broader context of the UN Watercourses Convention.

Another way that a negotiated process can be undermined is through mistaken sequencing. Effective process design requires careful attention to the choreography of concessions and agreements, especially in package negotiations where multiple issues are linked. Chapter 39 provides an example of this in negotiations between Afghanistan and Iran. When Afghanistan prematurely concluded agreements in the water committee without securing corresponding concessions in other areas, it effectively surrendered its primary leverage. This sequencing error allowed Iran to adopt more rigid positions on security and economic cooperation, knowing Afghanistan had

already committed to water-sharing arrangements. This case study demonstrates the risks that arise when committees are too isolated to effectively link issues. A well-structured process can help ensure progress is coordinated across different negotiating tracks and avoid situations where premature agreements in one area can lead to the effective collapse of broader negotiations.

### *Heritage and Shared Narrative Matter*

Heritage and shared narrative matter to water diplomacy by grounding cooperation in shared values, histories, and identities that transcend political boundaries. In transboundary waters, heritage creates opportunities for mutual recognition and collaborative action while presenting complex challenges when diverse heritage claims compete, or development imperatives threaten cultural connections. Historically, the idea of heritage has often been invoked as a watchword for the need to preserve something that is threatened or restore something that has been lost. However, water diplomacy recognizes the reality of a world in flux and requires a view of heritage that connects the past pragmatically with the needs of the present and a shared hope for the future. The cases below illustrate how this living notion of heritage functions as both a foundation and a catalyst for water diplomacy across diverse contexts. They demonstrate how vital heritage narratives can be mobilized to inspire collaboration, create moments of peace amid armed conflicts, foster solidarity across cultural divides, and be a source of diplomatic revival amid long-standing water disputes. We begin with a look at how water diplomacy efforts regarding Urmia Lake may benefit from a reframing of heritage grounded in a notion of intergenerational justice.

Urmia Lake in northwestern Iran is one of the world's largest hypersaline lakes. The lake and its islands support a remarkably diverse ecosystem. In the warmer months, salt-loving algae transform the waters to vibrant shades of pink while migratory birds such as flamingos, pelicans, and egrets create spectacular displays. The lake attracts tourists, both based on its beauty and its reputation for curative mud and salts. Yet despite its cultural significance and status as a UNESCO Biosphere Reserve, National Park, and Ramsar Convention Site, Urmia Lake has experienced a catastrophic decline in water levels and surface area over several decades. While the lake holds profound cultural values and heritage, human activities emerging from agricultural traditions and development policies have critically diminished its inflows. To date, campaigns to address this issue have focused on ideas of restoration. As Chapter 46 notes, this framing of heritage as the restoration of "what was" has proven insufficient to mobilize needed collaborative action. Instead, the authors suggest reframing heritage through the forward-looking lens of intergenerational justice by expressing a mutual obligation to extend these ecological and cultural relationships with water to future generations. This vision of heritage might better support water diplomacy efforts because it resonates more strongly with cultural notions of justice.

Recent events in Syria's Al-Ghab Plain also demonstrate the value of reframing common notions of heritage. The Al-Ghab is a fertile region fed by the Orontes River. The region's demography includes ancient settlers, Bedouin communities, nomadic fishing villages, and coastal mountain migrants, all with distinct relationships to what might be called a "plural heritage." The ongoing conflict in the region has contributed to the destruction and disrepair of essential water infrastructure through intentional acts, collateral damage, and an inability to perform maintenance safely. However, as Chapter 50 describes in greater detail, some community actors were able to leverage their reputations and identities linked to shared cultural values to negotiate with the controlling parties to achieve temporary improvements on humanitarian concerns, such as reducing kidnapping, facilitating safe border crossing for government employees, and maintaining

irrigation canals. Like the Urmia Lake case study, this chapter invites us to consider that embracing heritage is not simply about limiting change or restoring the past. A living view of heritage allows us to see it as a basis for pragmatic and collaborative community action to meet current needs and build a shared vision of a better future.

The Salween River illustrates another example of plural and living expressions of heritage, both as a source of conflict and as a foundation for cooperation. This 2,820-kilometer river is shared by China, Myanmar, and Thailand and is known by many different local names. The basin represents a complex heritage landscape where indigenous cultural practices, ecological knowledge, and traditional livelihoods have evolved for centuries alongside what is now one of Asia's last free-flowing transboundary rivers. While government narratives frame the river primarily as a hydropower frontier with the potential for dozens of dams, diverse ethnic communities, including the Shan, Karen, Karenni, and others, maintain deep heritage ties that transcend modern political boundaries. This tension has manifested in both violence and resistance, particularly in Myanmar, where dam sites in conflict-affected regions have become entangled with forced displacement, military operations, and ethnic insurgencies. Appeals to heritage from outside organizations have largely reflected a desire to protect the area from further development, as can be seen in the designation of the Three Parallel Rivers of Yunnan Protected Areas UNESCO World Heritage Site. However, as Chapter 40 notes, local NGOs have offered a more nuanced view of heritage as a mechanism for cooperation and water diplomacy. Actions such as exchange programs between communities facing dam displacement, joint protests on the International Day of Action for Rivers, and shared knowledge about traditional river stewardship are contributing to relationship-building across differences. These essential relationships are based on a recognition of mutual vulnerability, the potential for cooperative action, and the possibility of solidarity within a plural heritage.

Recognizing shared heritage can also reinvigorate transboundary diplomatic engagement, as seen in the Sundarbans. The Sundarbans, the world's largest contiguous mangrove forest, spans the lower reaches of the Ganges River delta. While ecologically contiguous, administrative boundaries have fragmented the management of the Sundarbans since the 1947 partition of India. Today, the two sections of the forest are known separately as the Sundarbans National Park in India and the Sundarban Reserve Forest in Bangladesh, both designated as Ramsar and UNESCO World Heritage sites. Among an exceptional array of biological diversity, the forest is home to the Bengal tiger, the national animal of each country, and the forest's dominant and namesake tree species, the Sundari. While the Sundari within the National Park and Reserve Forest are protected from many of the direct human threats posed by coastal development, they remain in decline, suffering from a "top dying" disease and failing to recover from the damage of cyclones. Rising salinity levels—directly linked to upstream water diversions at facilities like India's Farakka Barrage—are fundamentally undermining the ecosystem's resilience. The 1996 Ganges Water Sharing Treaty, which set the terms of these diversions, failed to adequately consider impacts on the Sundarbans. Recognizing the threat to this common heritage, India and Bangladesh reached a Memorandum of Understanding (MOU) in 2011 that recognizes the Sundarbans as a single ecosystem divided between two countries and the need to co-govern and co-manage it as such. As in Chapter 45, this MOU carries a broader significance than just the preservation of the Sundarbans. The acknowledgment of this shared responsibility has opened a space for a more active form of diplomatic engagement on water issues than has been seen by the two countries in the recent past. As the 1996 Treaty approaches renewal in 2026, the hope remains that this appeal to mutual heritage will help sustain the relationships necessary to engage more effectively on a broad range of transboundary issues.

### *Divergent Worldviews and Framing Matter*

Worldview matters in water diplomacy because it shapes how stakeholders perceive water challenges, define problems, and envision the future. The diverse ways water is perceived—as an object made of hydrogen and oxygen, or a sovereign resource, a shared commons, an economic commodity, or a sacred entity—fundamentally influence whether shared waters are seen as an inherent source of conflict, a possible source of mutual benefit through cooperation, or a shared responsibility that the parties have a moral obligation to jointly govern and manage. People's thinking—from religion to science and from values to facts—rests on how they characterize reality and what analogies are drawn to create coherence among the elements of that characterization. These analogies are the basis of concepts that we all internalize and that influence our thoughts and actions.

Whether water is a human right, or a commodity depends not on logic but on the worldview one holds. Both facts and values matter in creating and sustaining these worldviews, and conflicting worldviews cannot be addressed by appealing to objectivity or science alone. Because scientific knowledge is tentative, and values are interpretive, the synthesis of knowledge and values through engaged conversation is essential to effective water diplomacy and finding common ground amid divergent worldviews.

One can think of a worldview as comprising several basic beliefs that are philosophically equivalent to mathematical axioms (e.g., "two points determine a straight line" is a mathematical axiom from a Euclidean worldview). These axioms are foundational; they are taken to be true to serve as a premise or starting point for further reasoning and arguments. Consequently, axioms and worldviews are typically argued *from* rather than argued *for*. For any dialogue among contending parties to be constructive and actionable, we need to have an open conversation about the worldviews each party is bringing to the table. If two different worldviews have sufficient commonalities, it may be possible to have an immediate constructive dialogue between them. Consider the case of the Sava, described in Chapter 42, where compatible worldviews likely helped the parties come together more readily in collaboration, even after violent conflict. On the other hand, if different worldviews are held to be incommensurate, then we need to have a facilitated and negotiated conversation to agree on a shared premise that is mutually acceptable to all contending parties. This shared premise suspends judgment about the truth of various belief systems but focuses on a problem-solving mindset, recognizing that a negotiated outcome may not satisfy either party fully but that it may still produce mutually beneficial outcomes. To have a conversation related to different worldviews, one may start by classifying them into three broad categories: objective, subjective, and intersubjective (Vidal 2012).

To contextualize how facts and values shape worldviews, consider the Groundwater Grab case study presented in Chapter 48 and discussed in Chapter 2. State and municipal entities operate from a utilitarian worldview that prioritizes economic development and population growth, viewing aquifers as exploitable assets rather than an integral part of a connected surface water system with ecological and cultural dimensions. For example, in the United States, Western water rights regimes like Prior Appropriation ("first in time, first in right") both reflect and help sustain such worldviews by granting independent rights to surface and groundwater as resources to be independently appropriated, despite clear hydrological science indicating their interdependence. This worldview promoted resistance to acknowledging this scientific truth, even though it clearly aggravated conflict between water rights holders. Worldviews that see water as properly managed on the basis of legal rights often rely on a judicial appeal to settle such conflicts. A 2024 Nevada Supreme Court ruling sets a new precedent by acknowledging that the state of Nevada

has the authority to manage surface water and groundwater conjunctively. Yet many questions remain unanswered. The ruling outlines what the state can do but provides no guidance on how surface and groundwater should be managed together. What does conjunctive management look like in practice? How would prior water rights be reconciled? This is where water diplomacy requires open conversations about different interpretations of facts and values, the evolving nature of science, and the reconciliation of competing needs.

Such discussions of water rights impact Indigenous communities, especially in the US, who often need to work within such worldviews even though they diverge from their own. This clash between Indigenous and settler perspectives, as detailed in Chapter 47, provides a striking example of how fundamentally different understandings of water create boundary-crossing problems. For Indigenous peoples, land and water are not commodities or bundles of legal entitlements but rather integral to their stories, cultures, histories, and identities. Natural landscapes are held to be as sacred and integral to the spiritual practice of Indigenous peoples as the consecrated human-built structures of the major world religions. Unlike the Western notion of monetary fungibility that often dominates "water value" discussions, Indigenous perspectives emphasize relationships and responsibilities to water that transcend economic considerations. When the Yurok Tribal Chairman described the Klamath River as "our grocery store, our church, and our main highway. It's our lifeline," he articulated a worldview where water is simultaneously a material sustenance, spiritual center, and community infrastructure.

Water diplomacy requires acknowledgment of these differing worldviews not only in abstract terms but also in practical application across scales. As Chapter 7 notes, the likelihood of conflict increases when "the rate of change within a basin exceeds the institutional capacity to absorb that change." This institutional capacity to absorb change depends in large part on whether it is affixed to a particular worldview or is accommodating of conflicting perspectives. This insight helps explain why the Sukhomajri case described in Chapter 49 evolved from success to failure—the system itself transitioned from simple to complex while the dominant worldview still framed it as a simple system. Similarly, Chapter 6's analysis of water conflict pathways illustrates how pre-existing governance and social factors determine whether grievances over water escalate to violence. What these perspectives collectively reveal is that successful water diplomacy depends on understanding different worldviews not just as philosophical positions but as practical frameworks that shape how stakeholders respond to change, from community-level resource sharing to international river basin management. By respecting these pluralistic approaches to water, diplomats can identify intervention points where institutional capacity can be strengthened to match the complexity of emerging challenges.

Readers will find further exploration of worldview considerations in Chapter 8, which examines how the framing of problems impacts collaboration across scales. Chapter 9 emphasizes considering diverse actors, themes, and drivers in water diplomacy processes. Chapter 12 contrasts the objective, particle-based worldview of water as hydrogen and oxygen with subjective, context-dependent worldviews of water as a resource, asking whether water is a human right or property. Chapter 20 discusses how different stakeholders may have different perspectives leading to conflicts over scientific information, noting how "supposedly objective science quickly becomes politicized, with parties marshaling the 'facts' that best support their respective positions." Chapter 37 distinguishes between worldviews focused on causal versus enabling conditions of water problems, highlighting why this distinction matters when addressing complex water challenges. Even seemingly simple questions like "What causes floods?" do not have generalizable answers but depend on the complex interplay between physical and social factors.

Water diplomacy requires us to recognize and honor these different worldviews, not to determine which is "correct," but to create spaces where multiple perspectives can inform a more comprehensive understanding. As we've seen in both the heritage and worldview discussions, successful water diplomacy isn't about imposing a single framework but rather building adaptive approaches that acknowledge the legitimacy of diverse ways of knowing and valuing water. By embracing this complexity rather than simplifying it away, we can develop more resilient, equitable, and sustainable water governance and management through water diplomacy.

Table 3.6 shows different case studies and how they relate to key themes and relevant pathways.

While the *Working Together* pathway helps readers identify key actors and roles, and the *What Matters and Why* pathway explores critical factors shaping water diplomacy processes, an in-depth understanding of water governance requires attention to additional factors that influence

*Table 3.6* Overview of case study key themes and recommended pathways

| *Case Study & Chapter* | *Key Themes* | *Suggested Pathways* |
|---|---|---|
| Türkiye's Perspective on Water Cooperation in the Euphrates-Tigris Basin *(38)* | Transboundary water governance, political cooperation | Working Together (Decision-making & Resource Communities) |
| Afghanistan-Iran Water Negotiations *(39)* | Complexity of transboundary water disputes, geopolitical tensions | What Matters and Why (Divergent Worldviews, Process Design) |
| Salween River *(40)* | Multi-stakeholder engagement, environmental concerns, development pressure | What Matters and Why (Heritage & Shared Narratives, Flexibility) |
| Jordan River Basin *(41)* | Historical agreements, sovereignty, international mediation | Working Together (Decision-making & Knowledge Communities) |
| Sava River Basin *(42)* | Post-conflict cooperation, legal frameworks for sustainable development | What Matters and Why (Process Design, Flexibility) |
| Colorado River Basin *(43)* | Cross-border water institutions, successful diplomacy models | Working Together (Decision-making & Resource Communities) |
| Silala Dispute (Chile-Bolivia) *(44)* | Failed agreements, legal disputes over water rights | What Matters and Why (Divergent Worldviews, Process Design) |
| Sundarbans Mangrove Forest & India-Bangladesh Agreements *(45)* | Upstream-downstream dependencies, environmental conservation | What Matters and Why (Flexibility, Heritage & Shared Narratives) |
| Urmia Lake Restoration, Iran *(46)* | Environmental degradation, adaptive management, stakeholder engagement | Working Together (Knowledge & Impacted Communities) |
| Indigenous Nations & Water Conflicts *(47)* | Indigenous rights, historical injustices, sovereignty over water | What Matters and Why (Heritage & Shared Narratives, Process Design) |
| Great Basin Groundwater Grab *(48)* | Scientific uncertainty, dueling experts, legal ambiguity | What Matters and Why (Divergent Worldviews, Process Design) |
| Sukhomajri Water Management (India) *(49)* | Adaptive governance, community-led water solutions | Working Together (Impacted & Knowledge Communities) |
| Al-Ghab Plain, Syria *(50)* | Heritage-based water diplomacy, conflict-sensitive approaches | What Matters and Why (Heritage & Shared Narratives) |

outcomes across contexts. Beyond the four factors discussed above, water diplomacy is also shaped by scales, uncertainty, metrics, trust and legitimacy, power and asymmetry, and technology and infrastructure. These factors, though implicit in many case studies, deserve explicit recognition as they influence both the dynamics of negotiated problem-solving, efficacy of the problem-solving processes, and the sustainability of agreements for actionable outcomes. The following sections explore how these six factors impact water diplomacy and where they are addressed in the handbook.

### *Scales Matter*

*Why It Matters:* Water diplomacy occurs at multiple interconnected scales—transnational, subnational, and community. Actions at one level often have unanticipated consequences at another level. A failure to coordinate governance across scales can exacerbate disputes and hinder cooperation.

*Key Challenges:* Water agreements negotiated at the national or transboundary level may fail to reflect local realities, leading to ineffective implementation. Conversely, local initiatives may struggle to gain support without alignment with broader policies.

*Examples:* The Sundarbans case (Chapter 45) highlights how scale mismatches between India and Bangladesh complicated conservation efforts in a shared ecological system. Similarly, the Jordan River Basin case (Chapter 41) demonstrates how national agreements overlooked local needs, requiring additional subnational cooperation.

Other relevant chapters:

- Chapter 6: Sources of Conflict (geographical scales)
- Chapter 7: Sources of Cooperation (macro, meso, micro scales)
- Chapter 9: Water Diplomacy Paths Approach (subnational, national, regional scales)
- Chapter 17: Knowledge Transmission (multi-level knowledge transmission)

### *Uncertainty Matters*

*Why It Matters:* Scientific, political, and social uncertainties shape negotiation outcomes. Water availability, climatic variability, and hydrological data are often incomplete or contested, creating opportunities for strategic ambiguity or leading to distrust between parties.

*Key Challenges:* Overconfidence in quantitative models can lead to false precision while ignoring uncertainty can erode trust and prevent decision-making. Effective water diplomacy requires negotiating under uncertainty rather than waiting for perfect information.

*Examples:* The Great Basin Groundwater Grab (Chapter 48) illustrates how uncertainty about aquifer depletion fueled legal disputes and conflicting claims. Similarly, the Silala dispute (Chapter 44) highlights how uncertainty over historical water flows became a point of contention between Chile and Bolivia.

Other relevant chapters:

- Chapter 5: Hydrology Primer (uncertainty in runoff monitoring)
- Chapter 14: Scientific Uncertainty (its role in negotiations)
- Chapter 18: Disinformation (distinguishing uncertainty from ambiguity)
- Chapter 20: Joint Fact-Finding (uncertainty in problem definition)

### *Metrics Matter*

*Why It Matters:* Quantitative indicators—such as water scarcity indices, economic valuations, and treaty compliance measures—play a central role in negotiations. However, metrics often fail to capture the lived experiences of affected communities and can be used to frame water issues in ways that privilege certain interests over others.

*Key Challenges:* While metrics provide structure, they can also oversimplify complex realities and distort decision-making by focusing on what is measurable rather than what is meaningful.

*Example:* The Sukhomajri case (Chapter 49) illustrates how early success metrics failed to account for long-term sustainability, leading to unexpected governance challenges. Similarly, the 1996 Ganges Treaty shows how agreements that meet formal compliance targets can still be misaligned with on-the-ground realities, such as deteriorating ecosystems (Chapter 45).

Other relevant chapters:

- Chapter 22: Mutual Gains (metrics for measuring negotiation success)
- Chapter 31: Watercourses Convention (subjectivity in defining compliance)

### *Trust and Legitimacy Matter*

*Why It Matters:* Trust is a critical enabler of cooperation in water diplomacy. Even well-designed agreements can collapse without trust in the process, data, or negotiating partners. Legitimacy—both of institutions and agreements—is essential for compliance and long-term stability.

*Key Challenges:* Trust is hard to build and easy to break. Historical grievances, misinformation, and opaque decision-making processes can undermine legitimacy, making agreements difficult to implement.

*Examples:* The Indigenous Water Rights conflicts (Chapter 47) highlight how Indigenous communities often distrust formal governance structures due to historical exclusion. Similarly, the negotiations at the Grand Ethiopian Renaissance Dam show how the absence of trust between Ethiopia, Sudan, and Egypt prolonged disputes despite the availability of technical solutions.

Relevant Chapters:

- Chapter 21: Modeling (as trust-building in transboundary negotiations)
- Chapter 35: Regional Perspectives (water diplomacy as confidence-building measures)

### *Power and Asymmetry Matter*

*Why It Matters:* Water diplomacy does not take place on a level playing field—some actors hold more political, economic, or hydrological power than others. These power imbalances shape how water is allocated, who gets a seat at the table, and which solutions are considered viable.

*Key Challenges:* Weaker parties (e.g., small upstream states and marginalized communities) often struggle to have their concerns acknowledged, while dominant actors (e.g., wealthier nations and large development banks) may define water issues in ways that reinforce their control.

*Examples:* The Euphrates-Tigris Basin case (Chapter 38) demonstrates how Türkiye, as the upstream country, has significant leverage over downstream Syria and Iraq. The Great Basin

Groundwater Dispute (Chapter 48) illustrates how urban interests often dominate rural concerns in water allocation decisions.

Other relevant chapters:

- Chapter 11: Actors (power dynamics between actors)
- Chapter 29: Capacity Development (reducing information and experience asymmetry)

### *Technology and Infrastructure Matter*

*Why It Matters:* Infrastructure and technology both may enable and constrain water diplomacy. Large-scale dams, desalination plants, and water transfers shift power dynamics while emerging technologies (e.g., AI-based water forecasting and remote sensing) may create new possibilities for exploring mutually beneficial options.

*Key Challenges:* Infrastructure investments can be used strategically to alter negotiation leverage. Some agreements fail to anticipate how technological shifts will impact future water governance.

*Examples:* The Jordan River Basin (Chapter 41) demonstrates how desalination changed Israel–Jordan water negotiations. The Sukhomajri case (Chapter 49) highlights how community-scale infrastructure transformed governance dynamics.

Other relevant chapters:

- Chapter 16: Creating and Distributing Benefits (infrastructure and technology benefits)
- Chapter 21: Modeling (technology and water diplomacy)

These six additional factors—scales, uncertainty, metrics, trust and legitimacy, power and asymmetry, and technology and infrastructure—are as essential as the four factors explored before. Together, these dimensions provide a comprehensive framework for understanding and engaging in water diplomacy, ensuring that agreements are adaptive, inclusive, and resilient across scales and contexts.

While the *Working Together* pathway helps readers identify key actors and roles, the *What Matters and Why* pathway provides insights into other factors influencing water diplomacy. In many cases, navigating water challenges requires a combination of both pathways—understanding who is involved and what key dynamics shape their decisions. For example, a member of the decision-making community may need to engage with the resource community while also understanding how flexibility and worldviews influence negotiations. Readers are encouraged to explore both pathways in parallel to develop a well-rounded perspective to design and implement interventions for their specific water problem.

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# 4

# A LIVING HANDBOOK

## Connecting Handbook Contents with the AquaPedia Case Study Database

*Melissa Landman and Renata Bolotova*

### AquaPedia and the Water Diplomacy Handbook

AquaPedia is a web-based resource that provides actionable knowledge to resolve water problems worldwide. It was initiated by a group of water scholars and practitioners from across the globe as a part of the water diplomacy initiative (Islam et al. 2010; Islam and Susskind 2012). A key goal of AquaPedia is to create a knowledge repository that can be of value to water scholars, professionals, and users facing complex water problems throughout the world. Over the last decade, AquaPedia has curated several hundred case studies and has been accessed by water scholars and professionals worldwide over 435,000 times.

Likewise, this Water Diplomacy Handbook is envisioned to be an accessible reference for those seeking negotiated resolutions to water conflicts and dialogue opportunities at the transnational, subnational, or community scale. Many publications address these issues only at a theoretical level, but this handbook is practice-oriented in content, structure, and its approach to theory–practice synthesis. This handbook presents the latest insights from water diplomacy thinking and practice. Water diplomacy is an evolving framework for addressing complex water problems at multiple scales – from transboundary water conflicts to distributional inequities within a state to disputes between endangered fish and Indigenous farmers. Here, water diplomacy refers not only to the official state-sanctioned diplomacy that happens in official meetings but also to *being diplomatic* in the ordinary, local, and often informal circumstances in which water is contested. In this broader view, *diplomacy* refers to a negotiated problem-solving approach that is both principled (i.e., rejects options that compromise or ignore values) and pragmatic (i.e., acknowledges that contextual constraints may necessitate negotiation of interests).

The handbook presents a wide variety of cases from different scales and regions. By delving into case studies, one will come across commonalities – knowledge that is generalizable and context-independent of place and time. One may also come across many differences between case studies that are context dependent. For example, a solution that had great success in Bangalore may yield very different results in Boston.

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Of course, as is the case with anything in print, once published, the content written in this handbook will be stuck in time. On the other hand, water governance and management challenges and their effective resolutions will continue to evolve as new information, knowledge, technology, and insights emerge.

This is why we plan to connect the handbook's contents with AquaPedia. The revised version of AquaPedia – synchronized to be launched at the time of the publication of this handbook – will allow water professionals, scholars, and decision-makers around the world to share what they have learned and will enable this handbook to live on as an adaptive guide for practitioners as situations change and new actionable knowledge emerges. We believe case studies are incredibly valuable tools, and they become even more valuable when connections can be made among case studies. We strive to make connections between the contents of AquaPedia and this handbook more easily searchable and usable.

We invite you to explore AquaPedia and to share your knowledge, insight, and wisdom on complex water issues with our water world! Check it out at aquapedia.waterdiplomacy.org.

### *Why Do We Need AquaPedia?*

The most challenging contemporary water problems cross scales and boundaries. These boundaries are not just natural (e.g., between ecosystems and Earth systems); they are also societal (e.g., between cultures and sectors) and political (e.g., between states and communities). Water professionals seek out best practices, advice, and ideas for meeting competing and conflicting needs and demands for water. Although water problems are experienced around the globe, it is not easy to transfer knowledge to resolve water problems from one context to another. Interactions of variables, processes, actors, and institutions from the natural, societal, and political domains usually limit the direct transferability of water knowledge from one situation to another location.

Nuggets of transferable knowledge exist but finding ways to connect the people seeking water information and wisdom to the sources for explicit and tacit knowledge of resolving water problems is not easy. Currently, multiple databases, books, and journal publications are the main sources for learning about the successes and failures of sustainable water management theory and practice. However, in general, these resources are fragmented, hard to find, out of date, and not easily accessible to many potential users.

Simply collecting more data and producing more case studies will not solve our water problems. However, we believe that there are some concrete steps we can take to make them more useful for those engaged in water diplomacy. First, we need to take a structured approach and organize case studies in a way that allows them to be related to one another based on their common aspects while also giving space to the nuances in each case. Background relevant to multiple cases should be cross-referenced and kept up to date as a single source of up-to-date information. This resource should be accessible to anyone who wants to learn about water problems, explore how problems have been resolved elsewhere, and discover the links between transferable elements that can be used to develop sustainable solutions to water challenges at various scales and contexts. Cases should have a dedicated space for the expression of multiple perspectives on an issue. Resources in this database should be considered living documents, editable to reflect emerging information, insights, and viewpoints, augmented with additional resources from across the internet. These were the ideas guiding the structure of the AquaPedia case study database, as illustrated in Figure 4.1.

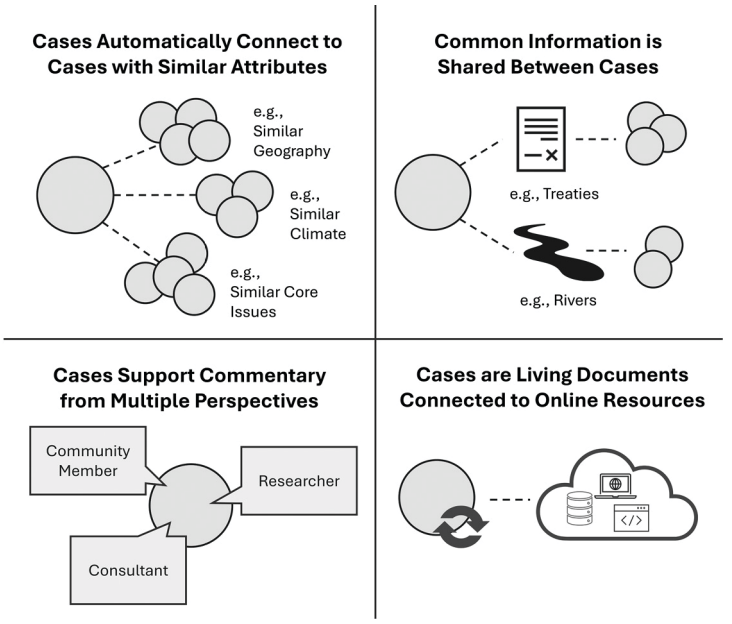



*Figure 4.1* Illustrating the multiple benefits of an online case study database. At the top left, entering basic information about the case automatically links it to other cases with similar attributes. At the top right, cases utilize shared background information on treaties, waterbodies, infrastructure projects, etc. This reduces the work required to start a new case and allows updates to that background information to occur in a single place as new information emerges. At the bottom left, cases allow for multiple perspectives on the same case to appear alongside each other in the Analysis, Synthesis, and Insights section. At the bottom right, the cases can be linked to external resources and updated over time as events unfold or new resources become available.

### *What Are the Components of an Initial AquaPedia Case from 2009?*

A typical AquaPedia case study has the following six components:

1 Summary
   - An "executive summary" that provides a brief narrative overview of the case.
   - This section acknowledges controversies, etc., but tries not to interpret them, and instead attempts to provide an honest broker's description of the situation.

2 An Overview of Natural, Historic, Economic, Regional, and Political Context
   - Describes the context and discusses the "particularities of the context that matter" and "why it matters."

3 Stakeholder Engagement
   - Provides a stakeholder assessment, including how stakeholders were chosen and what level of engagement was achieved.

4 Analysis, Synthesis, and Insight (ASI)
   - Provides space for multiple interpretations and analyses, as well as their respective insights.
   - Each author's ASI is maintained separately.

5 Key Questions Addressed by the Case
   - Provides brief answers to key questions that are used to index and group multiple articles together (e.g., How does asymmetry of power influence water negotiations?)
6 Bibliography

### *Examples of Original AquaPedia Case Studies*

#### *Forming a Groundwater Sustainability Agency for Salinas Valley, California (USA)*

This case is an example of a subnational case. Following three years of severe drought, the State of California passed the Sustainable Groundwater Management Act of 2014 to create a statewide framework for groundwater regulation. This legislation called for local agencies to form Groundwater Sustainability Agencies for priority groundwater basins, develop groundwater sustainability plans, and achieve sustainability within 20 years. The Salinas Valley is one of the priority basins within the state, relying mostly on groundwater. This case looks at the agriculture sector within the basin, and the use of an impartial mediation organization called the Consensus Building Institute. It also discusses the transparent process surrounding stakeholder participation that ultimately led to success.

#### *A Salty Affair: An Analysis of US–Mexico Water Diplomacy in the Colorado River*

This case is an example of transnational-scale water diplomacy between the United States and Mexico. During the 1960s, the salinity levels in the Colorado River increased considerably. The construction of the Wellton-Mohawk Irrigation Project, a 50-mile-long channel completed in 1961 in Southwestern Arizona, resulted in increased salinity levels in the Colorado River, ultimately making the water useless for irrigation purposes. The agriculture sector in Mexico experienced significant crop losses. Debate ensued between the United States and Mexico, and negotiations to solve the salinity issues lasted a decade before coming to a final solution in 1973. The case highlights the complexities of transboundary water management, the influence of historical and economic factors, and the challenges posed by climate change, necessitating continuous collaboration between the US and Mexico.

#### *Yarlung Zangbo–Brahmaputra River: Competing Priorities of Hydropower and Agriculture*

This case is another example of the transnational scale. The Yarlung Zangbo/Brahmaputra is part of the Ganges–Brahmaputra–Meghna Basin, running through China, India, Bhutan, and Bangladesh. The river's hydrogeological features contrast greatly between the portions located in the northern and southern aspects of the Himalayas, resulting in differing impacts of hydropower projects in these distinct parts of the river. Although no legally recognized transnational framework exists to govern the basin or resolve disputes, collaboration exists between India and Bangladesh for the southern sub-basin, China's national law applies to the basin, and there have been informal agreements encouraging basin-level collaboration on a bilateral basis between China and India and China and Bangladesh. The case emphasizes the hydrological complexities, governance challenges, and the need for a structured dispute resolution mechanism to ensure sustainable management and equitable utilization of the Yarlung Zangbo/Brahmaputra River.

### *What Can AquaPedia Users Do?*

Anyone may read case studies, visit links, and use query tools to find the connections between cases and discover information relevant to the user. All logged-in users may use a discussion board feature to discuss each case, ask questions of the contributors, editors, and administrators, and share their thoughts on the case. These discussions will be used to improve the detail, accuracy, and relevancy of each case. Logged-in users may also create case studies, edit existing case studies for content or clarity, and add information and additional links that can be used to connect common themes within the database and create connections to other resources for the case that exist on the internet or in published sources.

### *Transparency and Oversight*

The database stores every edit ever made to any case study and the username of the individual who made the edit. A special page linked to each case study shows the date and time stamp for these changes. Edits can be compared to examine how a case has grown over time. Each case can be "reviewed" by the contributor and other users and flagged for completeness, accuracy, quality of links, and style/grammar concerns. All users see these flags when reading a case. A limited number of editors and administrators can mark a case as "stable." These are the case edits that have been spot-checked for appropriate use of citations/references and appear to be written in a fairly professional manner. All users will see the "stable" version of the case but can also view updates that have occurred that have not yet been reviewed or have been rejected.

### *How Can We Link the Current Structure of AquaPedia with the Contents of the Water Diplomacy Handbook?*

In addition to the six typical sections of the original AquaPedia cases discussed above, a new section titled "Water Diplomacy Handbook Resources" will be added to all future case studies. This section will have three subsections and show how some of the water diplomacy – (a) Concepts and Ideas, (b) Challenges, and (c) Tools – discussed in the handbook are discussed within the context of a case study. In the remainder of this chapter, we present two case studies to show how a case study can be structured by linking the format of AquaPedia and the contents of this Water Diplomacy Handbook. These example case studies are limited in detail due to space constraints in the book but will appear with additional detail on AquaPedia that evolves over time. We hope these example case studies provide you with an idea of the proposed structure and invite you to the online experience to see how they are cross-referenced with other cases and resources. By joining the handbook and AquaPedia together, we hope to create a living resource for water diplomacy practitioners that can continuously be updated through collective contributions from water researchers, professionals, decision-makers, and users worldwide.

## Case Study: The Sukhomajri Model for Water Management

### *Summary*

To address siltation issues in Sukhna Lake, the main water supply for the city of Chandigarh, India, researchers traced back to the small village of Sukhomajri as a starting point. In the 1970s, when investigations began, the village consisted of 59 families of similar backgrounds. The

villagers relied on crop production and livestock for their livelihoods, and open grazing by livestock kept the surrounding watersheds bare. Initially, researchers attempted to implement soil conservation measures in Sukhomajri. However, villagers continued to let their animals graze, and improvements were not seen. The researchers began to realize the importance of cooperation with the villagers, and small earthen dams were constructed with funding from a private foundation to divert water into a reservoir, with some farmers benefiting from the ability to irrigate water-intensive crops. While these efforts bore some success, social inequality in the disbursement of benefits led to tensions within the community.

It became clear that equitable access to water was essential for overall project success. There was a switch from conflict to cooperation among key stakeholders that would lead to an incredible economic impact for a number of years as water management became more complex, and emerging political and societal issues led to diminishing returns. With the initial success, the model for water management was replicated throughout India. In this case study, we will explore how the model was first developed in the village of Sukhomajri at a community scale and the replication across India thereafter. We will also delve into what is contextual versus what is generalizable. As we will see, what worked or failed in one village may not produce the same results in another.

### *Overview of the Natural, Historic, Economic, Regional, and Political Context*

At the foothills of the Shivalik Mountain range, approximately 15 kilometers upstream from Sukhna Lake in the state of Haryana, India, sits the small shepherding village of Sukhomajri (Agarwal and Narain 2000). In the 1970s, Sukhomajri was home to 59 families of the same Gujar caste and similar socioeconomic standing. Most families resided in mud and thatch houses and owned under a hectare of land (Lenton and Muller 2009). Livestock and crop production drove the economy within the community, accounting for 58% of the total income (Joshi et al. 2004). The entire village consisted of 100 hectares, half of which was owned communally by the community members. With no source of irrigation to water their crops, they relied on the heavy rains from the four monsoon months but had been experiencing devastating drought. Meanwhile, less than 21 kilometers away, the main water supply for the city of Chandigarh, Sukhna Lake, was filling up with silt from sediment tumbling in from the barren forest lands surrounding it (Agarwal and Narain 2000). Researchers from the CSWCRTI surveyed the area and ultimately recognized Sukhomajri as the ideal starting point to salvage Sukhna Lake (Agarwal and Narain 2000).

However, the institute's otherwise sound technical advice did not consider the long-standing history of societal and political tensions within the community. During British colonization, heavy logging took over the region, and forests were transformed. In 1902, the Land Preservation Act prevented grazing in certain areas and implemented certain soil conservation measures. The colonial government failed to involve community members and encroached on their traditional land use processes, ultimately leading to opposition toward the conservation methods. Decades later, cooperation had still not been built – villagers continued to let their animals graze and actively destroyed soil conservation structures, check dams, and brushwood dams (Agarwal and Narain 2000).

In 1976, the institute built small earthen dams, which diverted water into a reservoir. The following year brought insufficient rains, and the villagers' wheat crop failed. With permission from the institute, villagers diverted water from the reservoir to save some of the crops. A second dam was later built with support from the Ford Foundation, and underground pipes were laid to distribute water and maximize irrigation benefits. Once again, societal issues surfaced as only half of the villagers received benefits from the new construction, and government officials began

accepting bribes. In 1979, severe droughts increased existing tensions as unirrigated maize crops were destroyed, and irrigated crops continued to thrive (Agarwal and Narain 2000).

In 1979, a solution was born that would become the basis for the Sukhomajri model for watershed management – every villager would receive an equal share of water. A water users' association, renamed the Hill Resource Management Society (HRMS), was founded to manage the forest and water resources (Sengupta 2017). Pipes were laid throughout the village, and fees were issued to each household to cover maintenance costs. Most importantly, a rule was established that would take away water rights for any member whose cattle were discovered grazing within the watershed. The resulting efforts transformed the village – crop production increased by nearly three times, milk production increased, and the economy was revitalized (Agarwal and Narain 2000).

By 1980, siltation in Sukhna Lake declined by 95%, saving Chandigarh $200,000 annually in maintenance costs (Joshi et al. 2004). With the watershed conditions improving, the forest department allowed joint grass-cutting rights to Sukhomajri and the neighboring village of Dhamala in 1985. The following year, both villages obtained rights to harvest bhabbar grass – a tall grass used in the production of paper and rope – in return for a royalty. Grass production soared from 40 kg per hectare in 1976 to 3 metric tons per hectare by 1992 (Agarwal and Narain 2000).

The small village of Sukhomajri started off as a poster child for community-scale watershed management, promising prosperity and harmony with the environment. In the 1980s, visitors from over 120 countries flocked to Sukhomajri, eager to learn how community management of forests and water can alleviate poverty and transform communities into self-sufficient actors (Sengupta 2017). Sparked by the initial success of the model, there was a sudden infiltration of funding toward community-based rainwater harvesting projects involving rehabilitation and construction of small check dams and tanks (Briscoe and Malik 2006). Projects varied widely in scope and scale, from the multi-state World Bank-financed Shivalik Hills project to large state-financed projects in Andhra Pradesh and Tamil Nadu. The performance also varied widely, with World Bank reports showing just 15%–25% of projects sustaining success (Briscoe and Malik 2006).

## *Stakeholder Engagement*

### *Overview of Stakeholders*

The Sukhomajri model for water management brought together stakeholders from multiple domains, including researchers, private funders, government, civil society, and community members. The principal stakeholders in this case include the City of Chandigarh, the Central Soil and Water Conservation Research and Training Institute, the Ford Foundation, the Forest Department of Haryana, the villagers from Sukhomajri and neighboring Dhamala, and the HRMS.

### *Technical Facilitators and Private Funders*

City officials in Chandigarh were concerned with the silting of the man-made Sukhna Lake and elected the CSWCRTI to provide technical expertise and solutions. In the 1970s, scientists from the institute concluded that runoff from the Shivalik Hills was a principal cause of siltation in the lake (Sengupta 2017). They concluded that downstream sedimentation and siltation could be solved by constructing erosion control structures in the upstream village of Sukhomajri. Realizing that the structure could not handle the increased sediment load from Sukhomajri, the institute suggested the construction of a small earthen dam to control water and sediment runoff, thereby creating a reliable water source for the farmers (Chapter 49).

The CSWCRTI played a crucial role in fact-finding and technical knowledge, acting as a key advisor to the government in the early stages of solving issues surrounding Sukhna Lake and implementing technical solutions.

The Ford Foundation, a private American foundation, was a key funder for the implementation of water management systems in Sukhomajri. They provided a grant to support the construction of a dam and underground pipeline, as well as a level terrain to maximize irrigation benefits (Agarwal and Narain 2000). They were also involved in funding projects outside of Sukhomajri, such as the cloned model in Nada village, working under the auspices of the Forest Department of Haryana (Staples 1992).

### *Government Administrative Role*

The forest department is an administrative government agency that played a key role in the distribution of resources and was ultimately responsible for the replication of the Sukhomajri model in 60 villages in the Shivalik range. India's forests, containing valuable sources of grass and wood, are owned by the government, and villagers traditionally have limited rights to these areas. Although grazing or collecting wood and fodder for animals is illegal, villagers would continue to do so, having no stake in the sustainable management of the area. The agreement of the forest department to give joint grass-cutting rights to Sukhomajri and Dhamala was a key process that created incentives for improving the forest (Agarwal and Narain 2000).

### *Community Participation and the Creation of a Civil Society Organization*

After initial attempts by the CSWCRTI to implement soil and conservation measures failed, it became clear that community member involvement and buy-in were crucial. When the villagers began to see the economic benefits of conservation, they became an integral part of protecting the watershed. The forest department included the neighboring village of Dhamala in joint grass-cutting rights, which both increased community participation and raised tensions between the two villages.

A water users association, the Hill Resources Management Society, consisted of representatives from the community of Sukhomajri to maintain the dams and distribute water. Initially, each family was represented. After the importance of a participatory approach was recognized, membership expanded to include all adult residents, and a bylaw was created to require at least two women on the managing committee (Agarwal and Narain 2000).

## ***Analysis, Synthesis, and Insight: Compare and Contrast – Insights from the Replication of Sukhomajri***

### *Analysis*

The Sukhomajri model initially began as a technical solution to solve environmental issues at a designated scale. However, water management is inherently complex, involving interaction between the societal, political, and natural domains. Technically, the Sukhomajri model is sound – a decrease in animal grazing and the installation of check dams led to a restoration of the natural environment. However, societal and political issues arose that ultimately dampened initial achievements. With increased crop yields and a revitalized economy came tensions over the shares of wealth. Although the Sukhomajri villagers belong to the same caste, the neighboring village of

Dhamala is an upper-caste village with greater access to the forest department. Conflicts eventually arose between the two castes when the forest department divided up the land between the two villages, with the villagers of Sukhomajri arguing that Dhamala were allotted the portion of land where the majority of grass grows (Agarwal and Narain 2000). Furthermore, the government largely took control of the profits, with no more than a quarter of timber proceeds from the regenerated forest allotted to the community members and less than half of the income from sales of bhabar grass (Agarwal and Narain 2000). Moreover, the project revealed institutional weaknesses and a lack of stakeholder engagement (Chapter 49).

### *Synthesis*

When the model was replicated, similar issues arose. One example of the cloning of the Sukhomajri model is Nada village, which consists of two castes: the Harijan and Lavana. In 1980, the Forest Department of Haryana took over expenditures of a $14,000 investment to restore the degraded watershed. The Ford Foundation provided an additional grant of $18,750. The Harijan hamlet, a lower caste, is situated on a degraded watershed and agreed to protect 17 hectares of the forest (Mahapatra 1998). They were convinced to stop grazing in the hills so that natural regeneration and afforestation could occur, and they replaced goats with animals that did not destroy saplings. Over time, significant improvements were seen, such as an increase in wheat production. However, the Lavana, a higher caste, continued plundering the forest for their own self-interest. Like Sukhomajri, there were initial benefits associated with the restoration of the environment, but political and societal issues quickly led to the project's demise. The project, initiated and sponsored by outsiders, failed to engage part of the community. Also, the village was divided by a caste system, and the project pushed existing inequalities to the surface. Furthermore, the execution was lacking – the dam designed to collect water was constructed on a loose rocky base with no bond to the soil, ultimately leading to leakage (Mahapatra 1998).

The story of the Sukhomajri model is not all bleak. The Centre for Science and the Environment in New Delhi has been monitoring the Sukhomajri model and has published briefs every few years since 1994. In the 2007 brief, the center speaks highly of a similar watershed program launched in the neighboring village of Bunga following a visit to Sukhomajri in the early 1980s. According to the report, Bunga has largely avoided Sukhomajri's issues. Extreme weather, from flash flooding to droughts, had led villagers in Bunga to become nomads eight months out of a year. The CSWCRTI offered technical expertise to build dams in the village in 1983, and the state agriculture department went on to implement the project. Within a decade, three dams were built, and positive change ensued. Yields for wheat and maize increased significantly, and farmers began to introduce new crops to their land, including rice, sugarcane, and cotton. Milk production increased fourfold, and the surplus was sold at Rs 12 per liter (Down to Earth 2007). Bhabbar and fodder profits also soared from the regeneration of the commons. Unlike Sukhomajri, the HRMS in Bunga was more assertive, regularly meeting once every month. Since the commons comprises over half of the catchment area, villagers had an incentive to follow the advice of the water users association in crop management and water usage. Overall, the distribution network was managed better, and community members regularly maintained records. Interventions by the state government to raise revenue failed due in large part to the assertiveness of the HRMS (Down to Earth 2007).

Bunga still has problems despite its many victories over the years. Technical issues have arisen, such as silt in the dams and villagers' lack of resources to de-silt. Pleas for external intervention to assist with technical and logistical problems made to the collector's office and the agriculture department have yet to be answered (Down to Earth 2007).

### *Insights*

Comparing the Sukhomajri project with its successors, which were modeled after it, provides important insights into complex characteristics that cannot be evaluated through a single study. By analyzing the Sukhomajri model, we are able to uncover what is generalizable and what is contextual.

In all three cases – Sukhomajri, Nada, and Bunga – there are three important generalizable takeaways: community buy-in is needed, equity issues must be addressed, and projects must have systems in place to address technical issues and maintain a project in the long term. In the case of Sukhomajri, the turning point to push the model forward was giving equal rights to water access. Community members had an incentive to maintain the land as they would directly profit from it. In Nada village, there was no project buy-in, as the program was initiated and sponsored by outsiders. By failing to involve the villagers, there was little hope of the project succeeding in the long term. In Bunga, buy-in was clear from the onset since the commons accounted for over half of the catchment area, and the villagers quickly began to reap profits.

Although there is some generalizable knowledge that can be gleaned from the cases, there are also specific issues that are contextual. Caste systems, such as those within India, are complex, and villages are bound to have their own unique history of tensions and conflicts. Communities outside of India may not have a distinct caste system, but other context-specific histories of tension between marginalized groups and elites must be considered when dealing with the social aspects of implementing a water management project. Furthermore, each village has unique relationships between different stakeholders that must be considered. In the case of Bunga, the villagers were greatly involved throughout the extent of the project and continued to meet regularly. They were also assertive when dealing with institutional and governing bodies. These two factors were instrumental in the ongoing success of their project.

## ***Key Questions***

### *Integration across Sectors – How Does Community Buy-in Affect Water Negotiations?*

In the case of Sukhomajri, the turning point to push the model forward was to give equal rights to water access. Community members had an incentive to maintain the land as they would directly profit from it. In Nada village, there was no project buy-in, as the program was initiated and sponsored by outsiders. By failing to involve the villagers, there was little hope of the project succeeding in the long term. In Bunga, buy-in was clear from the onset since the commons accounted for over half of the catchment area, and the villagers quickly began to reap profits.

### *Power and Politics – How Do Issues of Equity Affect the Outcome of Water Management Projects, and How Can Negative Effects be Addressed?*

The issue of equity appears in all three villages. In Sukhomajri, the villagers belong to the same caste; however, once the neighboring village of Dhamala became involved in the project, conflicts arose due to arguments over the unfair partitioning of land to the upper-caste villagers. In Nada, the division of caste within the village ultimately led to the project's demise as inequalities surfaced. In Bunga, despite having two castes, the Gujjars made up 90% of the village (Down to Earth 2007). Having a large portion of village land as the commons seems to have created little reason for tension between the castes.

### *Technical Innovation – How Do You Mitigate Potential Technical Issues on Complex Management Projects?*

Technical issues are bound to arise in community-scale projects. In the case of Sukhomajri, implementers failed to train villagers on how to maintain the water distribution system (Sengupta 2017). In Nada, the dam was constructed on a loose rocky base and did not bond with the soil underneath, leading to leakage (Mahapatra 1998). In Bunga, when technical issues arose due to silt build-up, villagers were ill-equipped to resolve them. It is important to have a plan for monitoring and evaluation in place, as well as a governing body to oversee maintenance and repairs. The creation of detailed technical manuals, a water council or committee, and training workshops are all valuable pieces of a water management project's long-term success.

## ***Water Diplomacy Handbook Resources***

### *Water Diplomacy Concepts and Ideas Addressed in This Case Study*

*Water as a source of conflict:* For a period of time, water management in Sukhomajri was a source of conflict. The villagers relied on animal grazing for their livelihood and continued to let their animals graze, destroying soil conservation structures and breaking dams (Agarwal and Narain 2000). Support from the Ford Foundation in the late 1970s only helped approximately half of the village, and the villagers who did not receive water access continued to graze. Chapter 6 discusses the ways in which water can become a source of conflict in more detail.

*Water as a source of cooperation:* In the case of Sukhomajri, the equitable distribution of water resources from the dam to community members ultimately led to cooperation for a period of time (Deora 2021). It was established that every villager gets an equal share of water. A water users association was formed, and a rule was created stating that any member whose cattle were found grazing in the watershed would lose water rights (Agarwal and Narain 2000). The formation of this governing body with equal representation was a true turning point in the Sukhomajri story. Chapter 7 explores more broadly the idea of how water can become a source of cooperation.

*Concept of scale:* Scale is an incredibly important concept in the Sukhomajri model. Sukhomajri sparked a series of larger-scale state-sponsored projects, including the multi-state Shivalik Hills project sponsored by the World Bank (Briscoe and Malik 2006). Although some of the efforts proved successful, many of the replicated projects failed. When considering community-scale projects, it is imperative to consider issues that are contextual to a particular community versus issues that are generalizable. Chapter 8 discusses scale-related concerns in water diplomacy.

### *Water Diplomacy Challenges Addressed in This Case Study*

*Mapping the problem space:* In Sukhomajri, water management started off as a simple system. Initially, sediment accumulation was significantly reduced with the implementation of check dams and the enhancement of water conservation practices. The growth of new economic activities, such as increased revenue through better crop yields, the sale of forest resources, the introduction of green fodder, and the expansion of dairy production, complicated matters. As the system evolved, people started using groundwater as an alternative source of water, and the forest department began taxing the sale of grass and distributing land to two different communities. Over time, a complex system emerged, ultimately weakening the incentive structures that

were successful previously (Chapter 49). Chapter 12 provides additional details on the importance of mapping the problem space.

*Creating and distributing benefits:* Increased crop yields and a revitalized economy led to an overall increase in wealth. However, issues arose over the equity in distributing benefits between the Sukhomajri villagers and the Dhamala villagers. When the forest department gave joint grass-cutting rights, both villages benefited (Deora 2021). However, villagers from Sukhomajri argued that Dhamala was allotted the portion of land where the majority of grass grows (Agarwal and Narain 2000). Furthermore, tensions arose over the government's control of the profits, with no more than a quarter of timber proceeds from the regenerated forest and less than half of the income from sales of bhabar grass allotted to the community members (Agarwal and Narain 2000). The issue of creating and distributing benefits is discussed in Chapter 16.

### *Water Diplomacy Tools Used in This Case Study*

*Mutual Gains:* The rise in revenue through improvement in crop yields, sale of forest resources, the introduction of fodder, and the expansion of dairy production are all mutual gains that were developed and implemented by key stakeholders and decision-makers in the case of Sukhomajri (Chapter 49). The related topic of mutual gains negotiation is discussed in Chapter 22.

*Capacity Development:* During the complex phase, there was a disconnect in communications and decision-making between the various levels of governance and no coordinating mechanisms to adapt to changing conditions. In turn, there was no adaptive learning (Chapter 49). Developing such capacities is an ongoing challenge for many communities. Recent research suggests that experience exchange with other communities can be an effective form of capacity development. For more details, see Chapter 29.

*Principled Pragmatism:* The project's initial success was unsustainable due to a lack of flexibility in institutional arrangements at different levels and the absence of coordinating mechanisms to deal with changing conditions as the system became more complex. Continuous monitoring of evolving situations needs to be addressed with interventions that are consistent with the capacities and constraints of the local context (Chapter 49). Such situations can benefit from the lessons of principled pragmatism discussed in Chapter 36.

## Case Study: Transnational Water Management in the Indus River between India and Pakistan

### *Summary*

The Indus River Basin case provides insight into transboundary water management, emphasizing the intricate interplay of geographical, environmental, and geopolitical factors. The success of the Indus Waters Treaty[1] (IWT) is credited to its contextual understanding, tailored to the region's unique challenges. It highlights the importance of considering shared principles, like third-party engagement, recognition of interdependencies, and mutual value creation. These principles, evident in the Indus case, are relevant in other regions, such as the Jordan River Basin. However, contextual factors like climate change, population growth, and evolving geopolitics necessitate tailored tools for ongoing collaboration between India and Pakistan.

Overall, the case offers valuable lessons for policymakers, emphasizing the significance of addressing gaps in knowledge, fostering local engagement, and crafting proactive strategies for

sustainable transboundary water utilization. In essence, the Indus River case serves as a model for effective, context-specific, and collaborative transboundary water management.

## *Overview of the Natural, Historic, Economic, Regional, and Political Framework*

### *Geography of the Indus River Basin*

The Indus River Basin is located in South Asia and covers parts of India, Pakistan, China, and Afghanistan. It is named after the Indus River, which is the primary river flowing through the region. The Indus River is the key geographical feature of the basin. The river originates in Tibet, China, and flows northwest through India. After entering Pakistan, it continues northwest before gradually turning southwest and then south, eventually emptying into the Arabian Sea.

The area of the Indus River Basin spans four provinces of Pakistan: Punjab, Khyber Pakhtunkhwa, Balochistan, and Sindh. The basin's topography varies greatly, from the high-altitude mountains in the north, including the Karakoram, Himalayas, and Hindu Kush, to the lower-lying plains and deserts in the south near the Arabian Sea. It is fed by several major tributaries, including the Sutlej, Beas, Ravi, Chenab, Jhelum, and Kabul rivers. The river flows through an elevation of 5,486 meters from the Himalayas, traverses the Indian-administered Jammu and Kashmir region to the Sindh plains, and discharges into the Arabian Sea.

The fertile alluvial plains of the Indus River Basin sustained civilization for 4,500 years and have supported agriculture for millennia. Crops grown in the region include wheat, rice, cotton, sugarcane, and various fruits. Even today, the mighty Indus River is a vital source of water and energy supply and food security for the 268 million people who inhabit the river basin, which includes India, Pakistan, and some parts of Afghanistan and China. Major cities include Karachi, Lahore, and Peshawar.

### *Climate and Environmental Challenges*

The climate in the Indus River Basin is diverse. In the mountains, it ranges from cold and temperate to polar. In the lower plains, it can be extremely hot and arid. The region also has distinct monsoon seasons, with wet summers and drier winters. Precipitation levels vary significantly across the basin.

The basin is also home to a diverse range of flora and fauna. The Himalayan and Karakoram ranges house several unique and endangered species. The wetlands and riverine ecosystems in the basin support a variety of bird species and aquatic life, making it a vital area for conservation efforts. Despite the abundance of natural resources and biodiversity, the basin has been facing several environmental challenges, including water scarcity, pollution, and the melting of glaciers in the Himalayas due to climate change.

### *Climate Change and Vulnerability*

The Indus River Basin, one of the world's most critical water sources, faces significant challenges due to climate change. Approximately 45% of its water flow comes from glacial melt in the Himalayas, rendering it particularly susceptible to the impacts of climate change. However, these impacts are complex and hard to predict (Zahra et al. 2023). They encompass glacial ice melting,

rising temperatures, shifts in precipitation patterns, and evolving weather conditions. This vulnerability is exacerbated by the vast Hindu Kush Himalaya range, which spans multiple Asian countries and supplies major rivers like the Indus, Brahmaputra, and the Ganges, serving nearly one billion people (Zahra et al. 2023).

### *Glacial Retreat and Water Supply*

Consistent with global trends, glacier retreat has accelerated over the past century and is expected to continue due to rising global temperatures. While this will initially increase the river flow by 40%, long-term projections indicate a more alarming outcome – a decrease of over 60% (Zahra et al. 2023). Simultaneously, rising temperatures will elevate evapotranspiration rates in the irrigated Indus River Basin, intensifying the demand for irrigation water and triggering fiercer competition for surface and groundwater resources (Molden et al. 2022).

### *Hydrological Challenges and Consequences*

The Indus River Basin heavily depends on monsoon rainfall, glacier melt, and snowmelt, which collectively contribute over 85% of its annual flow. Anticipated shifts in the intensity, location, and timing of monsoon activity will significantly change the hydrological system in the next decade or two. A stark example of this occurred in 2010, when Pakistan experienced a devastating flood, a consequence of these hydrological shifts, despite glacial melt playing a minor role in the event (Molden et al. 2022).

### *Aquifer Stress and Glacial Melt*

In 2015, NASA ranked the Indus River Basin as the world's second most critically stressed aquifer, warning that diminishing groundwater could worsen the water crisis in the region (Parvaiz 2021). A 2019 assessment report from the International Centre for Integrated Mountain Development in Kathmandu emphasized that one-third of the glaciers feeding the Indus River Basin were melting. Furthermore, a separate study revealed a 17% reduction in the size of nine key glaciers in the Kashmir Himalayas between 1980 and 2013 (Wester et al. 2019). Recent projections indicate an accelerated glacier melt due to rising global temperatures. This is expected to raise river flow by 40% in the near future, but in the long term, the Indus River's typical flows are projected to decrease by over 60% (Zahra et al. 2023).

### *Population Growth and Water Consumption*

In addition to the existing water challenges, the rising population in the region has led to an increase in per capita water consumption, resulting in a decline in per capita water supply. In contrast, basins like the Ganges and Brahmaputra are less vulnerable because they receive a significant volume of water from rainfall, unlike the Indus, which predominantly relies on solid precipitation and ice melt.

### *Indus River Water Allocation Issues*

Even predating the India–Pakistan partition, the Indus River was a contentious issue within British India. However, post-partition, the matter escalated internationally due to heightened hostilities

and the lack of overarching legal authority. This created a vulnerable situation for Pakistani territory, which was historically reliant on the Indus for water and was now sourcing water from a neighboring country amid rapidly deteriorating geopolitical relations (AquaPedia 2013; Naqvi 2012).

The core issue surrounding the Indus River's flow reflects a classic conflict between upstream and downstream riparian states. The intense negotiations during the Inter-Dominican Agreement on the Canal Water Dispute in Delhi on May 3–4, 1948, vividly illustrated this discord. India, having gradually halted the water flow after the 1947 Standstill Agreement[2] expiration, agreed during the Conference to restore it without committing to future water supply. However, weeks later, India announced that it had no obligation to continue supplying water to West Punjab, contending that Pakistan could not claim an inherent right to a share of these waters (AquaPedia 2013; Naqvi 2012; Caponera 1987). India's position was fortified by arguing that Pakistan's payment for water under the Standstill Agreement recognized India's water rights. Conversely, Pakistan contended, raising prior appropriation rights and asserting that payments were solely for operation and maintenance costs (AquaPedia 2013; Biswas 1992).

Despite these unresolved conflicts, the two nations reached the Delhi Agreement. India assured Pakistan that it wouldn't halt water delivery without allowing time for alternative sources. However, Pakistan expressed dissatisfaction on 16 June 1949, advocating for "equitable apportionment of all common waters" and proposing World Court jurisdiction (AquaPedia 2013). In response, India suggested a commission of judges from both sides to resolve differences before third-party intervention (Naqvi 2012). This impasse persisted through 1950 (AquaPedia 2013).

### *Negotiations: Attempts to Manage Indus Waters*

In 1951, both India and Pakistan extended an invitation to David Lilienthal, the former head of the Tennessee Valley Authority (TVA) and subsequent Chairman of the US Atomic Energy Commission, to examine the irrigation system of the Indus River Basin . After his visit and meetings with both Prime Ministers, Lilienthal proposed an integrated river management approach for the Indus system, drawing parallels to the TVA (Naqvi 2012). His recommendations, covering psychological measures and practical proposals for the Indus headwaters, were detailed in an article where he introduced the concept of an "Indus Engineering Corporation" supported by international financing. Learning of Lilienthal's ideas, the World Bank's President, David Black, proposed the Bank's mediation, which was accepted by both countries. In 1952, a Working Party was established with the goal of formulating a program to enhance the Indus River's water supply (Naqvi 2012; AquaPedia 2013).

The Working Party, consisting of Indian and Pakistani engineers along with a team from the World Bank, convened in Washington in May 1952. Their primary objective was to outline a program, including potential technical measures, to augment the available Indus River water supply for economic development. After three weeks of discussions, they agreed on an outline that involved determining total water supplies categorized by catchment and use, estimating water requirements for cultivable irrigable areas in each country, calculating necessary data and surveys based on either side's requests, and preparing cost estimates and a construction schedule for new engineering works that could be part of a comprehensive plan. In a diplomatic effort to avoid potential conflicts, both parties concurred that while requested data would be collected and verified when feasible, its acceptance or the inclusion of any study topic would not commit either side to its "relevance or materiality" (AquaPedia 2013).

Despite subsequent meetings in Karachi (1952) and Delhi (1953) failing to produce a common plan, India and Pakistan submitted separate plans in 1953, revealing significant disparities in allocated water supplies. The Indian proposal allocated 29 million acre-feet (MAF) annually to India and 90 MAF to Pakistan, totaling 119 MAF. In contrast, the Pakistani proposal allocated 15.5 MAF to India and 102.5 MAF to Pakistan, totaling 118 MAF (AquaPedia 2013).

### *Outcome*

The final IWT of 1960 divided the Indus River system into two categories: the Eastern Rivers and the Western Rivers (Janjua et al. 2021; AquaPedia 2015). India was granted unrestricted use of the Eastern Rivers (Ravi, Beas, and Sutlej) for various purposes, including irrigation, non-consumptive uses, and hydropower generation. Pakistan was granted similar rights over the Western Rivers (Indus, Jhelum, and Chenab), however, with certain limitations, such as an allowance of limited amounts of water from the Western Rivers to be used by India for non-consumptive purposes, including for power generation (Sattar, Robison, and McCool 2017).

Additionally, IWT addressed both technical and financial concerns and featured a comprehensive plan and timeline for transition (AquaPedia 2013). The key elements of the Treaty encompassed (AquaPedia 2013):

- *Infrastructure Development in Pakistan*: Provisions were made for the construction of three dams, eight link canals, three barrages, and 2,500 tube wells in Pakistan to enhance its water infrastructure.
- *Transition Period:* A ten-year transition period, spanning from April 1, 1960 to March 31, 1970, was established. During this period, water would continue to be supplied to Pakistan according to a detailed schedule, ensuring a gradual transition.
- *Financial Contribution from India*: India committed to providing a fixed financial contribution of $62 million to Pakistan. This amount was to be disbursed in ten annual installments throughout the transition period, demonstrating India's financial commitment to the Treaty.
- *Data Exchange and Future Cooperation:* Additional provisions were included for data exchange and fostering future cooperation between the two nations, emphasizing the importance of ongoing collaboration in managing the shared water resources.

The Treaty additionally created the Permanent Indus Commission (PIC), featuring two commissioners from both India and Pakistan. The PIC's mandate includes fostering cooperation, facilitating data exchange, and addressing disputes that may arise. In instances where disputes prove unresolvable through the PIC, the Treaty delineates a multi-step resolution process. This process includes options such as appointing a "neutral expert," engaging negotiators or convening a Court of Arbitration (AquaPedia 2013; World Bank 2018).

## ***Stakeholder Engagement***

Stakeholder engagement leading up to and during IWT negotiations was characterized by a combination of bilateral discussions, the involvement of neutral external parties, and technical expertise. Participants in discussions largely represented the Government of India, the Government of Pakistan, and the World Bank. There was limited direct participation by communities impacted directly by the construction of dams, barrages, and other infrastructure projects outlined in the Treaty.

Technical experts and advisors, including hydrologists, engineers, and water resource management specialists, were engaged by both governments to provide technical insights and assessments during the negotiations. The World Bank played a crucial role as an external stakeholder and mediator throughout the negotiation process. Its involvement was crucial for financing and facilitating discussions, ensuring impartiality, and fostering the overall success of the negotiations. Beyond its financial contributions, the World Bank provided valuable technical assistance and played a key role in appointing a neutral expert, contributing to the establishment of a neutral ground for discussions.

### *Analysis, Synthesis, and Insight*

Recognizing that water management extends beyond technical aspects to encompass intricate political, economic, and social dimensions is crucial. Effective water governance demands adaptive strategies capable of addressing evolving socioeconomic and environmental conditions (Janjua et al. 2020; Chapter 37). For both India and Pakistan, this involves a reassessment of current water agreements and governance mechanisms to ensure resilience and equity in water allocation for present and future generations. Although proposals to modify the IWT have been suggested, with the most recent notice sent by India in January 2023 through the Commissioners for Indus Waters, progress on these modifications has been limited (PTI 2023). The challenge is how to uphold the legacy of the IWT while adapting it to emerging challenges such as population growth, increasing water needs, water scarcity, and climate change. Both countries can explore various avenues to enhance existing tools and techniques for future water cooperation to meet this challenge:

- *Joint Research and Data Sharing:* The PIC and the World Bank can facilitate collaborative research projects on water resources and hydropower between India and Pakistan, which involve sharing hydrological data. Despite ongoing data sharing, concerns about accuracy and potential information gaps persist.
- *Scenario Planning:* Both nations have engaged in discussions to assess scenarios related to hydropower development and water resource management. However, complexities in reaching mutually acceptable solutions have led to persistent disagreements.
- *Local Community Engagement:* Recognizing the importance of involving local communities affected by hydropower projects, efforts have been made to address concerns, especially regarding resettlement and compensation. Yet, challenges related to transparency and communication with affected communities remain.
- *Regular Bilateral Dialogues:* Periodic bilateral dialogues addressing water-sharing arrangements and hydropower development act as a platform for issue resolution. However, progress on key matters has been sluggish.
- *Joint River Project Developments:* Although opportunities for international cooperation in hydropower development have been explored, limited collaborative projects involving multiple Indus River Basin countries have emerged. International organizations, such as the World Bank, have facilitated discussions and provided expertise to some extent.
- *Long-Term Vision:* Crafting a shared long-term vision for sustainable water resource management and energy generation remains a challenge. Despite mutual acknowledgment of the need for such a vision, achieving consensus on specifics proves difficult.
- *Conflict Resolution Mechanism:* The existing IWT offers three conflict resolution options: diplomatic channels, neutral expert appointment, and arbitration court establishment. Recent issues, like the Kishanganga Dam dispute, underscore the necessity to renegotiate the 1960 treaty.

Specifically, considering an amendment to Article 9 to prioritize a sequential, hierarchical approach to dispute resolution through diplomatic channels, neutral expert appointment, and arbitration court establishment would better address contemporary concerns.

- *Sustainable Development Goals (SDGs):* Both countries recognize the relevance of aligning hydropower projects with SDGs and the importance of clean energy and water resource management in achieving sustainable development. However, translating these principles into tangible actions has varied.

### *Analysis*

The Indus River case emphasizes the intricate dynamics shaping transboundary water management. The historical complexities, as illuminated by the Inter-Dominican Conference of 1948, highlight the challenges arising from differing interpretations of water rights and the need for upstream–downstream cooperation (Caponera 1987). The mediation efforts of international actors, especially the World Bank, culminated in the establishment of the IWT, a foundational framework that not only allocated specific rivers but also recognized the interdependence of India and Pakistan on shared water resources (Chapter 37).

This aligns with the broader discourse on transboundary water management, offering a nuanced understanding of success factors. Previous studies on the Indus River, while addressing common themes like conflict, cooperation, and environmental concerns, often miss the contextual richness and the potential for a model in transnational water governance (Wolf 1998; Carius et al. 2004; Zawahri 2009; Braulik et al. 2014; Salman and Uprety 2021). This study makes a valuable contribution by acknowledging the distinctive context of the Indus River while also identifying transferable aspects that position it as a model for effective water management (Janjua et al. 2020; Chapter 37).

Comparing the Indus River and the Jordan River highlights the critical role of contextual factors in determining success. In both cases, third-party engagement was pivotal, leading to the creation of treaties. Eugene Black's mediation for the Indus case, facilitated by the World Bank, actively addressed hydrological interdependence, clarified issues, and established working groups, fostering negotiation based on essential principles. Similarly, US mediation during the Madrid Conference and informal talks in the Jordan River case helped identify and address interdependence, culminating in the Peace Treaty between Israel and Jordan amid complex geopolitical dynamics.

Despite shared underlying patterns, contextual differences emerge. The IWT stands alone, while in Jordan, water sharing integrates within a broader treaty. Notably, the IWT has provided stability and collaboration, whereas the Jordan River basin grapples with geopolitical complexities. This underscores that the success of water management strategies is intricately linked to the broader political context and the commitment of involved parties to collaborative governance, a challenge evident in the Jordan River case.

### *Synthesis*

The Indus River stands out as a model of successful cooperation among the parties involved. The parties recognized the need for adaptive governance mechanisms and an understanding of interdependence in sustaining the Treaty over the years (Chapter 37). This cooperative endeavor serves as a testament to the efficacy of such approaches in managing transboundary water resources.

In contrast, several other transnational cases (Jordan River, Mekong River, and Nile River) grapple with challenges rooted in geopolitical complexities that overshadow cooperative efforts. These cases highlight the pivotal role of a conducive geopolitical environment alongside technical agreements in achieving successful water management. This case underscores that the sustainable use of transboundary water resources demands more than just technical agreements; it necessitates fostering a collaborative spirit, third-party engagement, acknowledging shared interests, and establishing robust governance mechanisms.

As we reflect on these examples, it becomes evident that understanding and addressing the gaps in knowledge and research is crucial for advancing transboundary water management. Future research should delve into the intricacies of geopolitical complexities and their impact on cooperative efforts. Considering growing apprehensions surrounding the geopolitical dimensions of energy, particularly in the context of hydropower projects on transboundary rivers, there is a pressing demand for thorough studies. These studies should delve into the optimal strategies for policymakers to effectively reconcile the safeguarding of national interests with the promotion of global common goods. Furthermore, there is a critical need to explore how multilateral institutions can most effectively play a mediating role in addressing the intricacies of transboundary cases, particularly those marked by increased complexity.

By addressing these gaps, researchers and policymakers can contribute to the development of more proactive and effective strategies for the sustainable utilization of transboundary water resources.

## *Insights*

The central theme in the Indus River case is the interplay between active recognition of interdependencies and mutual value creation regarding shared waters. As socioeconomic and environmental factors evolved, both countries adopted adaptive management strategies. India and Pakistan began to account for changing water availability, climate patterns, and the needs of downstream regions. The evolution of ideas underscores the recognition of the multi-dimensional nature of water management, incorporating elements of negotiation, mediation, practical proposals, and international financing.

The process depicted in the case outlines a journey from initial conflicts and negotiations to the formation of IWT. The process involves the creation of the PIC and the subsequent efforts to manage water resources collaboratively. The ongoing process includes periodic dialogues, data exchange, and the resolution of disputes through diplomatic channels and, if necessary, through arbitration.

The practice observed in the case involves the practical application of water treaties and collaborative mechanisms. The establishment of the Permanent Indus Commission and the involvement of technical committees demonstrate the practical implementation of governance structures. The ongoing challenges, particularly those related to resolving disputes related to new projects, showcase the complexities of putting theoretical frameworks into effective practice.

The evolution of Indus River management can be broken down into three phases:

1 *Early Cooperative Efforts:* Initially, both Pakistan and India recognized the importance of the Indus River and its tributaries for their respective populations. In 1960, the IWT was signed, establishing a framework for the equitable distribution of the river's waters between the two countries. This phase can be characterized as the initiation of a cooperative system.

2 *Development of Infrastructure:* Over the years, both nations invested in infrastructure development, including dams, canals, and reservoirs. These projects were jointly planned and executed, reflecting a shift from a simple to a more complicated management system.
3 *Adaptive Management:* Both countries adopted adaptive management strategies as socio-economic and environmental factors evolved. They began to account for changing water availability, climate patterns, and the needs of downstream regions.

The insights gained from the analysis and synthesis of the Indus River case provide valuable lessons for the broader discourse on transboundary water management. It reinforces the idea that effective transboundary water management requires a combination of historical understanding, international mediation, and a commitment to a cooperative framework that adapts to emerging challenges. The elements of the IWT showcase the importance of long-term commitment, trust-building measures, and mechanisms for dispute resolution in sustaining such agreements. This case underscores that successful transboundary water management requires a nuanced understanding of the geopolitical landscape and a commitment to collaborative, adaptive governance.

## *Key Questions*

### *Transboundary Water Issues – What Mechanisms beyond Simple Allocation Can Be Incorporated into Transboundary Water Agreements to Add Value and Facilitate Resolution?*

Water was separated from other contentious issues between India and Pakistan. This allowed negotiations to continue, even in light of tensions over other topics. Water problems were to be viewed as "functional" rather than political. Some points may be agreed to more quickly if it is explicitly agreed that a precedent is not being set. In the 1948 agreement, Pakistan agreed to pay India for water deliveries. This point was later used by India to argue that, by paying for the water, Pakistan recognized India's water rights. Pakistan, in contrast, argued that they were paying only for operation and maintenance. In an early meeting (May 1952), both sides agreed that any data may be used without committing either side to its "relevance or materiality," thereby precluding delays over data discrepancies.

### *Power and Politics – To What Extent Does Third-Party Engagement, like the World Bank's Role, Contribute to Resolving Transboundary Water Issues?*

Positive, active, and continuous involvement of a third party can be vital in helping to overcome conflict. The active participation of Eugene Black and the World Bank was crucial to the success of the IWT. The Bank offered not only their good offices but a strong leadership role as well. The Bank provided support staff, funding, and, perhaps most importantly, its own proposals when negotiations reached a stalemate. Coming to the table with financial assistance can provide sufficient incentive for a breakthrough in agreement. The Bank helped raise almost 900 million from the international community, allowing for Pakistan's final objections to be addressed.

*Transboundary Water Issues – Which Types of International Water Treaties or Agreements Offer a Balance between Providing a Robust Structure for Enforceability and the Flexibility Needed to Adapt to Unforeseen Challenges in the Future?*

Ensuring effective and adaptable water treaties between countries involves key attributes:

- *Clear Rights and Obligations:* Specify clear rights and obligations to establish a solid foundation.
- *Time-Bound Dispute Resolution:* Implement a time-bound framework for bilateral dispute resolution; if bilateral efforts fail within a specified time, initiate construction work cessation.
- *Comprehensive Cooperation Clause:* Include a comprehensive clause in the Treaty addressing future cooperation, covering gaps and challenges for optimal water utilization, and ensuring flexibility.
- *Institutional Mechanism*: Establish an institutional mechanism, like a joint commission, to promote cooperation. This body should regularly report to the involved governments with concrete suggestions for cooperation.
- *Real-Time Data Collection and Sharing:* Mandate real-time data collection and sharing, barring military defense considerations, to facilitate informed decision-making.
- *Balanced Water and Benefit Sharing:* Maintain a suitable balance between water and benefit sharing to ensure fairness.
- *Binding Third-Party Decisions:* Ensure the binding nature of third-party decisions, constituting a panel of 5 to 7 persons for diverse perspectives and credibility.

## *Water Diplomacy Handbook Resources*

### *Water Diplomacy Concepts and Ideas Addressed in This Case Study*

*Water as a Source of Conflict:* The historical tensions between India and Pakistan over the Indus River have been evident, especially in times of water scarcity or perceived inequality in water distribution (Wolf et al. 2003; Wolf 1998). For instance, during periods of drought, accusations of water hoarding and unauthorized dam construction on both sides have led to diplomatic strains. One such example is the construction of the Baglihar Dam by India in 2005, which led to disputes with Pakistan, as the latter raised concerns about the impact on the flow of the Chenab River, one of the tributaries of the Indus (AquaPedia 2015; Salman 2008). Water as a source of conflict is the subject of Chapter 6.

*Water as a Source of Cooperation:* Despite historical conflicts, instances of cooperation have emerged. The IWT stands out as a notable example of diplomatic collaboration (Wolf et al. 2003; Wolf 1998). The Treaty has survived multiple conflicts and continues to be a guiding principle for the Indus River sharing between the two nations. One notable example of the success of the IWT in facilitating cooperation between the two countries is the resolution of the Tulbul Navigation Project dispute (AquaPedia 2015; Wolf 1998). The project, aimed at enhancing navigation and water storage in Wullar Lake, sparked tensions in the late 1980s. Instead of escalating the conflict, both countries turned to the IWT's mechanisms, particularly the PIC. Through diplomatic and technical dialogue facilitated by the PIC, India and Pakistan reached an agreement in 1987. The resolution showcased the Treaty's efficacy in providing a structured framework for addressing water-related disputes, emphasizing the importance of institutionalized cooperation in managing transboundary water resources and preventing

conflicts in the Indus River Basin (Wolf 1998). Water as a source of cooperation is the subject of Chapter 7.

*Third-Party Engagement:* The Treaty allows for the involvement of international organizations, such as the World Bank, in facilitating discussions and providing expertise. International organizations have played a role in supporting the implementation of the Treaty and fostering cooperation between India and Pakistan. Their involvement has contributed to technical expertise in various projects (World Bank 2018). The World Bank's promise of financial incentives further facilitated this cooperation, and the partitioning of the Indus waters was viewed by both India and Pakistan as pragmatic and equitable (World Bank 2018). This arrangement not only enabled the countries to collaborate in securing necessary waters but also allowed them to secure financial assistance from the Bank for building essential infrastructure, culminating in the signing of the IWT (Chapter 37; World Bank 2018; Wolf and Newton 2008; Miner et al. 2009; Salman 2008; Sarfraz 2013). The Bank's role in fostering technical knowledge management and providing additional financial assistance to Pakistan contributed to the recognition of immediate and long-term mutual gains, solidifying the foundation for cooperation between the two nations (World Bank 2018; Salman and Uprety 2021). The role of third parties is discussed in Chapters 10 and 33.

*Adaptive Governance and Management:* Adaptive governance and management are important principles that govern the Indus River (Janjua et al. 2020). The socioeconomic changes and environmental impacts resulting from the construction of dams necessitated the adoption of adaptive governance strategies. As one of the largest reservoirs on the Indus, the Tarbela Dam underwent expansion to address growing water demands. In this case, the adaptive governance approach involved considering changing climatic patterns and population needs. More details on adaptive governance are presented in Chapter 36.

### *Water Diplomacy Challenges Addressed in This Case Study*

*Mapping the Problem Space:* A thorough understanding of challenges is essential. For the Indus River Basin, this involves mapping issues such as water scarcity, infrastructure challenges, and the impacts of climate change. For example, mapping regions experiencing acute water scarcity, like parts of Sindh in Pakistan, allows for targeted interventions to address the specific needs of these areas (Alam 2019). Mapping the problem space is discussed in more detail in Chapter 12.

*The Role of Distrust in Transboundary Water Relations:* Given the historical and political context between India and Pakistan, distrust may be a significant factor in the region's transboundary water relations. Instances where perceived water-related violations have fueled mistrust need to be addressed. The Kishanganga Hydroelectric Plant (KHP) Dispute is a good example of such mistrust. The construction of KHP by India raised concerns in Pakistan, contributing to mutual distrust regarding adherence to IWT (AquaPedia 2015; Mustafa 2013). The role of distrust is discussed in Chapter 15.

*Creating and Distributing Benefits:* The foundation of negotiation lies in the pursuit of mutual value creation, ensuring the continual acknowledgment of interdependencies. By aligning benefit identification and sharing with the principles of mutual benefit, equity, and sustainability, new options are typically forged. Examining how the benefits of water resources are distributed between India and Pakistan is vital. Ensuring equitable distribution can contribute to diplomatic stability and cooperation.

The agreement to share the limited resources of the Indus River's waters involved stakeholders deriving benefits, particularly in securing water for agriculture and energy development through diversion and storage reservoirs (Chapter 37; Alam 2019). The World Bank played a pivotal role by proposing a plan that established the principle of equitable allocation of the Indus' and its tributaries' flows, considering both historical flow and planned use (Janjua et al. 2020; Wolf and Newton 2008; Dinar et al. 2007). A pragmatic component of the allocation mandated India to supply water to Pakistan until the latter could build link canals to secure its own sources, reflecting a pragmatic approach that prioritized the international law principle of causing no harm while creating a mutually beneficial option (Chapter 37; Miner et al. 2009; Sarfraz 2013). The challenge of creating and distributing benefits is discussed in Chapter 16.

### *Water Diplomacy Tools and Techniques Addressed in This Case Study*

*Building Political Will and Shaping the Narrative:* The negotiation and signing of the IWT in 1960 required significant political will and a narrative emphasizing mutual benefits (Malik 2019; Biswas 1992). The Treaty itself can be considered a tool for shaping cooperation. Diplomatic engagements and high-level talks between leaders of India and Pakistan have involved efforts to build political will and shape public narratives regarding the importance of cooperative water management (Salman and Uprety 2021; Malik 2019). Building political will is discussed in Chapter 19.

*Joint Fact-Finding to Tackle Difficult Water Challenges:* The PIC, established under the IWT, serves as a platform for India and Pakistan to engage in joint fact-finding and resolve disputes related to the implementation of the Treaty (Caponera 1987; Biswas 1992). Through PIC, both countries have established mechanisms for sharing hydrological data and information, fostering transparency and trust (AquaPedia 2013; AquaPedia 2015). Joint fact-finding is discussed in Chapter 20.

*Principled Pragmatism:* The adaptability of the IWT to changing circumstances and the establishment of institutions like the PIC reflect a degree of pragmatic flexibility in governing and managing transboundary water issues while maintaining attention to principles. This manifested in an adaptive approach to both infrastructure and institutions. Adaptive approaches to water management and governance are discussed in more detail in Chapter 36.

While not explicitly framed within the context of climate change, the Baglihar Dam dispute illustrated the need for flexibility in infrastructure design to adapt to changing conditions (Salman 2008). Changes in precipitation patterns and glacial melt, influenced by climate change, can impact the availability of water resources. Through diplomatic negotiations facilitated by the PIC, India and Pakistan reached an agreement in 2007 (AquaPedia 2013; Salman 2008). The adjustments made to the dam's design addressed Pakistan's concerns, demonstrating the adaptability of institutions and infrastructure in managing water-related issues in the Indus River Basin (AquaPedia 2013; Salman 2008; Wescoat Jr. et al. 2000). Additionally, periodic talks and discussions between the two countries, facilitated by diplomatic channels, often address water-related concerns. While not necessarily resulting in new bilateral agreements, these interactions contribute to a mutual understanding of multi-faceted interdependencies and ongoing cooperation over newly emerging climate and environmental issues in the region (Janjua et al. 2020). Principled pragmatism is discussed in more detail in Chapter 36.

## Notes

1 The Indus Waters Treaty is a comprehensive water-sharing agreement signed on September 19, 1960, between India and Pakistan, with the World Bank as a signatory, that governs the distribution and use of waters from the six rivers of the Indus system. The treaty allocates the three western rivers (Indus, Jhelum, and Chenab) to Pakistan for unrestricted use, while granting India control over the three eastern rivers (Ravi, Beas, and Sutlej), with specific provisions for limited Indian use of western river waters for domestic purposes, non-consumptive uses, agricultural use, and hydroelectric power generation. The agreement establishes the Permanent Indus Commission with commissioners from both countries to oversee implementation and resolve disputes, and includes detailed technical annexures covering transitional arrangements, agricultural use limitations, hydroelectric development criteria, and water storage regulations. For the full text of the treaty, visit: www.mea.gov.in/bilateral-documents.htm?dtl/6439/Indus

2 A Standstill Agreement was a pact inked between the newly independent dominions of India and Pakistan and the princely states of the former British Indian Empire before their integration into the new dominions. This bilateral agreement outlined that all administrative arrangements in place between the British Crown and the princely state would persist unchanged between the signing dominion (India or Pakistan) and the princely state until new arrangements were established.

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## SECTION II

# Water Diplomacy Themes, Concepts, and Ideas



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# 5

# A HYDROLOGY PRIMER FOR DIPLOMATS

*Scott W. Tyler and Shawn J. Wheelock*

**Key Takeaways**

- The water cycle is essential to Earth's climate regulation and ecosystem health. It connects the oceans, atmosphere, and land through processes such as evaporation, precipitation, infiltration, and groundwater movement.
- Water systems transcend political boundaries—rivers, aquifers, and atmospheric flows connect nations and regions in ways that require collaborative management approaches.
- "Virtual water" trade through agricultural products creates hidden international water dependencies, with major agricultural exporters effectively transferring billions of cubic kilometers of water to importing nations.
- Climate change is intensifying water challenges, from glacier retreat and groundwater depletion to extreme weather events like atmospheric rivers, and increasing wildfire threats.

## Introduction

Water regulates the climate, sustains ecosystems, and allows humanity to flourish. To craft effective policy and foster international cooperation, we must understand how it is stored, moved and transformed—through both natural processes and human activities. In this chapter, we begin by exploring the core processes of the hydrologic cycle. We then look at examples of just how profoundly human decisions have impacted it. These include the diversion of the Aral Sea's tributary rivers—and its subsequent desiccation—as well as the depletion of groundwater across vast regions of the world, both primarily for agricultural use. Finally, we present cases where water scarcity is being driven by the effects of climate change, such as the retreat of mountain glaciers and the rise of catastrophic wildfires.

While hydrology (or *Hydrologic Science*) is ancient, it was only recently recognized as a distinct field. Its definition and scope have evolved over the past hundred years (Price & Heindl, 1968). The consensus today is that it is the science of water cycling through the natural environment. And to confuse matters even further, the study of water beneath the ground, such as that found in aquifers, is usually known as "hydrogeology." Although, as will be seen in this chapter, it is only

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one aspect of the Water Cycle. Most hydrologists, as well as diplomats, focus primarily on how it moves over the continents, since that is what most directly affects people and the ecosystems that surround us. That said, the field also examines the entire globe, measuring and interpreting the movements of water between the major stores (e.g., the oceans, the atmosphere, and the land) and through its various phases (i.e., ice, liquid, and water vapor). This planetary focus links it to many other Earth sciences, such as oceanography, atmospheric sciences, and biology.

## Fundamentals

### *Earth's Water—How Much and Where?*

Earth only has so much water… 1.38 billion km$^3$ worth. The vast majority of its fresh water is not residing in rivers and lakes, but in polar ice and the ground (see Figure 5.1). Much smaller amounts are scattered over the surface, in the atmosphere, and in us. It moves between each of these "stores," largely driven by weather.

### *The Water "Cycle"*

Most discussions of hydrology begin with the *Water Cycle*, a basic description of how water travels between stores and changes form. While reductionist, it allows us to quantify the system. Figures 5.2 and 5.3 present several depictions of the Water Cycle, each with a slightly different emphasis (a reflection of each artist's focus). The level of detail in each one reflects their intended audience: Figure 5.2 shows simplified depictions, suitable for general audiences, while Figure 5.3 presents more detailed versions for specialized use. The themes they all have in common are that

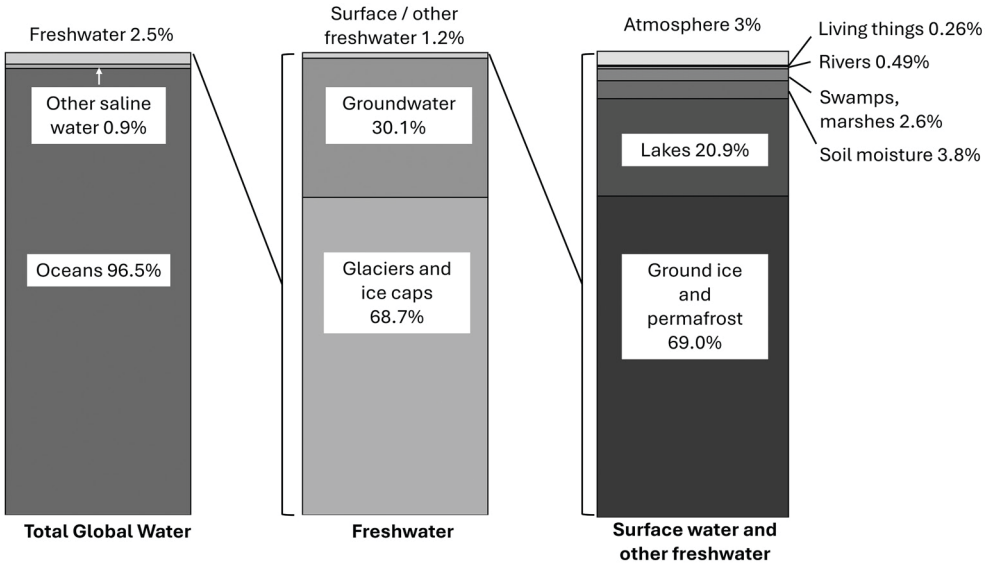



*Figure 5.1* Distribution of all water and subsequently the distribution of fresh water on the Earth. Data from Shiklomanov (1993).

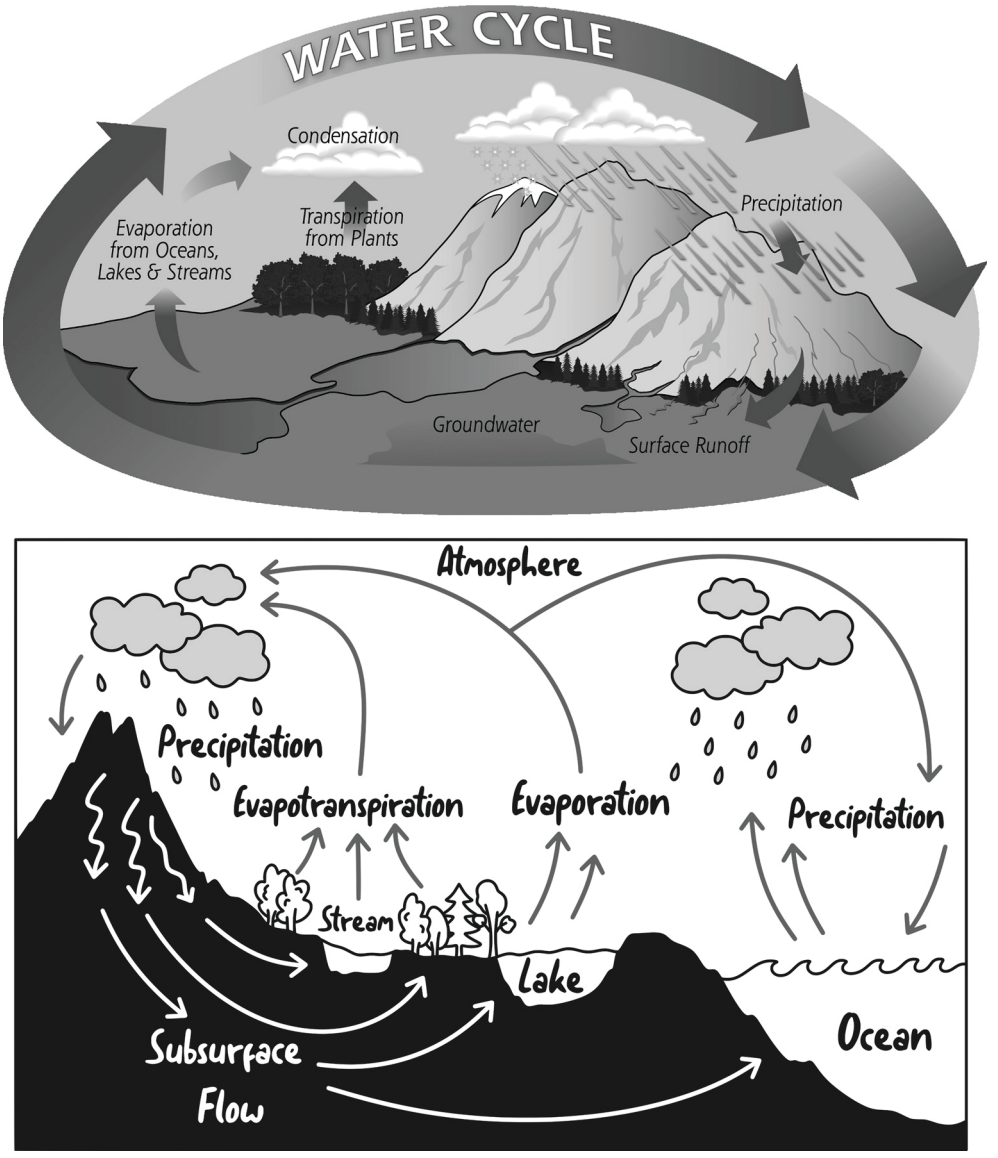
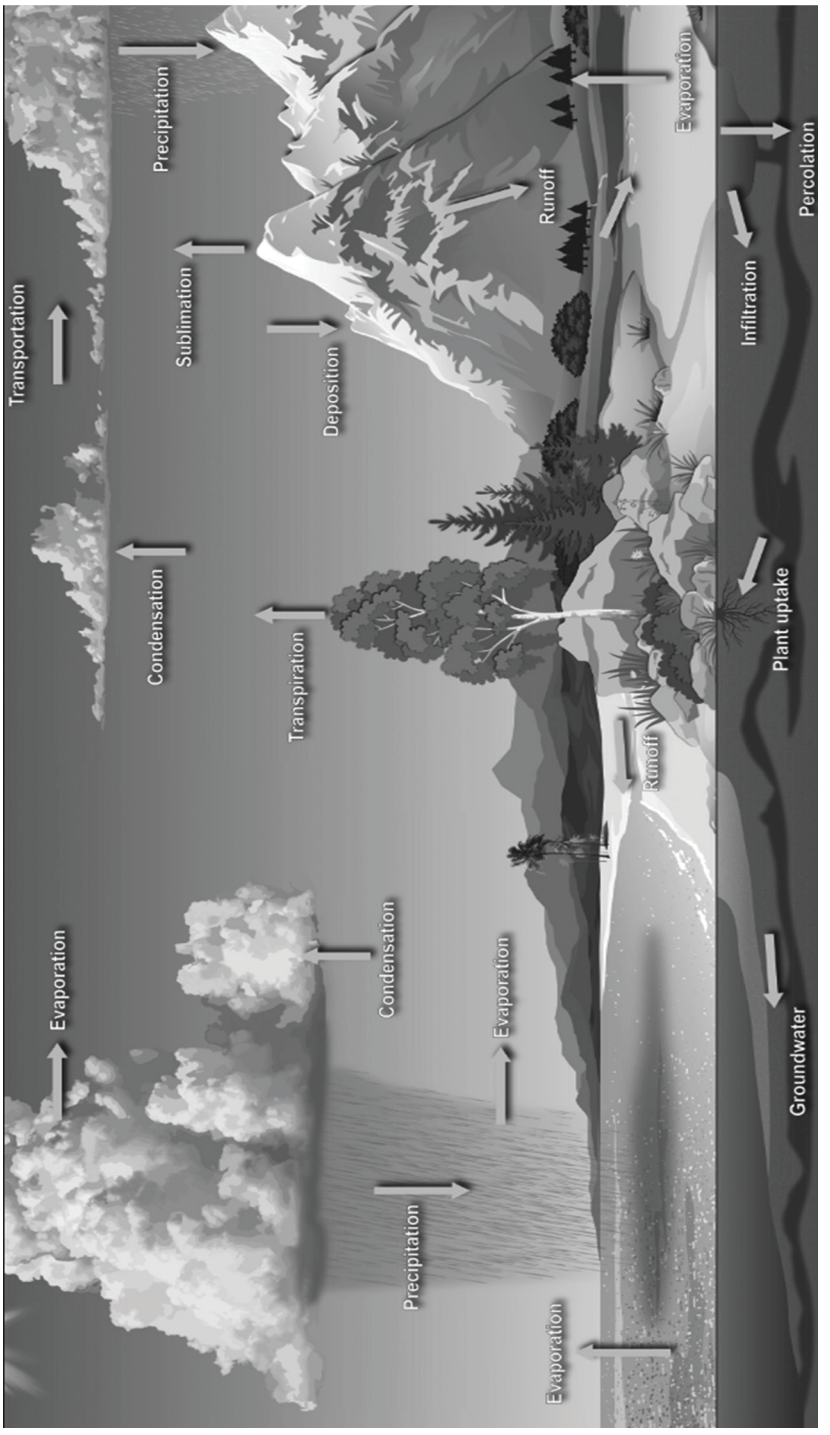



*Figure 5.2* Simplified views of the natural components of the water cycle. The top image is in the public domain, with credit to NASA. The bottom image was created for this text.

water flows in a cycle, is in constant motion, and is perfectly conserved— meaning that it is never lost or gained. As we will see it also can "short circuit" portions of the cycle, taking more direct routes when conditions allow.

Most presentations begin with Evaporation (*E*), which is primarily from the oceans (since they cover 71% of the planet[1]), secondarily from lakes, and, to a much lesser degree, from snow and ice (*Sublimation*). Once in the atmosphere as water vapor, it eventually forms clouds.


Transportation
Evaporation
Precipitation
Sublimation
Condensation
Deposition
Transpiration
Runoff
Evaporation
Infiltration
Percolation
Plant uptake
Groundwater
Runoff
Condensation
Evaporation
Precipitation
Evaporation

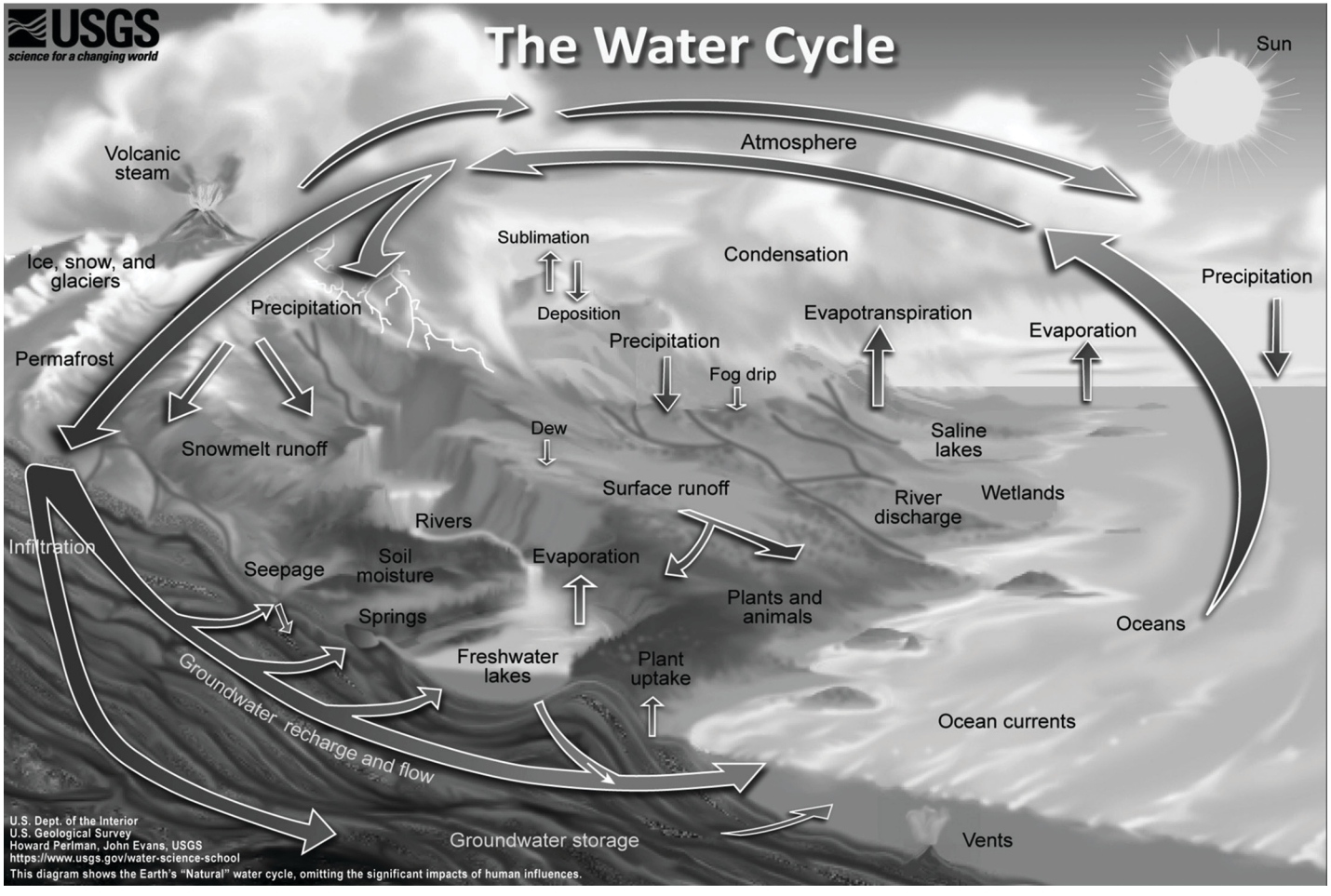



*Figure 5.3* More detailed examples of a hydrologist's view of water. Note that even in these more complicated diagrams, most present the flow of water as primarily in one direction and generally unaffected by humans. Top image credit Dennis Cain of the U.S. National Weather Service. Bottom image credits to Howard Perlman and John Evans of the USGS. Both images are in the public domain.

From the clouds, Precipitation (*P*) falls as rain, snow, hail, etc. Most of this reaches land, but in arid regions, a portion may re-evaporate during its descent (commonly known as *Virga*). Due to a layer of warm, dry air near the land surface, rain can be seen falling but not reaching the ground. Here, the "cycle" is not a cycle at all, but more like a highway or autobahn. There are many exits that allow water to take other paths.

When it reaches the land surface, water usually soaks into the ground (known as *Infiltration*, *I*) but may also accumulate as snow or glacial ice. When it flows over the surface, it is called *Runoff* or *Overland Flow* (usually denoted as *Q*, or less commonly, *R*). While we see dramatic images of runoff after hurricanes and typhoons, it is fairly unusual in nature to have much of it directly from rain. This is because most soils have sufficient *infiltration capacity* to absorb it as it falls.

When soils become saturated or humans make large areas impermeable—such as by building cities—that storms cause flooding. In most natural settings, the majority of rainfall and snowmelt quickly infiltrates and there is little runoff. As we shall see, this is far from the only way in which we have significantly altered the Water Cycle.

After the rain subsides—and assuming most of it infiltrated water may follow several distinct pathways, each operating on vastly different time scales. We will examine these processes in order from the shortest to the longest.

Water that remains *on* the vegetation, or very close to the soil surface, can reevaporate, which quickly recycles it back to the atmosphere. Although this portion plays a vital role in many arid regions, it accounts for only a small fraction of rainfall. The majority is retained within the soils (*Soil Water*), where it is available to vegetation—a resource commonly referred to as *Green Water*.

Remarkably 95–99% of the water that is used by vegetation is simply evaporated back to the atmosphere through the leaves and other plant surfaces. Only a few percent (at most) of it is actually converted into plant material through photosynthesis! While it is essential for their health, plants primarily use water as a medium for transporting nutrients and their growth products rather than incorporating it into their tissue. For instance the average water footprint of a single California almond is 12 liters (Fulton et al., 2019), but it obviously does not contain all that water! The vast majority simply moves through the almond tree and back to the atmosphere.

Since the uptake and transport of water by plants to the atmosphere (*Transpiration, T*) is often difficult to measure and distinguish from the evaporation from adjacent soils hydrologists generally combine the two processes into *Evapotranspiration* (*ET*): the total amount of water that evaporates from a vegetated area. Given that its primary controls are atmospheric conditions (e.g., temperature and humidity) and sunlight availability—which are simple to measure—it is easy to estimate (Allen et al., 1998). This is the way farmers determine how much irrigation is needed to keep crops healthy.

Evapotranspiration also depends on the availability of soil water. What happens when houseplants are not watered? They eventually wither and die from lack of moisture. The same applies to natural vegetation: it reduces its transpiration in response to drying soil. Hydrologists coined the term *Actual Evapotranspiration* (AET) to represent the actual amount of water that is evaporated back into the atmosphere from vegetation and soils in the Water Cycle.

On most of the across the globe, evapotranspiration is the dominant "recycler" of water back to the atmosphere, typically accounting for 60–80% of rainfall. This water is only on the surface for a short time—generally ranging from days to weeks. This is known as its *Residence Time*.

During this time, the remaining precipitation has typically either infiltrated deeper into the soil or run off into rivers and lakes. The portion that penetrates beyond the reach of most roots follows complex pathways underground, and its journey may take *much* longer.

Under the influence of gravity, water generally moves downward vertically through the soil until it reaches either a soil layer that prevents further infiltration (such as clay) or the water table—a zone of fully saturated soil or rock (e.g., sand, gravel, and limestone).

Blocked by Impeding Layer: If the layer is shallow and sloping (as is common on hillsides or in regions with topographic relief), water follows that slope and either (1) returns to the land surface as intermittent springs, or more frequently, (2) drains to the lowest point on the landscape and collects into streams and lakes. This shallow subsurface flow is often rapid—ranging from hours to days. Once the water completes this journey, springs vanish and the elevated streamflow during (and immediately following) the storm gradually subsides.

Once water reaches the water table, it has replenished an aquifer and officially earns the title: *Groundwater*! An aquifer is one or more layers of rock or soil that are saturated with water and can *both* store and transmit it to springs or wells.

This process is known as *Groundwater Recharge* (*GWR*), or simply *Recharge (R*—but don't confuse it with runoff!). Once there—this will sound familiar—it usually follows the topographic relief and reemerges as springs or directly into the beds of streams, rivers, and lakes. What distinguishes this and the case in which the water does *not* reach the water table? The longevity of the hydrologic feature. When fed by an aquifer, streams continue to flow (*Baseflow*) long after the pulse of water that follows a storm has passed.

Baseflow is critical for both human and ecosystem sustainability. The continued flow of streams, despite long periods without rainfall or the absence of upstream lakes, is due to groundwater. Without it seeping into streams during the dry periods, many of them would dry up completely. The time of year when most of the water in channels comes from baseflow varies by region but is generally in the late summer months (or during the season of most dryness). As we will see in one of our examples, groundwater pumping for irrigation can lower the water table below the streambed, eliminating the connection required for baseflow to and drying up the channel—often with severe ecological consequences.

While hydrologists (as well as lawmakers!) often treat groundwater and surface water as entirely different and disconnected water resources, we see here that they are intimately connected and, in fact, are simply parts of the broader Water Cycle.

Water tables are a type of aquifer known as *Unconfined.* They are shallow and respond rapidly to changes at the surface. Groundwater may also reside in aquifers that are much deeper and under considerable pressure (*Confined*). While these are recharged in the same way as unconfined aquifers, the source water is typically from higher elevations. As the groundwater moves topographically downward, it flows *underneath* geologic material that is difficult for it to move through (such as shale or claystone) and continues to move downslope.

Eventually, the water in these deep aquifers also flows into streams, lakes, or overlying unconfined aquifers. Since these aquifers are under pressure, they can sometimes even produce flowing water at the surface when penetrated by wells (*Artesian Conditions*). While the amounts can be quite large, this flow is usually sustainable only for short periods of time.

The time scales for shallow groundwaters to return to the surface generally range from months to years, but in many arid regions, this process take millennia. As they often occur near the land surface and are influenced by seasonal changes in precipitation, the depth to the water table can vary significantly from season to season.

As a result, water levels in wells penetrating unconfined aquifers may vary by multiple meters from a wet season to the end of a dry season. In addition, unconfined aquifers are vulnerable to pollution from the nearby land surface from domestic waste, fertilizers, industrial chemical spills, etc. Where these aquifers are found along coastal settings, they can also be easily polluted by

seawater, either through storm surges or through over-pumping on land, which allows seawater to enter the aquifer.

In contrast, confined aquifers tend to be quite isolated from processes at the land surface and can contain water that infiltrated during prehistoric times. While they are often highly productive water supplies, they can easily be overexploited by pumping out more water than they are currently receiving as recharge.

As we will explore later, groundwater has become a vital resource for human development over the past two centuries. However, within the context of the Water Cycle, it is a small component, usually accounting for only 5–10% of the total precipitation. Its residence time—the **time it takes for water to move through the aquifer and return to the land surface**—is significantly longer than that of the other components. Consequentially, groundwater may be one of the most sensitive elements of the Water Cycle to human influence and overexploitation.

There are other important "exits" on the Water Cycle highway, such as uptake during mineral weathering, deep sediments subducted during plate tectonics, and water gained or lost through the uppermost atmosphere. But these are either quite small or operate at time scales far longer than most human planning and interactions, and are thus beyond the scope of this chapter.

## *Fluxes and Units: Terms of the Trade*

Up until now, we have discussed the components of the Water Cycle in general terms, without reference to their magnitude or how we measure and talk about them. Unfortunately, the jargon of water is complicated, confusing, and, at times, can seem to border on obfuscation. Hydrologists commonly speak of "acre-feet," "cubes," catchment yield in millimeters (mm) or million gallons per day (MGD)… all of which are essentially referring to a simple quantity of water!

Rather than consume the rest of this chapter with definitions, we provide below the most common terms for each of the major components of the Water Cycle, all of which are simply an amount of water (such as gallons, liters, cubic feet, etc.) that has moved in a stretch of time (e.g., year, day, second, etc.). All the components of the cycle are flows—or "fluxes" in the parlance of hydrologists—of water and are, therefore, a mass or volume of water per time. For example, the flow in a river (*discharge*) is commonly reported as a volume of water per time (such as cubic feet per second or cubic meters per second). For the sake of simplicity, we will assume here that our Water Cycle occurs over a single year and that water is incompressible, so we can talk in terms of volumes of water annually.

What you will quickly notice is that most of these values are usually expressed as either a depth or volume (depending on the application) per time. To move from a depth to the total amount of water for a given catchment or watershed, we multiply it by the area.

### *Evaporation (E)*

Evaporation is normally described as a depth of water per unit time, or simply a depth. Since evaporation is primarily controlled by the atmosphere, evaporation rates tend to vary less than other components of the Water Cycle. Typical evaporation rates on a sunny day can range from 0.2–1.0 cm/day, depending upon latitude, temperature, and humidity. To calculate how much water has evaporated from a lake, for example, we multiply the rate by the lake's area and the time during which there has been evaporation.

Evaporation has historically been measured using evaporation pans, which are essentially large containers of water whose levels are measured periodically. More recently, these estimates are

usually made from meteorological measurements, including temperature, humidity, wind speed, and solar radiation.

### *Precipitation (P)*

Precipitation is normally described by a depth (e.g., millimeters of precipitation, centimeters of snow, etc.) as this is how it is commonly measured by some type of collection device (there are *many* variations). To calculate the total amount of water that has fallen on a given catchment or watershed, we multiply this depth by the area of the catchment, which results in a volume of rain per year. Precipitation intensity is typically described as a depth per time. Normally, this is given during a specific time period since both intensity and duration are crucial factors in determining if significant overland flow or flooding will occur. For example, a 5 cm/hour storm lasting 60 minutes can produce serious flooding in most urban areas.

Many nations maintain ground-based "rain gauges" that are designed to measure the amount of rainfall and, in some cases, the intensity as well. "Measuring" snowfall is far more challenging. It requires large instruments or manual measurement of snow depth and snow water content. Today, many nations determine rainfall and snowfall in real time using radar networks or, at larger scales, satellite-based sensors.

### *Evapotranspiration (ET or AET)*

Evapotranspiration is a measure of the combination of evaporation from the soil and the transpiration of water from the plants across a given area. Since it is difficult to distinguish where water is evaporated across a mixture of vegetated and bare soils, we combine these two fluxes into the term, evapotranspiration. ET is normally described as a depth of water or depth per time. When reported as a depth, it is used to describe the amount of water needed to supply the evapotranspirative demand of vegetation and soil over a day, week, or month. To calculate how much water has evapotranspired from a given catchment or watershed, (as with precipitation) we multiply this depth by the catchment area, which produces a volume of evapotranspiration per year. Unlike evaporation, ET is controlled by the atmosphere and soil moisture availability. This means that in very dry deserts, AET may range from 0 all the way up to 2 cm/day at an oasis.

Evapotranspiration is quite challenging to directly measure over large areas since doing so requires a network of sophisticated meteorological stations. It can be estimated using meteorological parameters (Allen et al., 1998) and recent advances in satellite remote sensing have greatly improved our ability to estimate it at these scales.

### *Runoff (R or Q)*

Runoff is also described as either a depth or a volume per time depending on the application. When reported as a depth, it is calculated as the total runoff over a period of time divided by the catchment or watershed area. Used this way, it is referred to as the catchment or watershed "yield" and can be easily compared to the annual precipitation. For example, if the annual area-averaged precipitation of a catchment is 100 cm and catchment yield is 33 cm, then ~two thirds of the annual precipitation was evaporated back to the atmosphere from the catchment, while one third of the precipitation ran off the catchment in rivers and streams. Note that groundwater flow out of catchments is commonly not included in this calculation as it is generally small.

Runoff is typically measured using a combination of river elevation monitoring (*Stage Monitoring*) and periodic direct measurement of the volume of river discharge manually. Runoff monitoring is not without significant sources of uncertainty and large changes from year to year. An interesting diplomatic situation has arisen between the US and Mexico over stage measurements on the Colorado River in the early part of the 20th century. River monitoring was conducted prior to construction of the Hoover Dam, during a multi-year period of above-average flow. These erroneously high flow measurements were used to allocate annual water resources on the river between states in the US and between the US and Mexico, contributing to water shortages on both sides of the border (Reisner, 1993).

### *Groundwater Recharge (GWR or R)*

Groundwater recharge is usually reported as a depth per time or as a percentage of annual precipitation. A common time interval for recharge is annual, even though recharge may occur over short periods following precipitation events.

Quantifying groundwater recharge is challenging. Instead, many hydrologists measure groundwater discharge (from springs and other sources) and assume that the aquifers discharge as much as is recharged (known as the "steady state" assumption). This allows them to use the discharge value to estimate recharge. As will be seen in one of our examples, most aquifers are not at steady state and are, in fact, declining in storage.

Table 5.1 summarizes the major terms that we have defined so far and their abbreviations.

Hydrologists typically quantify the Water Cycle using a balance equation over some area/volume and over some period of time—that is, what goes in is either stored or exits the system. This "Water Balance Equation" typically is calculated over annual time scales, and takes precipitation as its input and outputs runoff. In mathematical terms, it can be written as:

$$P = ET + R + GWR + \Delta S$$

where $P$ represents the precipitation falling, $ET$ represents the amount of water evaporated and transpired, $R$ represents the amount of water leaving the area by streams and rivers, $GWR$ is the amount of water reaching the water table, and $\Delta S$ represents the change in the amount of water stored, typically in the soil or reservoirs.

*Table 5.1* A summary of the common terms used in hydrology and their common abbreviations

| *Terminology* | *Common Abbreviation(s)* | *Definition* |
|---|---|---|
| Evaporation | $E$ | Phase change of water from liquid to vapor |
| Infiltration | $I$ | Water entering soil or rock |
| Runoff | $Q$, $R$ | Water moving over the land surface |
| Soil Water | $\Theta$ | Mass or volume of water retained in soil |
| Transpiration | $T$ | Water evaporated from plants and vegetated surfaces |
| Evapotranspiration | $ET$ | Water evaporated from both vegetated and non-vegetated surfaces |
| Recharge | $R$, $GWR$ | Water entering the groundwater reservoirs, typically from infiltration |
| Baseflow | $Q_b$ | Streamflow supported solely by groundwater discharge |
| Groundwater | $GW$ | Water stored beneath the land surface, typically in saturated sediments or rocks |

Estimates of the magnitude of these components of the terrestrial Water Cycle have been available since the 1970s (Budyko, 1970; Rodell et al., 2015) report that, averaged over the entire globe, the annual precipitation is 0.80 m, while evaporation and evapotranspiration accounted for 0.48 m and runoff was 0.31 m. Estimates for groundwater recharge are not reported but are likely to fall within the uncertainty range of these values. And as discussed above in the section on river baseflow, a significant portion of the runoff spent time as groundwater.

### *Users and Consumers*

It is also illustrative and helpful to quantify the primary "users" and "consumers" of the terrestrial water. Here we define a user as a sector that withdraws water, either from surface water or groundwater, but returns most of that water, usually back to surface water. Examples of users would be public water supplies to municipalities where commonly 80–90% of the extracted water is returned as wastewater, either treated or not. Similarly, thermoelectric power generation uses large quantities of water for cooling, but most of this water is simply passed through the generating station and returned to rivers and lakes, albeit slightly warmer.

In contrast, an example of a consumer of water is the agricultural sector. Whether using natural rainfall or supplemental irrigation, a significant portion of the water applied is returned not to surface waters but to the atmosphere via transpiration and evaporation, hence "consuming" water. Depending on the efficiency of irrigation, between 50% and 70% of the applied water is returned to the atmosphere, while the remainder is either returned to surface water via drainage systems or recharges aquifers below the irrigated fields.

As an example, in the US, based upon 2010 data, the largest user of water is the thermoelectric power sector (45%), while public water supplies account for 12% of fresh water. In both uses, actual consumption of water is low, with power plants consuming 3–5% of their total water use, with similar values for public water supply. In 2010, agricultural water use was 32% of the total withdrawals, with perhaps half of this water consumed. Moving forward, however, we already see trends of decreasing water use by thermoelectric generation as the sector moves away from coal and moves toward natural gas and more efficient cooling systems. And in the agricultural section, while improvements in irrigation technology are reducing the amount of water used per hectare, irrigated acreage in the US continues to increase.

At the global scale, agriculture is dominant user and consumer of terrestrial freshwater. Globally, ~70% of freshwater withdrawals are related to agricultural production (Gleick et al. 2014). The use is strongly tied to income, with low-income nations using up to 90% of freshwater for agriculture, while high-income nations average only 41%. As up to 50% of this water is actually consumed, and is not returned to rivers or lakes, it is clear that agriculture is by far the dominant consumer of water. (Ritchie and Roser, 2017).

As climate warms and populations increase, the challenge for policymakers lies in the need to balance both food production, a consumer of water, and drinking water, a user of water. While water conservation efforts are a high priority in both sectors, it is clear, based on the differences in water consumption, that the agricultural sector is the "low hanging fruit" to reduce water stress.

## Interactions and Connections

While the processes and flows of water in nature appear large and slowly changing, humans have fundamentally altered the cycling of water, at an accelerating pace. The expansion of irrigated agricultural land in the 20th century, and its net consumption of water, has reduced global river

discharges by 2.1%, with the largest reductions in Asia and North America (Biemans et al., 2011). The rapid growth of urban centers has strained water supplies and degraded water quality significantly, leading to significant health threats. At the same time, climate warming is changing the inputs and outputs to the Water Cycle, generally increasing their vigor and temporal variability. In the second half of the 20th century, global precipitation was increasing at a rate of ~1 mm/year every year as the atmosphere can now hold more moisture, while the rate of evaporation from the land surface is only increasing by a rate ~0.5 mm/year. Because of this imbalance, runoff in rivers also appears to be increasing (Labat et al., 2004), which may be beneficial for some; however, there were large differences in runoff increase or decrease at the river scale (Zhang et al., 2015).

In the following brief examples, we highlight some of the Water Cycle issues facing society and diplomats, the impacts of human activity on water resources, and some of the new science available to address these challenges. These are meant to illustrate the types of water-related issues that policymakers, scientists, engineers, and diplomats are—and will be—facing in the future. We begin with an example that focuses on water management and water use by various sectors of society and close with the impacts of future climate change on water resources.

### *Groundwater Overdrafting—Recognizing the Lender of Last Resort!*

While the extraction of water from wells and aquifers for drinking water and small-scale irrigation has been a part of human history since the early days of Mesopotamia, it is only in the last 70–80 years that the use of groundwater has skyrocketed. Beginning in the 1940s and 1950s the development of high-capacity electric and gasoline/diesel pump opened this resource for use. Today, it is estimated that 35% of all fresh water is extracted from aquifers. Figure 5.4 shows the rate of groundwater depletion in major aquifers in the US, demonstrating the dramatic increase in pumping beginning the late 1940s. This trend is not unique to the US but is occurring in many parts of the world.

And nowhere has this made more of a change than in agriculture. This sudden availability of water, including arid and semi-arid regions, along with the development of low-cost inorganic

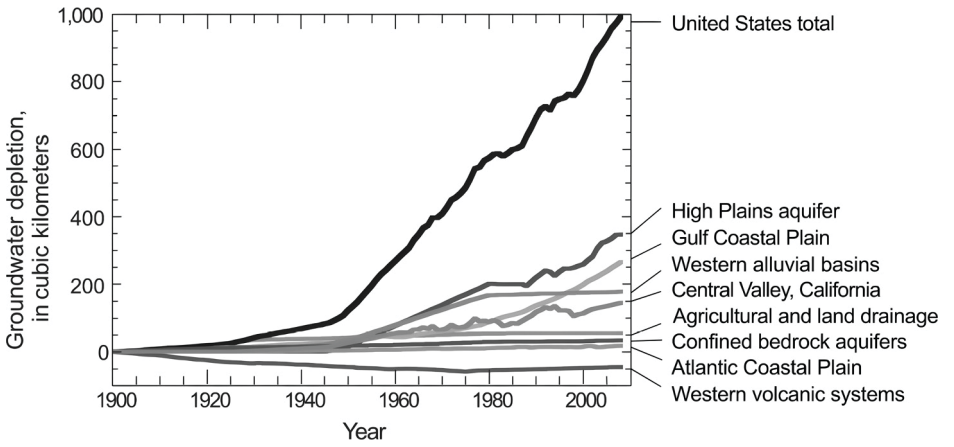



*Figure 5.4* Depletion of the major aquifers of the US from 1900 to 2010. The total depletion approaches 1,000 km$^3$ of water removed from aquifer storage. For comparison, the largest manmade reservoir in the world, Lake Kariba in Zimbabwe, contains less than 20% of this volume. Modified from Konikow (2013), which is in the public domain with credit to USGS.

fertilizer, has helped drive the Green Revolution, increasing agricultural production around the world. While first exploited in the semi-arid regions of the US, in such aquifers beneath Texas, Kansas, and Nebraska, and the Central Valley of California, agriculture based on groundwater or supplemented by groundwater is now found in almost all the arid and semi-arid regions of the world. Groundwater can be used alone to expand truly arid regions for agriculture, such as the "Great Man-Made River" project in Libya, but more commonly, groundwater is used to augment natural rainfall or surface water supplies, particularly in times of drought. For these extensive agricultural areas, groundwater has now become the "lender of last resort." But as was discussed earlier the water in many of these aquifers is quite old, having been recharged hundreds to thousands of years ago, and the rates of aquifer replenishment or recharge may be much lower today than in past wetter climates. And unfortunately, the groundwater "bank" cannot easily print new water!

Withdrawing more water from these aquifers than what is currently replenishing them places these aquifers in a state of "overdraft," and essentially the water is being mined from the aquifers. Over time, water levels in the aquifer begin to decline, requiring wells to be deepened and resulting in high pumping costs. The land may begin to subside due to the withdrawal of water, leading to disruptions of roadways, pipelines, and canals. If the pumping is close to the coastline, seawater may also be drawn into the aquifer to replace the water that is being withdrawn, rendering the aquifer useless. And, finally, when water levels fall below the level of streams and rivers during the dry seasons, it is no longer possible for the groundwater to provide the baseflow necessary to keep these streams flowing. For example, in the High Plains of the central US, groundwater mining has led to the collapse of upland fisheries and ecosystems that relied upon groundwater to support streamflow during the summer months (Perkin et al., 2017) and rivers from the aquifer. Laws related to the withdrawal of water from aquifers vary greatly across the world, with some authorities banning groundwater overdrafting, while others encourage it for the economic development that it can bring, albeit for a finite time.

Up until recently, assessing the overdraft and decline in many of the world's large aquifers was a challenging proposition, requiring long-term monitoring of water levels in wells, cooperation and free exchange of such data and an understanding of the recharge rates to the aquifer, and close accounting of the volume of water pumped. However, with the launch of the Gravity Recovery and Climate Experiment (GRACE) missions,[2] it is now possible to measure the mass of water extracted from the large aquifers of the world on a monthly to annual basis remotely, without the need for monitoring water levels. Figure 5.5 shows examples of rates of depletion of several of the worlds large aquifers in India and California used for agricultural production.

The volumes of water extracted and not replenished are enormous. For example, Alam et al. (2020) report that in the US Central Valley of California, over 3 $km^3$/year of water has been pumped and not replenished over the last several decades. These rates of pumping are not, in the long term, sustainable, and the future of agriculture and the economic livelihood of these regions is inevitable as the water resources are depleted. Advances in the use of flood waters to recharge aquifers during times of excess water are underway in many areas, with moderate success (He et al., 2021), as is the transfer of water from outside of hydrologic basins to artificially recharge aquifers. Yet in all cases, if more water is pumped from these aquifers than what can be recharged, over time, the aquifers will decline to depths where pumping is less economically viable. This depletion can also lead to land subsidence and will have impacts on infrastructure such as roads and canals. How nations and regions plan for this inevitability is a problem of the highest complexity; it cannot be addressed by scientists and engineers alone, but rather will require the tools of water diplomacy and cooperation.

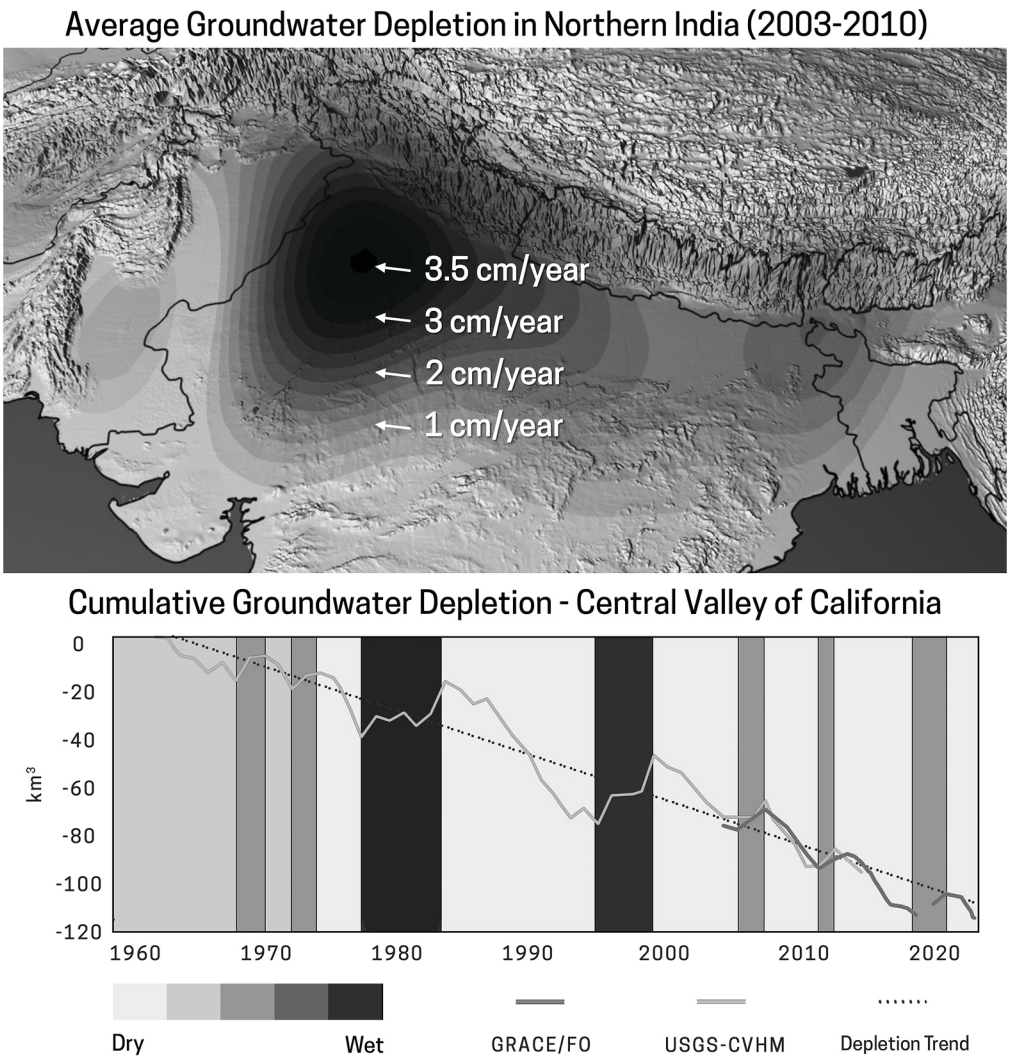



*Figure 5.5* Maps showing groundwater depletion in large aquifers in India and California. At top, GRACE estimates of average annualized rate of depletion from 2003 to 2010 in Northern India, given in units of water depth (cm). At bottom, estimates of groundwater depletion over time in the Central Valley of California using both a USGS's Central Valley Hydrologic Model (CVHM) and GRACE estimates, with units of volume (cubic kilometers). The top image is modified from NASA and is in the public domain. The bottom image is modified from Liu et al. (2022), who made it available under a creative commons license.

### *Virtual Water—Real or Imaginary?*

So far in this text, we have described the flows of water as they occur naturally. However, humans have fundamentally altered the flows and storage of water primarily to support agricultural production. While this has been occurring since the beginnings of civilization, it is only since the turn of the last century that massive water engineering projects have been developed to support

large-scale irrigated agriculture. These projects, combined with inexpensive chemical fertilizers, sparked the "Green Revolution" and have led to rapid growth in both population and economic prosperity around the world.

This expansion in worldwide agriculture, and more importantly the development of large-scale international trade of food products (both animal and vegetable), has led hydrologists and water economists to coin the term "virtual water" for water that is consumed in any way in the growing of food. The vast majority of virtual water is stored in the soil (or added by irrigation) and is termed "green water." (And recall that most of the water "consumed" by vegetation is actually evapotranspired back to the atmosphere, rather than returned to the terrestrial portion of the Water Cycle[3]). While not truly consumed, as this water must reenter the Water Cycle somewhere, it appears to have been "lost" to the landscape from where it was originally sourced and no longer supplies rivers and lakes with freshwater. Consequently streamflows decline from previous levels, and lakes shrink. A well-known example that was caused by agricultural diversions is the Aral Sea in central Asia. Since the 1960's, the flows of the Amu Darya and Syr Darya Rivers have been so reduced that its water level has fallen over 26 m. As of 2009, its surface area had decreased 88%, leaving four separate, salty water bodies (Micklin, 2010). Municipalities have dried plenty of areas as well. In California, the diversion of mountain streams to Los Angeles made Owens Lake vanish in a decade (Baugh, 1937). In the 1940's, the city extended its reach to scenic Mono Lake, which has since dropped 14 m, reducing its volume by half (Stine, 1991).

The diversion of water and hence the increase in agricultural production of many nations has led to a massive increase in global food trade, with some nations producing excess food and others relying on imports to feed their population. This new "food cycle" has added a new pathway in our Water Cycle, namely the "Green Water Cycle." Water, consumed by agriculture, can now be considered to move around the world as well, as the water associated with the production of food. This hidden water cycle has been coined "virtual water." While this water is not physically moving on bulk transport ships or in the holds of airplanes, it is virtually moving from where agriculture is produced to where it is consumed.

Figure 5.6 demonstrates the magnitude of this virtual water export in terms of cubic kilometers of water per year. Not surprisingly, the largest agricultural producers (the US, Brazil, Canada, India, and Australia) each export large quantities of green water to nations with large populations but less agriculture (Europe, the Middle East, Japan, and Mexico). The quantities of water are enormous, yet until recently, the presence and impact of these water transfers were rarely considered by hydrologists. Yet these pathways and the changes in export/import of virtual water are critical to the understanding of socioeconomics aspects of water. How these flows change or are disrupted by natural (drought) or human (conflict or upstream water diversions) is likely to be one of the major considerations in water diplomacy going forward under a changing climate. Hydrologists are only now beginning to study these complex human and physical processes together (see, e.g., the US National Science Foundation's programs in Innovations at the Nexus of Food, Energy and Water Systems[4]. This is and will continue to be an area of common study between diplomats and the scientific community.

### *Retreat of the World's Mountain Glaciers*

Unlike many parts of the Water Cycle, the retreat of the world's glaciers and icefields is easily recognized. The startling time lapse images of tidewater glaciers retreating and deflating in only a few years is the most visible evidence of hydrologic change we have. Mountain glaciers, such as those in the Andes, the Himalayas, and China's Qilian Range, whose annual melting provides significant freshwater resources to those living downstream, will have some surprising effects on local and regional water supplies due to changes in ice volume.

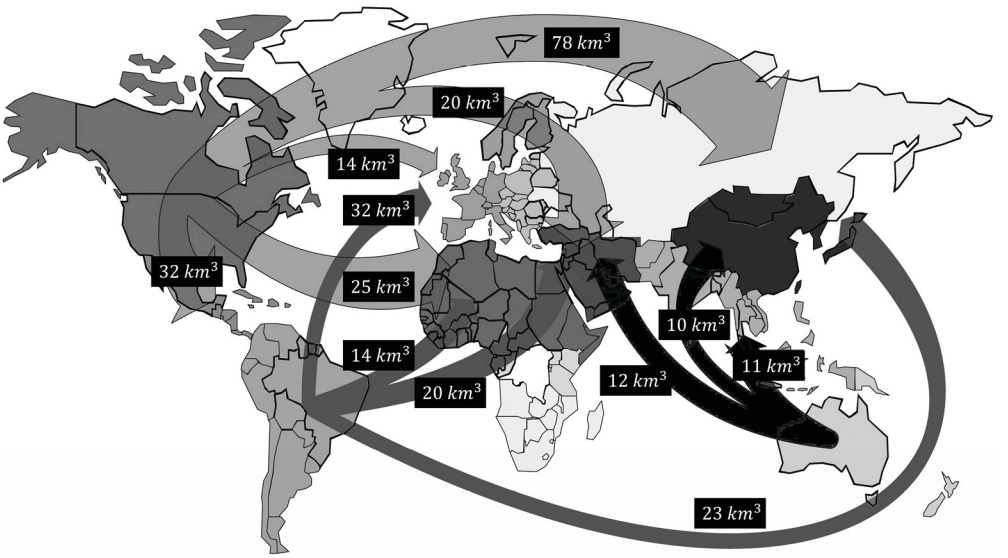



*Figure 5.6* An illustration showing select annual virtual water exports as reported by El-Sadek (2011). Note that 1 $km^3$ is equivalent to 1 billion $m^3$. Adapted from El-Sadek (2011), which is available under a creative commons license.

To begin with, it is important to recognize that glaciers have always been melting but over much of the industrial revolution, their melting was similar from year to year, with most of the melting occurring in the summer months. But it is also important to recognize that most rivers with glacial inputs also have significant input of water from melting snow in non-glaciated regions. As a result, most rivers fed by glaciers had displayed an increase in flow during springtime (from snowmelt) and, unlike rivers without headwater glaciers, an increase in flows through the summer as the glacier ice melted.

As glaciers recede under the current warming climate, water is released from long-term glacial storage. During this period, surprisingly, runoff and river flows actual increase. This is unfortunately a short-lived phenomenon; once the glacier shrinks below a threshold, there is simply less ice to melt, and river flows begin to decline. The time to "peak water" is years to perhaps decades and the peak flow can exceed the historical average flows by as much as 50%.

At the same time, as the glacier retreats, rather than having ice to reflect much of the solar energy, much more sunlight is absorbed by recently exhumed rock and soil. This both warms the ground and accelerates the melting of any snow that falls on the glacier or surrounding areas at its lowest elevations. This leads to a much shorter, and intense, period of snowmelt and river flow increase in the spring.

Glacier retreat changes the timing in the year and day when the most water is available in rivers. At mid- and high latitudes, runoff is greatest in the summer, when the glacier ice continues to melt after the winter snow has disappeared, and greatest during the day when air temperature and solar radiation are maximum. At peak water, more intense glacier melt rates also increase these daily runoff peaks, significantly stressing downstream infrastructure. In tropical areas such as the Andes, alternating wet and dry seasons are the main control rather than temperature on glacier runoff.

The impacts of retreat of many of the world's mountain glaciers on downstream water resources will be perhaps more challenging than other hydrologic changes, as the change will not mean a monotonically greater or less water supply, rather flows will increase for some time, then decline significantly. Designing human infrastructure for these kinds of changes is extremely difficult and controversial. It is therefore likely that significant flood damage in regions close to the glaciers will occur prior to and during peak flow, followed quickly by drought conditions and limited runoff during the important summer months when agriculture in the mountain communities relies upon summer glacial melt flows in the rivers. Much further downstream from the glaciers, where most major population centers are located (e.g., Seattle, Lima, and New Delhi), this will witness far less impact, as most of these major water supply systems rely on runoff from snow and other sources, rather than simply glacial melt. The only major tropical cities currently getting a significant proportion (~30%) of their water from glaciers are La Paz and El Alto in Bolivia. Therefore, mountain glacier retreat will have a disproportionate impact on traditionally poorer mountain communities whose access to resources and political power is sharply limited.

### *Wildfire—An Apex Predator*

Wildfire? In a hydrology primer? We wish it were not necessary.

Few observers of global events are unaware of the devastating toll of wildfire—or that it is increasing (Williams et al., 2022). In the first decade of the 2000s, the United States experienced more than twice as many wildfires as in previous decades—and they were four times larger (Iglesias et al., 2022). The implications of this explosive growth for our water supplies are alarming (Hallema et al., 2018; Martin, 2019; Robinne et al., 2021).

Wildfire affects the Water Cycle both by consuming vegetation and changing soil properties. Newly burnt soils are often impermeable (*Hydrophobic*). Normally, a portion of precipitation infiltrates, but when it cannot soak into the ground, nearly all of it becomes runoff. Not only does this choke off aquifer recharge the additional water traveling downslope gives the flow much more momentum. What else will happen? Vegetation also holds the soil in place. Without the roots, all that water takes loose soil with it—causing erosion. At best, vital topsoil is lost.[5] At worst, storms destructive floods and landslides (Neary et al., 2005; Rengers et al., 2020).

What happens to the sediment after it is washed downslope? It fills streams, lakes, and wetlands. Physically clogging them in this way reduces their ability to store water, damages the habitat and kills aquatic organisms, and makes them more likely to flood. This can be especially damaging to water supply, flood control, and hydropower infrastructure. (Draper et al., 2022; Lee et al., 2022; Whelton et al., 2023). Finally, the quality of the water itself can be seriously degraded, even to the point of being unusable for drinking (Hampton et al., 2022; Raoelison et al., 2023; Rust et al., 2019).

One of the other effects of vegetation loss is that the water plants were transpiring (remember the almonds!) is not returned to the atmosphere and instead becomes runoff. The area becomes drier (*Desertification*) (Neary, 2018). It is difficult to overstate just how important this water is for a landscape—Desertification as a whole is one of the greatest hydrologic challenges of our time.[6]

In public discourse, the causes of the *Wildfire Crisis*[7] are often framed as a binary debate between climate change and poor forest management. In nature, few things are *ever* that simple! The answer is usually both just to different degrees. A recent study estimated that human-caused climate change nearly doubled the area that burned in the western US between 1984 and 2015 (Abatzoglou and Williams, 2016) and another even directly linked it to the loss of Arctic sea ice (Zou et al., 2021). The literature on the subject is extensive.[8]

Modern science did not understand until recently that wildfire is natural *and essential* for many ecosystems to function properly (van Wagtendonk et al., 2018). By putting out all wildfires, we were causing fuels to build up and forests to become unhealthy. And when they do burn—because they *will* one way or another—they do so catastrophically. The basic rule of thumb for healthy, sustainable landscapes is low and moderate intensity wildfire: not only good, but vital. High-intensity wildfire: bad (dangerous and damaging).

### *The Discovery of Rivers in the Sky*

It has long been recognized that certain regions of the earth are subjected to intense precipitation events. Monsoons, related to the warming of the land masses and a reversing wind from the ocean, are well-studied regional climate conditions and typically refer to a "rainy season". These are generally predictable and last for weeks/months with periodic precipitation. However, other regions of the planet have been recognized to receive significant and prolonged rainfall yet occur infrequently; not fitting the definition of a monsoon season (Namias, 1939; Palmén and Newton, 1969; Browning and Pardoe, 1973). These storms typically produce 10's of cm of precipitation in a few days and are a large proportion of the annual precipitation for regions such as Portugal, Western Europe, Chile, and South Africa west coast of the US. With the advent of worldwide satellite monitoring, particularly microwave satellites capable of measuring the quantity of water vapor through the entire atmosphere, it has been observed that long (i.e., 1000's of km) yet narrow (i.e., 100–300 km) corridors of fast moving, very moist air is responsible for this precipitation. Termed "atmospheric rivers" or ARs (Zhu and Newell, 1994; Zhu and Newell, 1998) these rivers of atmospheric moisture can transport enormous amounts of water, exceeding by factors of 10 the flows of the major terrestrial rivers on Earth (Ralph and Dettinger, 2011). Figure 5.7 (top) show the regions of the globe commonly experiencing ARs while Figure 5.7 (bottom) documents the landfall of a major AR on the western coast of the US.

ARs most commonly occur north of the tropics in the Pacific and Atlantic oceans, southeastern Pacific, and South Atlantic oceans and reach the west coasts of North and South America. Other regions that experience AR landfalls include Greenland, Antarctica, and the south-central United States. ARs are now known to be an important mechanism in the global distribution of freshwater and energy. There are typically 3–5 of these narrow plumes present within a hemisphere at any given time.

While important for the water supplies of many parts of the world, ARs upon making landfall can also cause significant damage and destruction due to flooding. Prince et al. (2021) report that individual ARs have caused up to $3 billion in flooding damage. Fortunately, worldwide weather modeling and observations are continuing to improve and evolve, as are the forecasting and lead times for ARs (DeFlorio et al., 2018). A similar categorization system to that of hurricanes has been proposed (Ralph et al., 2019) based on the amount of water flowing in the atmosphere (termed the Integrated Vapor Transport or IVT) and the duration of the storm on land. As shown in Table 5.2, unlike hurricanes, low category ARs can be primarily beneficial rather than destructive.

The ability to predict and therefore plan for ARs continues to improve with typical 5–7-day reliable predictions available today, at least in North America and Europe. It is important that advances should be freely available for all nations/regions to provide early warning and the necessary preparation for potential flooding. Access to this information will become even more critical as climate warming continues, as the capacity of an AR to carry moisture will only increase with warming, potentially moving a storm from, for example, a Category (CAT) 1 to a CAT 3 storm.

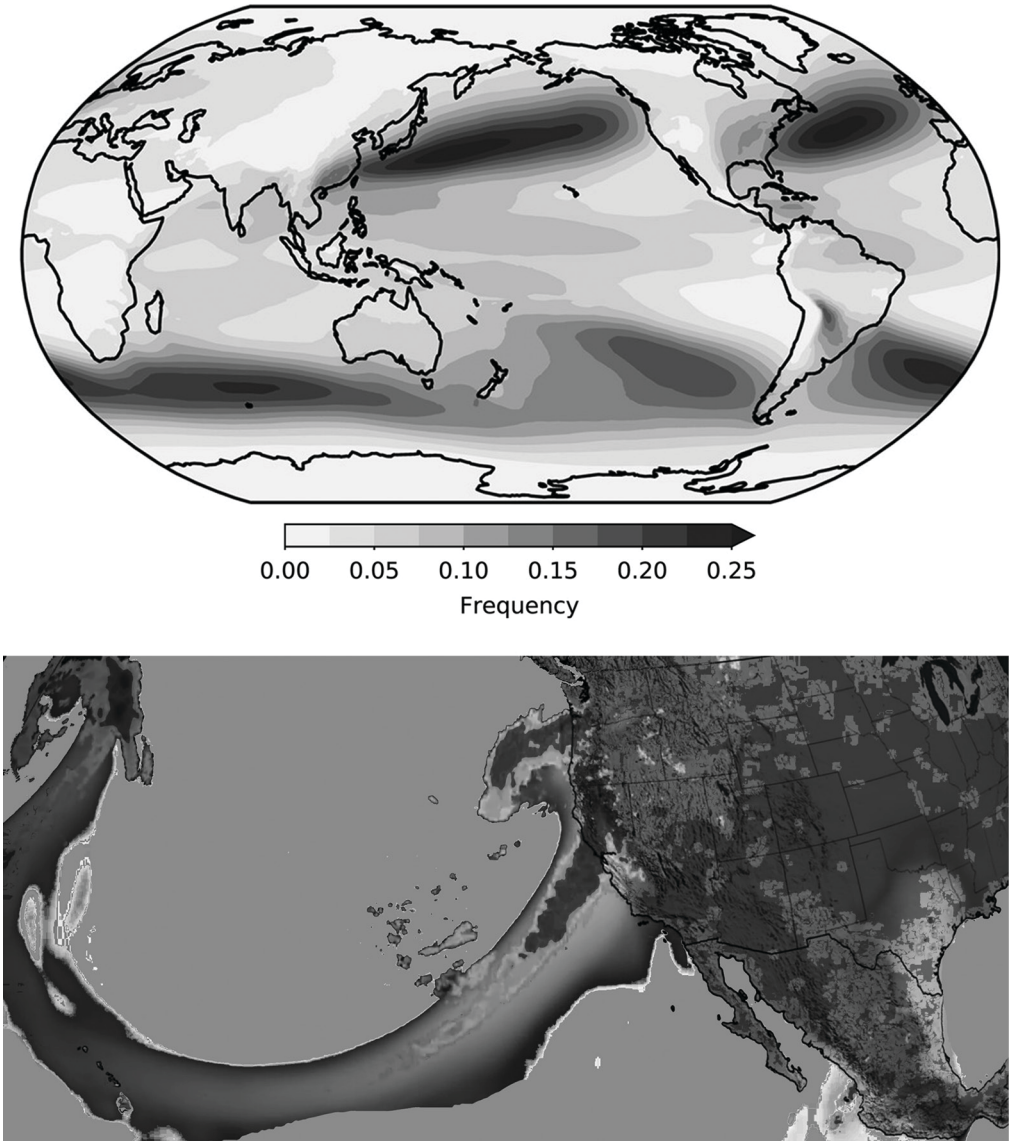



*Figure 5.7* Depictions of atmospheric rivers. The top image shows a global distribution of the fraction of time atmospheric rivers are present, as estimated and illustrated by Lora et al. (2020). The bottom image shows an extreme example of an atmospheric river reaching the west coast of the United States. Precipitation rates reached 50 millimeters per hour in the core of the river. The top image is used with permission and the bottom image is in the public domain courtesy of NASA.

### Accessibility and the Future, or "Show me the Data!"

While we have discussed the fundamentals of hydrology and some examples of hydrologic issues facing society, we have not yet discussed how and where to find the data needed to analyze complex hydro-sociologic problems. In many developed nations, data and access to hydrologic information

*Table 5.2* Atmospheric river categories, as proposed by Ralph et al. (2019)

| *Category* | *Strength* | *Impact* |
|---|---|---|
| 1 | Weak | Primarily beneficial |
| 2 | Moderate | Mostly beneficial, also hazardous |
| 3 | Strong | Balance of beneficial and hazardous |
| 4 | Extreme | Mostly hazardous, also beneficial |
| 5 | Exceptional | Primarily hazardous |

are provided by governmental agencies often at no cost. Such data can range from daily stream flow records on a local river to satellite-measured indices for drought and drought prediction. In less developed nations, locally derived data may be much more sparse, and may be challenging to access.

We have all witnessed the rapid development of drone and satellite imagery bringing battlefields and disaster sites into clear focus. Similarly, advances in satellite sensors and the sheer number of satellites imaging the planet have allowed hydrologists to monitor some hydrologic processes, such as droughts and floods, much more accurately. In the past few decades, significant advances in remote sensing and freely available remote sensing maps have made it possible to monitor ongoing drought conditions in real time and forecast them using models that combine soil moisture data and weather predictions. Agencies such as NASA and the European Space Agency routinely publish global drought prediction maps that have continued to improve in accuracy with time and are available with no cost or restrictions. Flood forecasting has also significantly benefitted from the combination of remote sensing and the use of ensemble (averaging of multiple different weather forecast models) approaches to predict landfall and intensity of hurricanes and typhoons.

There have also been tremendous advances in public and private networks of meteorological stations. High-resolution weather stations, previously only affordable to the wealthiest nations, are now available for $100–200 and are routinely used by private weather forecasting companies to improve their accuracy; such low-cost stations are also driving the development of non-profit organizations to help less developed nations with drought forecasting and weather-related early warning systems. For example, in sub-Saharan Africa, the Trans-Africa Hydro-Meteorological Observatory (TAHMO)[9] has developed a network of more than 500 low-cost, high-resolution community-operated weather stations across Africa, with open and real-time access to these data. Used by both local farmers for drought information and by cities and nations for emergency early warning systems, TAHMO and other programs like it are changing how hydrologists and communities collect and share data.

## Concluding Remarks

In this chapter, we have summarized the major components of the Water Cycle and hydrology, with a focus on how these elements can be viewed in both a scientific and a socioeconomic perspective. We presented several current challenges and advancements in water resources. However, the field of hydrology is vast and growing continuously. We did not discuss important areas such as water pollution and its impact on human and ecosystem health; the complexities of predictive modeling of components of the Water Cycle; advances in water treatment including desalination; transboundary disputes over water resources; or the privatization of water resources. While we touched upon the impacts of climate change on the Hydrologic Cycle, there is no doubt that warming will severely strain water distribution systems—and the people, economies and ecosystems that require reliable freshwater. This is a chapter whose text is yet to be written! We

trust that through partnerships of scientists, engineers, and diplomats, the story will be one of peace and cooperation.

## Acknowledgments

We appreciate the constructive comments and suggestions of the two anonymous reviewers along with the editors. We dedicate this work to Dr. Thomas Meixner, who was tragically murdered at the University of Arizona, on October 5, 2022. He was a friend, teacher, and colleague to both of us. Tom's contributions, energy, and the positive support he so freely gave will be greatly missed.

## Notes

1 For more information, see https://www.usgs.gov/special-topics/water-science-school/science/how-much-water-there-earth
2 GRACE is a joint mission of NASA and the German Aerospace Center (DLR).
3 For more information, see: https://waterfootprint.org/en/water-footprint/glossary/
4 For more information, see https://www.nsf.gov/pubs/2018/nsf18545/nsf18545.htm
5 While soil is a renewable resource, it forms slowly. Stockmann et al. (2014) found a global average rate of 0.02 mm/year. In arable soils of a co niferous forest near Nottinghamshire, UK, Evans et al. (2019) measured rates from 0.026 to 0.096 mm/yr. This is why soil loss can be such a threat!
6 The United Nations Convention to Combat Desertification (UNCCD) estimated that desertification affects one quarter of the world's land and one-fifth of humanity (D'Odorico et al., 2013)!
7 For more information, see https://web.archive.org/web/20231121141057/https://www.fs.usda.gov/managing-land/wildfire-crisis
8 Modeling is widespread in hydrology. It is essential to remember that models are approximations—simplified simulations—not reality (Klemeš, 1997). No matter how impressive the graphics and presentation may be: "All models are wrong, but some are useful" (Box & Draper, 1987). When making important decisions, ensure you know *how wrong* and *how useful* a model is before relying on its results (Wheelock et al., 2024).
9 For more information, see https://tahmo.org

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# 6

# WATER AS A SOURCE OF CONFLICT

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**Key Takeaways**

- Too much, too little, or too dirty water can be a source of tension and conflict.
- Escalation of water conflicts into violence has not yet happened in international water conflicts, but has happened at the subnational and community levels.
- Whether conflicts escalate into violence depends on the presence of social, economic, institutional, and political factors that influence access to water or protection from extremes, the available coping conditions, as well as existing grievances that lower the threshold to engage in violence.
- The importance of these factors means that the indirect links between water and violent conflict are very context-specific; understanding the interplay between water issues and other factors in a specific setting is therefore pertinent to taking actions that can reduce such water-related conflict risks.

## Introduction

Water is vital to human life and many aspects of society. The United Nations (UN) defines water security as "the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development" (UN-Water, 2013). This proposed definition affirms water's vitality in drinking and domestic use, supporting economic activities, sustaining ecosystems, and providing various services to society. Water security also includes protection from water-related disasters, such as floods, droughts, and pollution.

Changes in water quantity, quality and access to water and water-related services can impact the well-being of different social and identity groups in different ways, and as a result spark tensions because of (perceived) inequality or increased competition. However, the link between water and conflict is often indirect and highly context-specific, and, similar to findings on climate-related peace and security risks (Kim & Garcia, 2023; Mobjörk et al., 2020), determined by various social, economic, institutional, and political factors. Moreover, changes in political, economic, and other


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non-water systems can also directly spark water-related tensions, for example, if they lead to a change in access to water, without changes to the resource itself.

This chapter focuses on water as a source of conflict between social groups, communities, subnational regions, and countries. If one defines "conflict" as a *perceived divergence of interests* (Pruitt & Kim, 2004), incompatible needs and demands for finite resources such as freshwater can be sources of conflict. These conflicts can be either nonviolent or violent. They include, for example, organized violence and nonviolent actions, such as protests and legal actions when claims are made over competing access to and use of water. In fact, empirical studies have demonstrated that water conflicts primarily manifest themselves in nonviolent forms, while only a few cases escalate into violence (Bernauer et al., 2012; De Stefano et al., 2010; Ide, Lopez, et al., 2021).

This chapter focuses on conflicts *over* water and includes the indirect role of water in contributing to underlying causes of conflict. Specifically, it pays attention to what factors influence or prevent the change from nonviolent to violent. The literature also identifies other roles of water in conflict. For example, armed groups increasingly target water infrastructure and weaponize water, which has led to ecosystems and water infrastructure becoming casualties of war (Gleick, 2019; Sowers et al., 2017). Wartime destruction of water infrastructure and abuse of water for either pressuring civilian populations or utilizing water's physical force as a weapon is likely to lead to the deterioration of the resources and governance systems, which can also exacerbate the risk of conflict over water during post-war periods. While we retain our focus on conflicts over water, we emphasize the importance of understanding the role that water plays in the evolution of social tensions and conflict more broadly.

This chapter is organized as follows. First, an overview of the evolving discussion on water as a source of conflict is presented, followed by examples of situations where reduced water security resulted in conflict, violence, and protests at transnational, subnational, and community levels. Subsequently, the interlinkages between water issues and conflict across these levels are explored. Finally, the chapter concludes by making the case for developing an in-depth understanding of the links between water systems, water security, and conflict, to support effective water diplomacy efforts.

## Water–Conflict Pathways: An Evolving Discussion

This section discusses possible pathways from water to nonviolent and violent conflict, which have been unpacked in several recent studies. Inequality, exclusion, and the perception of unfair treatment bestow opportunities for mobilizing grievances for collective violence and conflict (World Bank & United Nations, 2018). Grievances play an important role in conflict mobilization, where discrimination and other forms of structural inequality deprive some groups in society of access to appropriate resources in order to thrive (Gurr, 1993). Depriving a community or a social group of water can lead to fueling group grievances and risk of conflict, especially if unequal access is driven by discrimination and inequality.

To further understand the links between water and conflict, four aspects are important for consideration:

- Water quantity (referring to the availability of water of sufficient quality and the protection against floods)
- Water access (related to formal and informal governing rules)
- Coping options (determining how people respond to changes in water quantity or water access)
- Preexisting governance and social factors.

This section first elaborates on these four points and then introduces three geographical scales for water conflict.

### *Water Quantity*

Changes in *water quantity* can be caused by factors such as increasing water demands, new infrastructure, and climate change. A growing global population strongly increases water demands, particularly for food production, which accounts for 70% of freshwater use. New infrastructure projects, such as reservoirs or irrigation systems, are developed to meet these water demands, but this results in changed geospatial distribution of water and degradation of water-related ecosystems, affecting different social and identity groups of people in society in different ways. Many climate impacts manifest themselves through changes in the water cycle. Evidence is mounting that changing climate and environmental conditions, including droughts, dropping groundwater tables, and erratic precipitation patterns, can affect peace and security (IPCC, 2022). Increased demands on water due to demographic changes, agricultural water requirements, and economic growth are positively associated with low-intensity water conflicts (Boehmelt et al., 2014). A decreased availability of groundwater has a more pronounced effect on inter-communal violence compared to surface water (Döring, 2020). Groundwater sources provide natural storage and supply of water during droughts or lower rainfall periods. When groundwater is depleted during droughts or due to overexploitation, populations may not have any other alternative water sources, such as in Syria during the multi-year drought from 2009 to 2011 (Kelley et al., 2015).

### *Water Access*

Changes in *access* to water can, independent of changes in the availability of the resource, increase tensions between different users of water. Several studies have suggested that access to resources plays a larger role in the origin of conflicts than actual availability (Audu, 2013; Keskinen et al., 2007). Access to water, or a lack thereof, is also one of the contributing factors in migration that is associated with increased security risks and instability (Reuveny, 2007). Governance of water, including both formal and informal rules regarding who has access, can thus play an important role in water conflict. Corruption in the water sector has benefitted political and economic elites who exploited their power to control water access for patronage and financial profits. Mismanagement of water due to elite exploitation can worsen existing problems and generate grievances and intergroup tensions (Mason, 2022). How governance-related factors influence conflict over water seems to be context-specific, as existing research has identified diverse pathways.

### *Coping Options*

To understand whether nonviolent or violent conflict may occur, it is important to understand the *coping options* people have when responding to changes in the water system. The climate–security pathways developed by Mobjörk et al. (2020) give useful insights for water-related conflict as well. These pathways, including deteriorating livelihood conditions, mobility patterns, changing armed group tactics, and elite exploitation, have been suggested as the main categories of climate-related security risks (Mobjörk et al., 2020). Chronic water shortages, droughts, and floods can lead to the deterioration of livelihood conditions and alter mobility patterns, which sometimes cause further political instability and human insecurity. For example, if people's livelihood conditions degrade, they may clash with others over access to remaining resources. Migrating herders may change the

itineraries of their cattle herding patterns and clash with farmers, fishermen, or other herders over access to fields and water points. Also, in urban areas, an influx of people can result in increased competition over jobs and other services, resulting in tensions. Another pathway concerns the tactics of armed groups, who may take advantage of such deteriorating livelihood situations to recruit new members by offering them income and status (Cárdenas et al., 2021).

### *Preexisting Governance and Social Factors*

In addition to the aforementioned factors concerning the supply-side issues, previous research emphasizes the *preexisting governance and social factors* as contributing to the risks of conflict over water. These factors determine the conditions and opportunities for mobilizations that appear to play a role in water-related nonviolent conflicts, especially at the subnational level. Mobilization is "a process to increasing readiness to act collectively" and a social psychological primer for social conflict (Gamson, 1975, p. 15). Capitalizing on widespread grievances from relative deprivation and the sense of injustice can be an effective means to galvanize communities and other forms of social groups to participate in conflict (Cederman et al., 2013; Gurr, 1993). The sense of grievances alone does not automatically lead to conflict and collective action, but social conflict would require effective organization around social groups (Turner & Killian, 1957). Existing research highlights several factors influencing nonviolent conflicts over water. Water-related protests after floods are more likely to occur when there is a political space for civil society and community actors to be able to openly dissent under a democratic or semi-democratic regime (Ide, Kristensen, et al., 2021). Protests could be a way to find a solution through nonviolent conflict, which might be difficult in autocratic settings (e.g., see Alimi, 2009).

### *Geographical Scales*

These dynamics between water and conflict play out differently at different *geographical scales*. Empirical evidence demonstrates that international water-related conflicts have rarely, if ever, escalated into inter-state violence (Wolf, Yoffe, et al., 2003).[1] There have been various instances when states threatened another state over water diversion and dam-building plans, but states have so far mostly restrained from using violence except for a few border skirmishes. At the subnational level, changes in water systems can result in different forms of both violent and nonviolent conflict. Subnational authorities also compete over water use when rivers cross subnational borders, and tensions have led to judicial disputes and electoral competition (Moore, 2018). Subnational water conflicts can also manifest as protests, riots, and communal violence mobilizing social groups, communities, or civil society (Bernauer et al., 2012). Communal violence often concerns access to water and land, especially when communities rely on natural resources for their livelihoods. Declining groundwater tables and precipitation exacerbate the risks of communal violence (Döring, 2020; van Weezel, 2019). During wartime, non-state armed groups can emerge as important actors who can control and even weaponize water to advance their military and political aims (King, 2015; von Lossow, 2016). Communal conflict is also becoming more frequent due to increasing resource scarcity, including water. Social groups with preexisting hostility or incompatibility are more likely to engage in conflict during droughts (Ide, Lopez, et al., 2021). Interestingly, communities with preexisting animosity may avoid conflict during droughts if disaster relief and conflict-mediating efforts are exercised by authorities (Tubi & Feitelson, 2016). The presence of authoritarian regimes can lead to an increased risk of violent water conflict when public water supply systems are inadequate to provide sufficient water to the population (Ide,

Lopez, et al., 2021). These findings highlight the importance of institutional interventions in the escalation of communal tensions over water during natural disasters.

The deviation in the role of regime types in flood- and drought-related conflict also seems to be related to different regional samples used for respective studies. These divergent findings demonstrate that many factors determine the connections between water and conflict and highlight the need for more research on the effectiveness of addressing water-related conflicts.

## Examples of Water as a Source of Conflict at Different Geographical Scales

### *Transnational Water Conflicts*

A large number of water bodies are shared by two or more countries: 310 transnational river basins have been identified (McCracken & Wolf, 2019) as well as 592 transnational groundwater aquifers (IGRAC, 2023). To support their economies and the livelihoods of their populations, many countries depend on the use and regulation of water in other countries. In the 1980s and 1990s, concerns grew around the possibility of water wars, especially in the Middle East. This was fueled by often-cited statements by political leaders in the Middle East threatening to go to war over water (Kameri-Mbote, 2007; Starr, 1991). However, subsequent research shows that "shared interests along a waterway seem to consistently outweigh water's conflict-inducing characteristic" (De Stefano et al., 2010; Wolf, 1998, p. 1), a topic further elaborated on in Chapter 7. Most interstate tensions over internationally shared water basins occur between state governments (Mirumachi, 2015). Although tensions and related threats occur between different water-sharing users, research has revealed that the sociopolitical outcomes of water disputes are more diverse than just conflict and instead result in a spectrum of interactions (Wolf, 1998; Zeitoun & Mirumachi, 2008). These have so far not resulted in interstate violence or war (Petersen-Perlman et al., 2017; Wolf, Stahl, et al., 2003).

The major issues in transboundary rivers shared by different countries concern water allocation and the development and operation of new infrastructure (De Stefano et al., 2010). Water quality issues and the sharing of groundwater resources have also caused tensions (De Stefano et al., 2010). In the Euphrates and Tigris river basins, Türkiye has been in dispute with downstream riparian countries over the Southeast Anatolia Project (GAP), which is threatening water security in Iraq and Syria (Al-Muqdadi et al., 2016; Dohrmann & Hatem, 2014).[2] Both downstream countries, Iraq and Syria, have consistently contested new Turkish dams and even threatened Türkiye that dams can be military targets, accompanied by posing military threats. However, so far, the tensions have not led to violence; instead, cooperation at technical levels has taken place (Warner, 2012). This does not mean that violent clashes have not occurred at the subnational level over the construction of the GAP. The dam sites of the GAP are at the heartland of the Kurdistan Worker's Party (PKK) strongholds, a rebel group against the Turkish government for decades, and military clashes have occurred near the GAP dam sites. Recent political developments in Syria, Iraq, and Türkiye may add to additional uncertainties that can tilt the power balance among the riparian states, posing risks of halted cooperation.

In the Nile Basin, the construction and filling of the Grand Ethiopian Renaissance Dam (GERD) has been a source of tension between Egypt, Sudan, and Ethiopia. Egypt depends on the Nile for virtually all of its water, inciting fear that the GERD could impact its water allocations. Sudan is similarly concerned about the dam's impacts on its irrigation facilities. On the other hand, Ethiopia sees the GERD as key to its socioeconomic development and energy production (Swain, 2017). In September 2021, the global community urged the three nations in the Nile Basin to persist in their

negotiations to expand the existing transboundary agreement from 2015.[3] This extension would include provisions related to the dam's filling process and its operation during periods of drought.[4] After the third filling of the dam had begun, Egypt called on the UN Security Council to intervene, while several council member states refrained from transboundary water disputes to be discussed in the UN Security Council (Security Council Report, 2021).

Transboundary tensions are developing in South East Asia's Mekong River Basin, where a series of upstream dams have been developed on the mainstream of the river. Currently, China has been operating 11 dams, Laos has recently added two dams, with seven additional dams in the pipeline (two in Cambodia and five in Laos) (Mekong River Commission, 2023). The Mekong Delta and the Tonle Sap Lake in Cambodia and Vietnam have recorded the lowest water levels since upstream dams have become operational in the last five years (Sithirith, 2021; Sok et al., 2021). The Tonle Sap Lake's ecosystems are highly valuable for biodiversity and fisheries, important livelihood sources for many Cambodians. The Mekong Delta is especially important for Vietnam's food security and economic development, and the acute problems of coastal erosion in the Mekong Delta are believed to be caused both by the trapping of sediment behind upstream dams and by climate change (Bussi et al., 2021). Declining agricultural and aquaculture productivity in recent years has prompted local authorities in Vietnam to raise concerns to the national government (Li et al., 2017).

Despite these grave challenges, there appear only to be limited interactions between riparian governments over the downstream ecological and livelihood consequences of upstream dams in the Mekong River Basin (Sithirith, 2021). The Mekong River Commission and the Lancang-Mekong Commission have provided institutional platforms for conflict prevention through procedures such as the Procedures for Notification, Prior Consultation, and Agreement. These procedures may not be sufficient to address the concerns raised by downstream countries, particularly Vietnam. At the subnational level, Vietnamese provincial governments in the Mekong Delta have raised concerns to the central government, but no substantial actions have been taken (Tran & Tortajada, 2022). This lack of intergovernmental engagement to reduce the downstream impacts of upstream hydropower dams may lead to further instability within national borders or in the Mekong region.

### *Subnational Conflicts*

Intrastate conflicts over water can take several forms, including water allocation disputes between subnational provinces and nonviolent protests and riots over insufficient water access. Conflicts between subnational administrative units resemble upstream–downstream water allocation disputes of transnational water conflicts. For example, in Iraq, rainfall in many southern provinces is low, and these provinces depend on water flowing through the Tigris and Euphrates from the northern, more upstream provinces. Several downstream provinces, such as Missan, Muthanna, Basra, and Dhi Qar, have accused upstream provinces, such as Qadisiyah, Wasit and Dhi Qar (Dhi Qar being upstream of Missan and Basra, but downstream of Wasit), of exceeding their allocated water quotas, threatening the livelihoods of the largely rural populations (Kool et al., 2020). This has led to the illegal removal of water management structures by local government security forces from a downstream province to restore the river flow (Kool et al., 2020).

Protests against government authorities form another example of water-related subnational conflicts. In the summer of 2018, in Basra, southern Iraq, many people experienced health problems that appeared to be related to the use of poor-quality water. Around 118,000 people were hospitalized because of these health issues. In combination with other grievances, the local population led by the Iraqi youth took to the streets to protest. The violent crackdown by security

forces ultimately led to the death of nine protesters and the injury of hundreds of others (Human Rights Watch, 2019). Although the exact cause of the poor water quality was yet to be determined, it was assumed that a combination of pollution from oil spills, low water flows leading to less dilution, and increased saltwater intrusion caused water treatment techniques to become less effective (Human Rights Watch, 2019). Some blame upstream water abstractions in Türkiye and Syria for Iraq's water shortages (Al-Muqdadi et al., 2016). Yet, such claims neglect protracted mismanagement and corruption in the water sector in Iraq that have resulted in the current state of infrastructure dilapidation (Mason, 2022).

Water mismanagement can influence a population's vulnerability to environmental changes and climate shocks, which is well demonstrated in the case of Syria (Daoudy, 2020). The civil war in Syria followed a multi-year period of low rainfall in 2007–2009. Syria's northeastern region is important for the country's agricultural production, and the agricultural extension policy to grow cotton since the 1970s has led to a high dependence on groundwater for growing water-intensive crops such as cotton (Selby, 2019).[5] This agricultural and water policy has been proven to be highly unsustainable. The overextraction rate of Syria's groundwater was 300%, and the groundwater resources were nearly depleted in the northeast region (Kelley et al., 2015). In addition, economic liberalization policies resulted in diesel fuel price raises that made pumping of groundwater very expensive and transport of agricultural products to the market unaffordable (De Châtel, 2014). Such structural conditions made Syria's agriculture extremely vulnerable to drought, which led to a drastic collapse of the agricultural sector during the 2007–2009 drought (Eklund & Thompson, 2017). Water scarcity in rural areas affects the rural population's livelihood and food security, but such vulnerability may not translate into social instability, as demonstrated in the Syrian case. Most rural migrants did not engage in political protests during the 2011 Syrian uprising (De Châtel, 2014). Moreover, a recent study showed that much agricultural land had already recovered by 2010, which the researchers see as an indication that drought-induced migration can be temporary and has limited social implications (Eklund et al., 2022).

### *Community-Level Conflict*

At the community level, conflicts can arise not only from competition between upstream and downstream users but also from competing interests over water and related resources at a single location, such as a well, a wetland, or a grazing field. Although many communal conflicts do not end up turning violent (Ide, Lopez, et al., 2021; Tubi & Feitelson, 2016), there are various accounts of violence between communities in which availability and access to water(-related) resources play a role.

Erratic rainfall patterns and related changes in resource availability combined with increasing populations and agricultural expansion have contributed to conflicts between different communities across the Sahel that sometimes turned violent (Tarif, 2022; Broek & Hodder, 2022). For example, as a result of changing rainfall patterns, herders sometimes return earlier to seasonal pastures before crop harvesting, causing damage to crops, as was described for Nigeria (Igwe, 2020), while in Sudan, herders started migrating further south, resulting in increased pressures on resources in these areas and conflicts with settled farmers in Southern Kordofan (Chavunduka & Bromley, 2011). Access to water for cattle along a migratory route is crucial, and both the denial of such access by settled communities and increased use by cattle, which easily pollute water sources, have resulted in conflict between herders and farmers in the Volta Basin in Ghana and Burkina Faso (Clanet & Ogilvie, 2009).

Also, for these community-level conflicts, social, economic, and governance conditions play a role in the escalation of tensions to violence. In the Lake Chad region, conflict driven by water scarcity was primarily found in regions where the population was already vulnerable due to a combination of other factors (Okpara et al., 2015). Transhumant herders seem particularly vulnerable since they generally have no formal right to land (Nagabhatla et al., 2021). For conflicts between herders, farmers, and fishermen, the obstruction of cattle migration routes, opportunistic behavior facilitated by the absence of government, and rent-seeking by government officials were found more important than direct environmental conditions and resource scarcity (Benjaminsen et al., 2012).

In addition to resource pressures and worsening livelihood conditions, these conflicts are also fueled by cultural factors, the presence of armed groups, and unequal governance arrangements that determine who has access to scarce resources and how disputes over resources are resolved. In conflicts among farmers and pastoralists in Northern Nigeria, limited access to sources of water was found to be a more important driver of conflict than actual water availability (Audu, 2013).

## Water Issues Can Influence Conflicts across Scales and Locations

The previous section gave examples of water-related conflicts at different geographical scales. This section examines how water issues and conflicts at different scales may be connected. Changes at larger scales can influence conflicts at smaller scales: upstream dams and irrigation impact the availability of resources at local levels and can incite conflicts directed toward the state or non-state groups. Community-level conflicts over water and water-related resources in the Inner Niger Delta in Mali, for example, may be aggravated when the planned Fomi dam in Guinea is completed, allowing for increased abstraction of irrigation water in areas upstream of the Inner Niger Delta (Liersch et al., 2019; Zwarts et al., 2005).

Some of the pathways described earlier involve connections between violence at other locations or scales. Altered migration patterns as a result of water shortage can potentially increase resource pressures and conflict risks elsewhere (Reuveny, 2007). Community-level conflicts have been found to be intertwined with state-level conflict in Sudan because of the perception that the government supported one of the groups, and was therefore against the other (Brosché & Elfversson, 2012).

Water issues do not only cause tensions within the river basins in which they originate. Droughts and floods can result in failed harvests that affect food availability and food prices around the world. Following the drought in Central Asia that resulted in large-scale losses of wheat harvests in China, Russia, and Ukraine, bread prices went up in Egypt, resulting in social protests and the so-called "bread riots" (Johnstone & Mazo, 2011; Soffiantini, 2020; Sternberg, 2012).

These examples highlight the importance of considering different scales and locations when analyzing water-related root causes of conflict or, conversely, assessing the potential conflict implications of changes in water systems.

## Conclusion: Effective Water Diplomacy Requires Insight into the Many Factors Affecting Water–Conflict Pathways

This chapter sought to shed light on the different ways through which changes in water quantity and quality can affect the lives and livelihoods of people or the economies of states to the extent that it can result in violent conflicts and protests. Whether water insecurity escalates to violence depends on various social, economic, cultural, political, and institutional factors. Conflicts may

arise because of actual competition over water resources or a (perceived) unfair water distribution, which adds to existing grievances.

For effective water diplomacy to take place, understood here very broadly as ways through which third parties can help ensure water security between two or more other parties, it is of key importance that underlying causes and distributional impacts of changes in water systems are well understood, which includes international linkages beyond water basins.

## Notes

1 Instead, interstate tensions have the potential to contribute to international water cooperation and the creation of transboundary water agreements and joint management organizations. Chapter 7 in this volume focuses on "water as a source of cooperation."
2 See Chapter 38 for Türkiye's perspective on water cooperation in the Euphrates-Tigris Basin.
3 Agreement on Declaration of Principles between the Arab Republic of Egypt, the Federal Democratic Republic of Ethiopia and the Republic of the Sudan on the Grand Ethiopian Renaissance Dam Project. 23 March 2015, Khartoum.
4 See the Statement by the President of the United Nations Security Council issued on September 15, 2021, available from: https://docs.un.org/en/S/PRST/2021/18
5 See Chapter 50 for a case study that covers this history in more detail.

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# 7

# WATER AS A SOURCE OF COOPERATION

*Lynette de Silva and Aaron T. Wolf*

**Key Takeaways**

- Reconceptualize shared waters so the definition is flexible and inclusive; in doing so, water security can be increased.
- Address power imbalances between states or even individuals to enhance the long-term security of an entire shared water system.
- Include diverse perspectives in decision-making so that local dynamics and concerns may be legitimized.
- Foster good communication exchanges to cultivate meaningful relationships, forge bonds among diverse water users, and increase the potential of bringing women and communities out of poverty.

## Overview

There are 312 watersheds around the world that cross the boundaries of two or more nations covering 45.3% of the land surface of the earth, including about 40% of the world's population, and accounting for approximately 80% of global river flow (McCracken and Wolf 2019). In addition, there are at least 468 transboundary aquifers (IGRAC 2021; Fraser 2021), complicating cross-border water management even further.

Surface and groundwater that cross international boundaries present increased challenges to regional stability because hydrologic needs (water supply and sanitation, irrigation, energy resources, and industry) can often be overwhelmed by political considerations. Water is shared across the borders of Israelis and Arabs, India and Pakistan, Azerbaijan and Armenia, and all 11 countries of the Nile Basin. While the potential for paralyzing disputes is especially high, history shows that water can also catalyze dialogue and cooperation, even between especially contentious riparians, those who live along a river, or those who share an aquifer. (Interestingly, "riparian" has the same root as "rival" signifying that those who share access to a river by nature can have competing interests.) In 2020, and for the ninth year in a row, the *Global Risks Report* of the World Economic Forum placed "water crises" among the top five global risks in terms of impact.


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There is some room for optimism, though, notably in the global community's record of resolving water-related disputes along international waterways. Oregon State University's Transboundary Freshwater Diplomacy Database documents more than 800 treaties related to shared waters as well as more than 1,800 events of water-related cooperation over a 60-year period, vastly overwhelming the conflictive events by two to one. One example of an event of water-related cooperation occurred in 1961, when the United States and Canada signed an agreement to address hydropower and flood mitigation along the Columbia River. Another example includes Great Britain and Zambia agreeing to a second phase of the Kariba Dam Scheme in the Zambezi River Basin in 1970 (TFDD, 2023). Notably, historically, there has only been one actual war fought specifically about water resources, and that was 4,500 years ago (Wolf 2007). Many of the most vehement enmities around the world either have negotiated water sharing agreements or are in the process of doing so, and once cooperative water regimes are established through treaty, they turn out to be impressively resilient over time, even between otherwise hostile riparians, and even as conflict is waged over other issues.

The precedent set by the positive record of cooperation on international rivers highlights the need for similar cooperative water sharing agreements on other transboundary basins and aquifers, and it provides support for cooperation through hydrodiplomacy within these basins. Violence over water across a border seems neither strategically rational, hydrographically effective, nor economically viable. Shared interests along a waterway or an aquifer seem to consistently outweigh water's conflict-inducing characteristics and also the impacts of climate change (De Stefano et al. 2012).

Nonetheless, shared waters clearly induce tension between countries, often exacerbating already tenuous relations and precluding efficient water management. In fact, a general pattern of unilateral development and transformation has emerged over time, known as the "crisis curve": Riparians implement water development projects unilaterally first on water within their territory, often without consultation with their neighbors, in an attempt to avoid the political intricacies of the shared resource. At some point, one of the riparians, generally the regional power, will implement a project that impacts at least one of its neighbors.

This might be to continue to meet existing uses in the face of decreasing relative water availability. This project, which impacts one's neighbors, can, in the absence of relations or institutions conducive to conflict management, become a flashpoint, heightening tensions and regional instability, and requiring years or, more commonly, decades to resolve. Currently, for example, Lao dams are creating concern on the Mekong, as is Ethiopian development on the Nile and Tajik infrastructure on the Amu Darya in Central Asia (McCracken et al. 2018).

The dynamics typically unfold with water quality and quantity degrading, negatively impacting the health of dependent populations, and ecosystems. This problem only worsens as the dispute intensifies. Disparities (economic development, infrastructural capacity, and political orientation) between nations further complicate international water resources management. In the case of groundwater, very few agreements or institutions actually exist between countries over the shared use of groundwater, therefore limiting capacity for preventing the intensification of a dispute over groundwater.

It is precisely the conflict potential and all that it entails, though, that then often creates the enabling conditions for dialogue, including global attention, third-party concern, and financial and technical resources. Then, slowly, processes of hydrodiplomacy take place, often over years or even decades, which regularly result in the resilient agreements that we describe above. There is a key relationship, derived empirically, underlying these processes (Wolf 2019).

> The likelihood and intensity of conflict related to water resources rise as the rate of change within a basin exceeds the institutional capacity to absorb that change.

This suggests that sudden changes, either on the physical side (e.g., primarily new infrastructure upstream) or on the institutional side (e.g., new countries, political boundaries, or governments), are more hazardous than "creeping changes" (e.g., decreasing quality and population growth), and that changes *in the absence* of mitigating institutions (e.g., strong political relations, economies, treaties, or river basin organizations) are those with the greatest potential for political tensions. For example, dams do not cause conflict; dams in the absence of an agreement on how to mitigate the impacts of the dam do. Peripheral to this central relationship, climate change exacerbates variability in several politically tense basins, where greater flooding and worse droughts may overwhelm capacity.

The relationship between change and institutions is a critical one to understand. The world is rife with settings where water quantity and quality are being degraded to where shortages of clean freshwater threaten lives and human and ecosystem health. Yet these are *not* necessarily where political conflict will result. In most of the developed world, both institutions and technological options are strong, as are alternatives such as food imports and desalination, such that cross-border violence is unlikely. In much of the deeply underdeveloped world, while adaptation strategies are fewer, so is the capacity to mobilize cross-border violence. These settings too are not necessarily places where conflict would result, except for very small-scale tribal or ethnic violence.

## Critical Lessons

The most critical lessons learned from the global experience in international water resource issues are as follows:

1. Water crossing international boundaries can cause tensions between nations which share the basin. While the tension is not likely to lead to warfare, early coordination between riparian states can help ameliorate the issue.
2. Once international institutions are in place, they are tremendously resilient over time, even between otherwise hostile riparian nations, and even as conflict is waged over other issues.
3. More likely than violent conflict occurring is a gradual decreasing of water quantity or quality, or both, which over time can affect the internal stability of a nation or region, and act as an irritant between ethnic groups, water sectors, or states/provinces. The resulting instability may have effects in the international arena.
4. The greatest threat of the global water crisis to human security comes from the fact that millions of people lack access to sufficient quantities of water at sufficient quality for their well-being.
5. The increase in future water variability forecasted by most climate change scenarios is one change that may alter current hydropolitical balances, affecting in turn the ability of states to meet their water treaty commitments. This may raise serious questions about the adequacy of many existing transboundary arrangements and lead to the need for new focus on resilient agreements.

In the years ahead, climate change and the proliferation of new technologies and information availability will require us to reshape our vision of shared waters. Because these megatrends are experienced in concert, the opportunities, challenges, and uncertainties for shared water management will continue to compound over time.

## The Future of Shared Waters

While it is impossible to know precisely how shared water will look in the future, we should already be working to expand how we conceptualize shared waters, address inequities embedded within water management, and develop criteria and processes that successfully identify and include nontraditional shared water actors in decision-making. These shifts will strengthen our ability to generate creative and sustainable management strategies and help us avoid water-related conflicts.

### *Reconceptualize Shared Waters*

Current definitions of shared water tend to be limited to a watershed or groundwater aquifer that is intersected by an international or subnational boundary. But water is a resource that crosses more than just political boundaries. By recognizing this with a more flexible and inclusive definition of "shared water," we can increase water security. For example, states that import water-intensive products such as grains could potentially offset their local water demand, allowing them to more readily meet other water needs. However, this virtual water exchange is currently obscured by more traditional trade considerations. By integrating a robust analysis of economic inter-basin water transfer, we gain a more precise measurement of water availability that can be used to recognize opportunities to reduce conflict and increase water security.

### *Address Power Imbalances*

Though the benefits of viewing water as a flexible resource are many, unless adequately addressed, the inequities built into existing social and political systems may be embedded into future shared water management initiatives. Such imbalances might exist at the international level between countries with differing financial or political power, or at the subnational level between communities, households, and individuals. It needs to be understood that though the world is increasing its economic capacity as a whole, disparities in the economic capacity between states or even individual water users can result in unsustainable allocations. Prioritizing one state or water user at the expense of another will ultimately undermine the long-term security of an entire shared water system. High-income countries should not be excluded from the imperative to promote positive change.

### *Broaden What Defines a Shared Water Actor*

The inherent connection between shared waters and other sectors will increase the number of actors that influence shared water management. Civil society organizations, multinational institutions such as the United Nations, and even corporations will become increasingly involved in management decisions. This could potentially steer water management away from approaches used unilaterally by water resource experts toward a more inclusive management approach within the greater sociopolitical environment. While participation of relevant actors in shared water management creates a sense of shared ownership and investment, which in turn can spark creative conflict management, there is also the potential for corporate, military, or other dominant interests to be prioritized over those of local communities or organizations.

It is important to note that change is not a new phenomenon in shared waters. However, the magnitude and distribution of change today – which includes but is not limited to environmental

change (including climate change impacts), population growth, and economic development – is placing unprecedented pressure on surface and groundwater quantity and quality.

To avoid future conflicts over water, we need to better understand how the drivers of subnational conflict, such as poverty and inequality, impact shared water issues (Campbell and Pimentel 2022; see Chapter 6 in this book). Diffuse forms of conflict are not yet adequately understood and will need to be considered as we strive to create increasingly adaptive management systems. While technologies will undoubtedly help in the creation of such systems, they may do so with an exclusively Western, technocratic perspective that could introduce unintended consequences. Without the inclusion of diverse perspectives in decision-making, local dynamics and concerns may be delegitimized. The shift to adaptive management is necessary for addressing the uncertainty ahead, and we must begin to prepare our institutions and rethink our approaches today.

## *Address Inequities*

Though equity and equality are sometimes used interchangeably, they mean different things. The latter presumes that life experiences are the same and that through access to resources the outcome will be fair and impartial. To be equitable is to recognize that life experiences are varied, and address unjust practices and systemic discrimination that disadvantage one group of people while favoring another. While there are many different types of inequity, including between young, old, different socio-professional groups, and ethnic groups, here, as an example, women are explored. Though women represent close to 50% of the world population, economically, women are poorer and wield less political influence at the national and international levels than men. Injustices include the one in four people in the world who lack access to clean water for domestic use and sanitation. This especially impacts the health and education of girls and women in Asia, South America, and Africa – contributing to billions of women and girls living in generational cycles of perpetuating poverty, on less than one euro a day (WHO & UNICEF 2021). Inequity includes women holding less than 30% of decision-making positions in River Basin Organizations, and less than 25% of the highest roles of water decision-making, positions like executive director, head of secretariat, and council of ministers positions (Best 2019). This contributes to women continually striving for "readily accessible clean water and infrastructural improvements; gender equality and social justice; and support systems and decision-making involvement" (de Silva et al. 2018; p. 227).

### *Gender*

Linkages between women and water cooperation can be seen through the lens of gender in environmental cooperation, where gender refers to characteristics associated with being feminine or masculine. This is because gender is regarded as a social construct referring to social and cultural roles considered appropriate for men and women, which may or may not correspond with one's biological sex. There are different dynamics at play for gender in environmental crisis and cooperation at all scales – macro (international), meso (community), and micro (individual) levels. Significant is the overlap of identities such as class, race, sexuality, ability, and gender (Fletcher 2018).

The promotion of the social, political, and economic equity is championed by feminists, who "argue that women should share equally in society's opportunities and scarce resources" (de Silva et al. 2018; p. 216). This approach to water cooperation is not exclusively the responsibility of women; it should be shared among all to support gender equity. Gender representation within the water sector should be demonstrated and reflected at all levels within society, including in

transboundary water frameworks, and water management and governance structures, in addition to legal and political, and technical processes (Earle and Bazilli 2013; see Chapter 25 in this book). Initiatives like South Africa's national Women in Water Program were designed so that "women should not only fetch water for their households, but they must also be suppliers of pipes and manage reservoirs" (Javan 2015). There was also a call at the World Water Forum in 2015 among the Global Water Partnership panel for water governing organizations to comprise at least 40% women so that women can be heard at all levels within institutions (Global Water Partnership 2015).

Gendered approaches to water management and conflict resolution exist through policies and governance among global entities, national governments, and institutions. They are in the form of policies like United Nations Security Council Resolution 1325 on *Women, peace and security*, and transboundary water frameworks like the 1992 Dublin Principles that highlight the key role of women in water management. And, Stone's (2014) research on "Women Transforming Conflict: A Quantitative Analysis of Female Peacemaking" indicated that when women are involved in negotiation, mediation, and peace agreements that, "not only do quotas increase the probability of violence ending within five years by an average of 27%, but there is also a 20% increased likelihood of a peace agreement lasting beyond five years" (Stone 2014; p. 29). However, despite such research, implementation of gendered policies has been slow.

One noticeable implementation was administered by the Swedish government through the Feminist Foreign Policy, launched in 2014 by Margot Wallström (Rosén Sundström 2023). This arrangement is built on measures to water cooperation through a gendered approach to political-economic analysis. It recognizes the rights of women with regard to transboundary water and promotes their representation. Furthermore, the policy provides resources for building capacity for professional women in water management (de Silva et al. 2018).

The hope is that similar implementations will be put into practice across other nations. While innovative ideas and initiatives are forever emerging, actions that can make a difference today already exist. This list includes, but is not limited to: (1) access to clean water and good sanitation for all; (2) access to good education and training, in addition to mentors and advocates for girls and women; (3) employing more women in all aspects of water management including high-level regional, national, and international decision-making roles; (4) documenting in the literature the contributions of women that work in water resources management; and (5) promoting women's water-networks and conferences.

### *Better Conversations and Representation*

Finally, no matter the level, water diplomacy is carried out by a small group of people engaged in dialogue, with all their very human incentives and disincentives, foibles, and tendencies. "Within this context of water disputes, transformation is about raising the level of personal consciousness through relationship-building" (de Silva 2022; p. 36). At the heart of building relationships is being fully present to converse—to talk and listen. More important than talking is listening. It begins by finding a quiet location and removing distractions. It involves listening with all five senses as well as one's heart and mind and fully facing one another when communicating. In doing so, the speaker can fully express their thoughts uninterrupted. If needed, when the speaker is done, the listener can clarify through paraphrasing. A key component of listening is to listen for the "why" a person has a particular interest in the resource. This component of the conversation may not be revealed so readily, not out of deception on the part of the speaker but out of emotional sentiment and vulnerability. Such sensitivity tends to be revealed only when the speaker feels

safe and levels of trust are fostered. Engaging in good discourse is a learning opportunity for each party, which over time gently builds trust. This kind of dialoging creates space for resolution and transformation (Wolf 2017).

Though conversing is an interpersonal skill, it can be transposed across scales to groups, communities, and institutions. Engaging in better conversations is an "opening for constructive change through which to increase justice and peace" (de Silva 2022; p. 36). If justice and peace are, indeed, worthy missions, then the dichotomies that hinder good water relations can be improved through listening. This includes building bridges across water rifts between humans and nature; those who live upstream vs downstream, and rural and urban communities; and affluent and disenfranchised citizens; and women and men. Giving voice to those that seldom get to be heard is a gift to both the listener and speaker, though it especially broadens the awareness and perspectives of those listening. Such inclusiveness provides representation, extending the bounds of the community so that more people can feel respected and at ease to live fuller lives. This embrace should not be limited to race, ethnicity, age, religion, ability, socioeconomic class, sexual orientation and gender – within this inclusivity, fairness and justice are the governing principles for equity.

Water as a foundational resource can be the opening for difficult conversations. Over time, good communication exchanges have the potential to cultivate meaningful relationships, forge bonds among diverse water users, and bring women and communities out of poverty. In this respect, the very act of a conversation can be the source of solutions and incite social and ecological transformation.

## Conclusions

The history of sharing waters is a rich one, filled with nuanced collaborations and practical applications. Yet the resources are threatened by dangers old – population, poverty, and pollution being chief among them – and new – climate change and commodification, for example. Avoiding crises and violence in the future will require heroic effort and political will, and will rely heavily on the work of the vibrant and growing hydrodiplomatic community in the years to come.

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# 8

# SCALES OF WATER DIPLOMACY

*Bruno Verdini*

**Key Takeaways**

- To vanquish the menace of uncertainty and scarcity, casting our eye toward interconnected scales can be game-changing, as challenging rigid protocols and genuinely taking the plunge to collaborate across jurisdictional and institutional scales is rewarded by meaningful outcomes in high-stakes conflicts.
- How we think impacts how we speak, and the ways in which we speak further determine with whom, how, and when we act on any challenge.
- Concrete water diplomacy action, built upon mutual, evolving, and adaptive learning to genuinely address blind spots, is what allows stakeholders to switch from a win–lose mindset to a prosperity mindset.
- Addressing extreme drought conditions by counter-intuitively turning water shortages into water surpluses and enhancing security through environmental restoration exemplifies how to resolve transboundary conflict through meaningful political, economic, and environmental results, enhancing trust and reciprocity between developed and emerging economies

## Introduction: Tackling Uncertainty and Scarcity

Across our beautiful planet, to hear that we live in times of *uncertainty* is a common occurrence. We encounter it constantly in the news. Corporations and start-ups compete for market dominance, emphasizing how their data-gathering and data analysis technologies render the unknown, known, and thus provide the upper hand. A stream of scientific studies, looking at our past and our future, is debated, published, and disseminated, focusing our attention on dangerous blind spots and key vantage points. And politicians, across the spectrum, battle each other for the acquisition and maintenance of power, weaving narratives in the public discourse to stake claims on the legal, economic, and governmental direction they deem would best protect and advance those whom they consider to be their core stakeholders.

Synonyms for the word "uncertainty" are varied, and they include variability, doubt, indecision, hesitation, vagueness, ambiguity, and insecurity. In a nutshell, they point to a widespread formula of inertia and stasis. This immobility is inexcusable when we consider that at least


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650 million people earn less than $2.15 a day. The reference point is the international benchmark assessed by the World Bank and used by the United Nations to monitor extreme poverty around the world. It amounts to a proportion of roughly one in 12 of the Earth's inhabitants (Hasell et al., 2022). Casting our eye toward the realms of water, currently, over 3 billion people are at risk of disease because their water quality is unknown. A fifth of the world's river basins are going through steep fluctuations, reducing water availability. And more than 40% of 75,000 water bodies examined in 89 countries have been found to be severely polluted (United Nations Environment Programme, 2021).

This absence of access, experience, and ownership of means for survival, let alone living, is an excruciating social *failure*. Etymologically rooted in both Sanskrit and Latin, to *fail* revealingly entails to stumble, miss, and err, as well as to deceive, trick, and dupe. Notice the choice of word. Not fact. Not reality. But *failure*. The reason in this choice is borne out of the experience that in the realm of natural resources *uncertainty* is often further weaponized when combined with *scarcity*. In the very same way that poverty is not an unfathomable, preordained, and inevitable social outcome, neither are the *failures* in achieving water security, quality, and sustainability. The onus ought to be on the decision-making abilities and accountability of all stakeholders involved. The mindset we use to approach, use, share, develop, and enhance vital resources is paramount. Ipso facto, how we think about any challenge impacts how we speak about it, and the ways in which we speak about it further determine with whom, how, and when we act on it.

The Water Diplomacy Framework, by mission and vocation, is a stakeholder-driven, problem-solving approach that meets head on the complexity of individuals, communities, organizations, and societies, and their reliance on nature. It makes it clear that the unearthing of rigorous, verifiable, and reproducible scientific data is essential to take effective steps in the management of water. It renders it equally plain that the push and pull between competition and collaboration that pervades decision-making in the social realms will not evaporate in the face of technical insights, however poignant or accurate these might be, and in spite of how daunting or pressing the odds. This is because it recognizes that stakeholders approach water management not only as a vessel encompassing myriad interests, but as an arena where identity-based concerns are at stake as well (Islam and Susskind, 2022, 2012).

Such a complex combination of elements, defined as variables, processes, actors, and institutions, in the hands of leaders that approach *uncertainty* and *scarcity* with the widely held win–lose mindset, is used as an excuse for draconian directives and fierce confrontation. This is part and parcel of the political theater of heroes versus villains that weekly clouds our airwaves and fuels endless paralysis. Yet, in the Water Diplomacy Framework, these elements call for the very opposite. Conveying, unequivocally, that the tools, techniques, and processes that will genuinely assist serious stakeholders in addressing complex problems must embrace a commitment, in both values and interests, to monitoring and testing across a wide array of domains, from the physical, ecological, and biogeochemical to the social, political, and jurisdictional ones. For only an agile outlook, anchored on an awareness whereby collective action is built upon evolving, mutual, and adaptive learning, can rise to meet the high stakes omnipresent in natural resource management (Choudhury and Islam, 2018; Islam and Susskind, 2018).

This is a powerful framework where deal-making emerges from sustained, interdisciplinary, joint fact-finding, vibrantly examined under the guidance of mutually devised, agreed-upon standards of fairness. Inherently, this is a dynamic partnership process where the outcome is not predetermined, where all the pieces of the puzzle are not yet known when negotiations are launched, and where the stakeholders' initial assumptions, goals, and solutions are amenable to

enhancing feedback and positive transformation. This represents exactly the kind of economic, environmental, and political problem-solving that serves as a suitable antidote to the needless polarization and strain in which narrow-minded leaders thrive, environmental resources whittle, and conflicts snowball (Susskind, 2013; Susskind et al., 2020).

Both as a springboard and catalyzer, the Water Diplomacy Framework empowers stakeholders who hold firsthand knowledge and have organized their lives around the resources at stake, to build momentum and enrich capacity by consistently being proactive about—rather than shackled by—the capacity and constraints present in any given context. For it outlines that it is precisely within larger jurisdictional and institutional kaleidoscopes, with an added number of moving elements across time and space, that local, regional, national, and international actors, brought together by the very nature of watersheds and river basins, can positively surprise one another. These surprises arise from the discovery of empowering solutions derived together through tangible, pragmatic, value-increasing trades (Islam and Madani, 2017; Islam and Smith, 2020).

## Flipping the Script: Turning Defeat into Victory

The creativity unlocked by the Water Diplomacy Framework is undeniable, within reach of any stakeholder who seeks to improve its reality, and amenable to emerge in most unexpected manners. Looking at it from a perspective centered on *interconnected scales*, as examined in this section, is an impactful window to drive this point home. I will focus strictly on the Colorado River, on account of the research I have led over a decade at the MIT Science Impact Collaborative, part of the inter-university consortium between Harvard, MIT, and Tufts, based at the Program on Negotiation at Harvard Law School. The effort has been centered on contrasting and piecing together, simultaneously, firsthand accounts from core stakeholders on both sides of the border. The focus has been on tracking and documenting the best practices of government, corporate, social, and environmental stakeholders in high-stakes conflicts impacting the partnerships that the United States and Mexico forge in their shared management of an overwhelmingly vital basin. This occurs amidst a backdrop of climate hardships in an increasingly drier region that relies on the Colorado River to provide water for over 40 million people, serve growing cities, generate hydroelectricity, sustain environmental tourism, and irrigate some of the most productive agricultural and ranching lands in both countries.

The examples I outline are concrete actions that have withstood the test of time across administrations with very different values and priorities, implemented well beyond those originally involved in negotiating them. They are described after interviewing the widest chain of stakeholders feasible, from presidents, secretaries, and ambassadors to activists, technical experts, and water managers. An in-depth look at a set of historical confrontations spanning three centuries, accounting for milestones across seven decades, and honing in on key turning points during the first two decades of the new millennium, culminates in a 12-step approach to effective transboundary negotiations as published by the MIT Press in *Winning Together: The Natural Resource Negotiation Playbook* (Verdini 2017). The book, with an extensive array of firsthand accounts, has been translated to Chinese and was being translated to Russian before the war in Ukraine broke out. Thus, it might be prudent to suggest that while the examples below occur in North America, the tenets embedded in them match opportunities across an array of political and economic systems, in diverse regions, including high-stake water conflicts in Southeast Asia, the Middle East, and North Africa, to name a few (Kittikhoun and Staubli, 2018; Klimes and Yaari, 2019; Basheer et al., 2021).

Long story short, the United States, the upstream riparian, and Mexico, the downstream riparian, collaborate with one another in the management of the shared waters of the Colorado River through a set of legal, political, economic, and environmental strategies that precede, derive, and unfold from a binational treaty signed in the 1940s. As is the case with international treaties across time, these binational directives have been further elucidated, shaped, and refined on account of conflicts and agreements that the two countries have spearheaded in moments of crisis and prosperity (Mumme, Ibáñez, and Verdini, 2018).

One core aspect of the binational partnership is the annual allocation of water of the Colorado River that pertains to each nation. A crucial benchmark that has informed, for more than 70 years, what this allocation must be, has unwittingly used a period of time with much wetter natural conditions, which no longer match the basin's drier reality. Compounded by the likelihood of even drier conditions in the decades to come, the seven US basin states, Wyoming, Utah, Colorado, Arizona, New Mexico, Nevada, and California, proactively proceeded to explore together what kind of measures they could come to terms with and put in action to enhance water availability, recognizing the shared need for a consensus on a host of combined strategies over the short, medium, and long terms.

Among the strategies the states agreed upon are reductions in water allocations under extraordinary circumstances and given a set of specific scenarios. By negotiating how these water shortages are to be mutually enacted, managed, and resolved, the stakeholders acknowledged looming threats and manifested that however difficult it already is to devise shared strategies, waiting to try to do so further down the road, under the stress and confrontation that could ensue in the heat of the moment of severe droughts, would be counterproductive to the core interests of all involved. They first reached agreement on the structure for water shortages during the George W. Bush presidential administration, in partnership with the Bureau of Reclamation, part of the Department of Interior, which oversees the Colorado River on a federal level. Then, they proceeded to communicate to the Department of State that the United States should progress to negotiate water shortage strategies with the Mexican authorities, and in particular, the International Boundary and Water Commission (IBWC), the binational body that supervises the execution of the agreements between the two countries on the shared waters of the Colorado River.

Since the basin was Mexican territory for centuries during colonial times and for many decades after independence from Spain, only to be lost on the heels of a war initiated by the United States, a historic animosity can be ignited whenever Colorado River themes are explored. This means that stakeholders on the Mexican side, let alone those in the IBWC, but the government officials in the national water, environmental, treasury, and foreign affairs ministries, as well as state agencies, tend to have limited maneuvering room in terms of what is politically feasible for their back table. And definitely if the moniker for the binational negotiation is to agree on water shortages. So, not surprisingly, after the first few rounds of negotiation, when the US federal agencies returned to summarize the state of affairs with US state leaders, they related that even though the Mexican stakeholders were not necessarily disputing either the science or the rationale behind the United States proposing the enactment of binational water shortages, Mexico would not concur with such measures, without simultaneously seeing to fruition an agreement that would secure increases in water availability. The latter, of course, sounded as an oxymoron: producing water surpluses in an extreme drought context where water shortages are at stake.

Yet, without such seemingly impossible outcome, a binational agreement would be dead. In this context, many stakeholders were quite tempted to go their separate ways and enact unilateral decisions. Following this path would have led to confrontation, litigation, and paralysis. Instead, and unlike what had occurred in decades past, cooler heads prevailed, and both sides decided to

give it a chance and enhance their negotiation protocols by empowering a larger number of core actors to contribute their expertise and resources to the conundrum at hand, not as observers to the negotiation process, but instead as stakeholders. This shift occurred during the presidency of Barack Obama and continued to be implemented during the Donald Trump and Joe Biden administrations, as well as the presidential administrations of three different political parties in Mexico, all from different ideological realms. It has meant that in addition to the experienced diplomats running these binational negotiations, the state representatives, the heads of water agencies, and the environmental actors with decades of experience working across the border, have been empowered to lead vital work to examine blind spots, float what-if scenarios, and test confidence-building measures.

One of such measures centered on resolving the concern, by some political appointees on Mexico's side, that the water shortages were an excuse by the United States to store a larger amount of water in the two core reservoirs of the basin, Lake Mead and Lake Powell, which, it was posited, would unfairly benefit hydroelectricity generation. This assessment was not shared by several technical stakeholders on Mexico's side, who knew that the water amounts at stake were negligible in the renewable energy arena, though, as is often the case in politics, they were not necessarily those with final say. So, after running around in circles for months, it was creatively envisioned that a fairly straightforward way to assuage concerns on any dangerous ulterior motives was to pause and spend an important number of negotiation rounds, studying together, with detail and precision, the complex set of rules that govern the relationships between the seven US basin states as it pertains to the management of the Colorado River, in order to underscore with evidence, that the mere intent of foul play in water storage would require such a complex degree of operational steps patently unable to escape notice and harsh penalization by the very own self-interest that each of the seven states has vis-à-vis the shared water resources. To cap off this reality, the US stakeholders took the unusual measure of inviting the Mexican stakeholders to tour together and see firsthand the facilities on the US side of the border, across different regions. This effort did not go unnoticed, earned goodwill, and catalyzed trust. Here is where the plot thickens.

In a reciprocal move to further enhance confidence, US stakeholders were invited to visit the facilities on Mexico's side. Unexpectedly, while touring several regions in the Mexican states of Baja California and Sonora, some noticed that many of the canals responsible for distributing the water of the Colorado River were not lined with concrete. This meant that a sizeable amount of the water annually allocated to Mexico was completely lost due to both seepage and evaporation. A problem that had been going on for decades. If the canals were to be lined with concrete, however, a water surplus would immediately exist. This would turn the binational negotiation into a deal-making process that actually delves into both water shortages and water surpluses.

Moreover, if the significant funding to line the canals came from financially robust water districts in Nevada, Arizona, and California, this would mean, in practice, that US stakeholders would be showing with actions that they were in it together with Mexico, and that they were directly contributing to enhance water availability in the country. In turn, to justify to their own US ratepayers the investments on Mexico's infrastructure, a fraction of the surplus water suddenly available could then be traded to these US districts, without the danger of any political uproar, since it would not be water in current use by any Mexican agricultural, ranching, or city interest. Since it would be exchanged at Mexican water prices, this would be considerably less expensive for the water districts in the US states than what is financially involved in acquiring tapped water rights on the US side of the equation. And Mexico would find itself with better canals, more water to deliver to more users, and a new stream of financial revenue. An incredible win, all around, for all involved.

## Conclusion: Expanding Scope and Impact

The victories did not stop there. Transformative innovations on binational water storage and environmental restoration, to name a few arenas, were equally achieved. What is crucial to point out is that the impacts were far-reaching and unexpected, by precisely intertwining multiple scales. As part of the Mexican stakeholders being amenable to engage in water shortages under certain extraordinary drier conditions in the basin, the two countries agreed that in wetter conditions, should these arise in the future, Mexico could rely on the large reservoirs in the United States, to store excess allocations, whenever it deems useful. This has a positive multiplier effect on several fronts. Mexico, which does not have reservoirs to store the Colorado River water, suddenly has access to world-class storage at Lake Mead and Lake Powell, at no cost. This is because the United States, by virtue of being able to increase water in its own reservoirs, reduces the rate of evaporation of its own water in storage, which further enhances not only the water availability for both sides, but also the quality, since the more water there is in the upstream reservoirs, the better the impacts on water composition, across the basin, with enhancing impacts on the sediments fueling more productive agriculture.

Furthermore, in this strengthened spirit of trust and collaboration, a percentage of the annual transfer of Colorado River water between the two countries, following the expert advice of the environmental stakeholders empowered to be more than observers, proceeded to be scheduled to coincide with specific periods in the year when the cycles of the native flora on the Mexican side can take root and replace the invasive species that took over long periods of drought across the Colorado River delta. These invasive species, paradoxically, compound the arid conditions as they draw on far more groundwater than native species. This partnership in timing coordination, which would not have become apparent had the two sides taken the easy way out of either one-sided decision-making or rigid thematic priorities, is not only an environmental boon, but also a spark that raises the security of local communities, since the invasive species, unlike the native species, grow tall, thick bushes that render smuggling activities harder to spot and track for law enforcement.

In summary, one of the many striking features of the processes and outcomes described is that it is precisely when the stakeholders moved away from the mirages they held about one another, be it in assumptions, expectations, or judgments, and instead engaged in serious joint fact-finding, that not only did they reduce sources of conflict, but also they found solutions neither originally envisioned. This is what is so telling, proof that more robust, agile, lasting actions that enhance your own core interests in the management of shared natural resources are hardly assured through unilateral moves, but instead through the byproduct of a curious, smart, and sustained exploration of what other stakeholders prioritize, experience, and value. For the pieces of the puzzle are myriad, and the vantage points necessary to figure out how to best put them together, are hardly the province of a single entity. As the Water Diplomacy Framework underscores, to vanquish the menace of uncertainty and scarcity, casting our eye toward interconnected scales proves game-changing.

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# 9

# WATER DIPLOMACY PATHS

## An Approach to Recognize Water Diplomacy Actions

*Marko Keskinen, Juho Haapala, Anna Huovila, Antti Rautavaara, and Suvi Sojamo*

**Key Takeaways**

- We look at water diplomacy as a long-term process that has a particular relevance in transboundary river basins shared by two or more riparian countries.
- Different water diplomacy contexts have multiple possible drivers that can lead to both increased cooperation and tensions between the key actors.
- We suggest a step-wise approach called Water Diplomacy Paths (WDP) that considers key themes and actors, as well as drivers to recognize possible water diplomacy actions.
- The WDP approach can provide a structured way to understand the water diplomacy dynamics and propose possible actions for going forward.

### Introduction: The Emerging Importance of Water Diplomacy

Water diplomacy can be generally understood as a negotiated problem-solving process that brings together different actors sharing a water body at the local (subnational) or regional (between states) scale. One of the most prominent uses of the concept is related to the latter scale, i.e., to transboundary waters shared by two or more countries. In such situations, water diplomacy brings together water and transboundary water cooperation mechanisms with negotiation processes and foreign policy (Council of the European Union 2018). While this section and the WDP approach introduce a focus on this kind of transboundary setting, most of the discussion could also be applied to the subnational scale.

Why is water diplomacy gaining increasing attention in international shared waters? The argument is that increasing tensions over shared waters – due to, for example, changing climate and growing water use but also due to increasing geopolitical tensions – call for new kinds of approaches that are able to tackle also the more political aspects of transboundary water use and allocation (Islam and Susskind 2013; Water Diplomacy Consortium 2013; Huntjens et al. 2016; Huntjens and de Man 2017; Klimes and Yaari 2019). Thus, water diplomacy not only builds on but also extends the more established mechanisms of transboundary water cooperation, often with a stronger focus on political dimensions and an inbuilt assumption about differing interests as well as often asymmetric power relations between the riparian countries. In such settings, established

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negotiation tools and diplomatic processes can provide means for addressing the potential differences and tensions, hence facilitating collaboration over shared waters – typically rivers but also lakes, aquifers and other water bodies shared by different countries and/or user groups – in ways relevant and applicable for each specific context.

Water diplomacy is generally seen to include technical and political dimensions (Klimes et al. 2019), with technical dimension referring to water-related knowledge and mechanisms and political dimension referring to political negotiation processes, both on and beyond water. The analysis by Keskinen et al. (2021) recognized also three additional aspects for water diplomacy, namely, Preventive, Integrative, and Cooperative aspects. Together, the five aspects thus indicate the so-called technical foundation and political ceiling of water diplomacy processes, but also indicate how the motivations, mechanisms, and aims of water diplomacy may link to conflict resolution and peace mediation (Preventive), existing institutes for collaboration (Cooperative), as well as the diversity of sectors and actors engaged in water diplomacy across multiple diplomacy tracks (Integrative).

The five aspects also imply that water diplomacy and transboundary water cooperation are two closely related but distinct concepts. Transboundary water cooperation typically builds on the established cooperative institutions and technical knowledge and planning processes, with a clear focus on water, linking it thus closely with the Technical and Cooperative aspects discussed above. Water diplomacy, on the other hand, often puts more emphasis on the political and geopolitical dimensions and related tensions on shared waters, noting the importance of conflict resolution and negotiation processes that typically engage several sectors and actors, also beyond water. While transboundary water cooperation can be seen to build on the idea of joint benefits and the willingness to cooperate, water diplomacy typically emphasizes national sovereignty and takes the differing interests and needs of the riparian countries as a starting point for the negotiations. Ultimately, however, both concepts have the same aim, namely, to use interactions on shared waters as a facilitator for (national and regional) political goals such as peace, development and security. The two concepts also contribute to each other. Establishing a mechanism for transboundary water cooperation (e.g., a joint agreement or river basin organization) typically requires long-term diplomatic interactions, and functional transboundary water cooperation can thus be seen as an end result of water diplomacy process. On the other hand, water diplomacy may complement more technically oriented cooperation in situations where the existing cooperative mechanisms are not able to address all political issues between the parties (Keskinen et al. 2014).

Similarly to any governance context, water diplomacy also builds on a set of both formal and informal institutions and actors, as well as their interactions (e.g., Young 2013; Pahl-Wostl 2015). The key institutions in water diplomacy consist of a variety of rules and practices for interaction between the riparian states, including formally established institutions such as regional (water) agreements and the related cooperative processes. Such institutions may build on two global framework conventions on shared waters, i.e., the UN 1997 Watercourses Convention and the UNECE Water Convention 1992, which set the general principles for transboundary water interactions. The key water diplomacy actors consist then typically of the riparian country governments and related organizations (e.g., relevant ministries) and – if existing – regional intergovernmental organizations such as river basin organizations (RBOs) (Schmeier et al. 2016). These actors are then usually complemented by a plethora of other actors (e.g., researchers, companies, and civil society organizations and networks) across multiple diplomacy tracks, including possible third-party actors.

## Water Diplomacy Paths Approach

The so-called WDP approach was originally developed by Keskinen et al. (2021) for analyzing a given water diplomacy context as well as for recognizing potential water diplomacy actions. The approach utilizes the co-existence of the five key aspects recognized for water diplomacy above, providing a general analytical framework for an external actor (e.g., a third-party facilitator) who seeks to understand better a certain water diplomacy context and the related possibilities for a meaningful engagement to prevent and reduce water-related tensions. Yet, the approach can also be used by actual water diplomacy actors (e.g., an intergovernmental organization) as a structured way to view the potential future paths as well as related tensions and water diplomacy actions. While the approach was developed for transboundary waters shared by two or more riparian countries, we suggest its basic principles might be relevant also at subnational scale where the issue is more related to different water users and their (potentially conflicting) interests.

The WDP approach is naturally not the first one to study shared waters, but it complements other existing approaches and initiatives that seek to understand water-related conflicts and/or provide recommendations for water diplomacy actions. Such approaches include, for example, the variety of tools recognized for promoting coordinated development in shared river basins (Leb et al. 2018), the assessments done under the Geneva Water Hub and the related Global Observatory for Water and Peace (GOWP – Global Observatory for Water and Peace 2022) as well as the Transboundary Freshwater Dispute Database and related analyses (e.g., McCracken and Wolf 2019). In addition, a variety of other reports and publications provide views and tools on both understanding water-related conflicts and suggesting water diplomacy actions (e.g., Pohl 2014; GGRETA Project 2016; Huntjens et al. 2016; Molnar et al. 2017; Farinosi et al. 2018; Hakala et al. 2023). One such is Water Diplomacy Conflict Analysis tool published in April 2023 by Finnish Institute of International Affairs, which can be seen as a complementary tool to WDP (Hakala et al. 2023).

The WDP approach introduced in this section is a revised and extended version, with an increased emphasis on practical implementation. To ensure this, we have slightly modified the original four steps and, importantly, added a fifth step that provides guidance for future planning and implementation of the possible water diplomacy actions (Figure 9.1). Such a revision was based on the discussion with water diplomacy practitioners, who highlighted the need to clearly understand the different options that the approach helps to bring forward. The five steps aim to provide a clear structure for the analysis, with the first two steps focusing on the analysis of the context and the latter three steps helping to recognize possible key drivers and future scenarios, as well as related water diplomacy actions. In the contexts where the current state is already well-studied and known, the approach can be started directly from Step 3. While the approach in this section is discussed only at the general level, Keskinen et al. (2021) provide three illustrative case studies from Central Asia, Mekong Region, and Finnish–Russian cooperation on the use of the approach.

The approach also has a strong temporal emphasis, as it seeks to consider both the historical trajectories and possible future paths forward in a given context. Such an emphasis seeks to help envision alternative future scenarios, moving beyond the present-day dynamics. The long-term view is also important to remind the actors about the dynamic, evolving nature of the shared water body. While water allocation and management decisions are often based on current or even past flow regimes, climate change and changing water use are likely to alter both the quantity and timing of the flows of the shared waters.

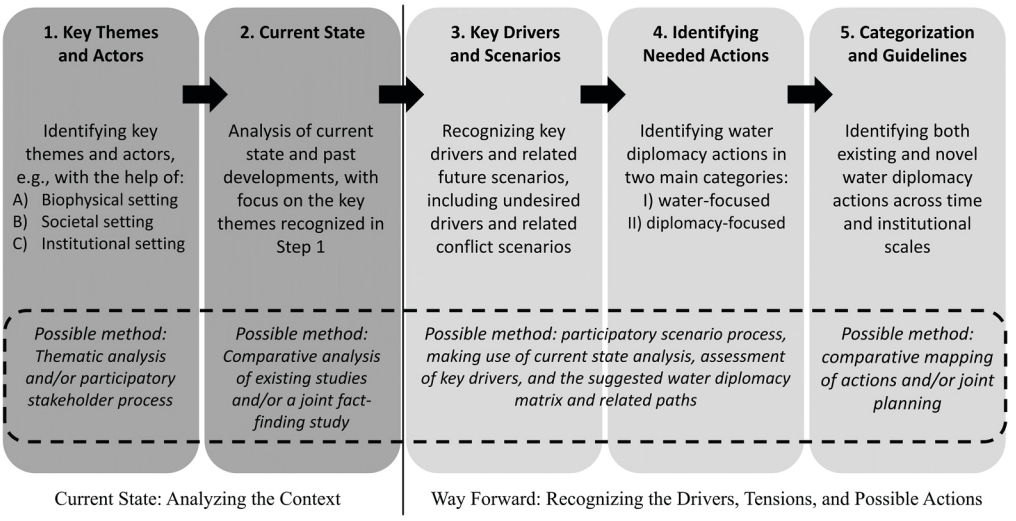



*Figure 9.1* Visualization of the water diplomacy paths approach and its five steps, forming two key phases with a focus on current state (Steps 1–2) and way forward (Steps 3–5).

### *Step 1: Identifying Key Water Diplomacy Themes and Actors*

The analysis starts by identifying the most relevant themes and related actors and their relations in the given water diplomacy context. This may include the use and development of shared water resources and related sectors such as the environment, agriculture, and energy, as well as the broader political and economic cooperation contexts. General divisions such as those of biophysical, societal, and institutional themes may help this identification process.

There are many methods for such analysis, starting from desk studies, literature reviews, and expert interviews. Ideally, the identification should be a facilitated participatory stakeholder process, involving methods such as knowledge mapping and social network analysis (Reed et al. 2009) that also help to understand the diversity of views that the key actors have on the given context. The benefit for the stakeholders who might already be aware of the main themes and actors is the systematic and collective recognition of the overall context and related categorizations that is mutually discussed and even agreed upon by participating stakeholders.

### *Step 2: Analyzing the Current State and Drivers*

The analysis continues by recognizing the current state of the specific water diplomacy context. This builds on Step 1 as well as on a consideration of the historical trajectories and past trends that have led to the current situation. These trends may be related to water use, infrastructure development, institutional evolution, and broader political relations. Recognition of the past drivers and pressures improves the understanding of the drivers and pressures of the present and also helps in envisioning alternative future paths in the following steps. It is therefore suggested that this step includes intentional consideration of the drivers that may lead to potential tensions, while recognizing that such a discussion is sensitive and often avoided and needs to be particularly well structured and facilitated.

Methods for this step may involve a comparative analysis and joint synthesis of existing relevant information in the specific transboundary context, as well as possible additional studies. This work could be conducted, for example, by an expert team representing all key actors, by an independent expert group, or by their combination (Keskinen et al. 2012). The process of joint fact-finding (McCreary et al. 2007; Islam and Susskind 2013) can provide a structured way to consider possibly conflicting information sources as well as to conduct the required new studies. The analysis should preferably be facilitated so that the parties can discuss the current baseline situation. This is important, given that knowledge – and different knowledge products such as models and impact assessment results – can become highly contested in transboundary settings (Käkönen and Hirsch 2009; Klimes and Yaari 2019). At best, this leads to the formation of a mutual understanding of the current situation that is accepted by all relevant parties.

### *Step 3: Recognizing Desired and Undesired Future Scenarios*

The third step takes a forward-looking view and envisions possible future scenarios on how water-related and political interactions could unfold in a given context. This step builds on the previous two steps and is based on a set of assumptions on how the current state may evolve due to the identified key drivers and evolving relationships between the key actors. The scenarios should preferably include both positive (desired) and negative (undesired) views on the future, thus also including intentional consideration of potential water-related tensions and even conflicts in a given context.

Both the third and fourth steps may utilize a participatory scenario process that creates alternative scenarios for the context, using, for example, one of the existing methods that have been used in different transboundary water contexts (Phillips et al. 2008; Keskinen et al. 2015; Warner and van Buuren 2016; Farinosi et al. 2018; Gorgoglione et al. 2019). While the scenario process contributes to both Step 3 and Step 4, there are also clear differences: Step 3 focuses on predictive and explorative scenarios ("What is likely to happen given the current state and drivers?"), while Step 4 considers more anticipatory and normative scenarios ("How can we achieve together a specific, peaceful future and mitigate the tensions envisioned in Step 3?"). Given the inclusion of potential conflicts into future scenarios, the step may also make use of a variety of conflict analysis tools and frameworks, such as the conflict wheel or conflict mapping (Mason and Rychard 2005; Mason and Blank 2013; Global Partnership for the Prevention of Armed Conflict 2017; Berghof Foundation 2018).

### *Step 4: Identifying Possible Water Diplomacy Actions*

The fourth step maintains a future-oriented view and seeks to identify possible water diplomacy actions that would respond to the drivers recognized in the previous step by enhancing collaboration, building trust, and/or easing potential tensions. The recognized water diplomacy actions should preferably link to both water-related processes and key diplomacy processes, as this will better ensure that the actions are broad enough and consider both the technical and political tracks of water diplomacy.

One way to link Step 3 with Step 4 is to use a matrix that considers both water-related and political drivers as well as related actions through a simplified division into two types of processes (Figure 9.2). In the matrix, the horizontal axis considers water and related knowledge production mechanisms ("water to politics"), while the vertical axis considers politics, differing national interests and related diplomacy processes ("politics to water"). While these two aspects are

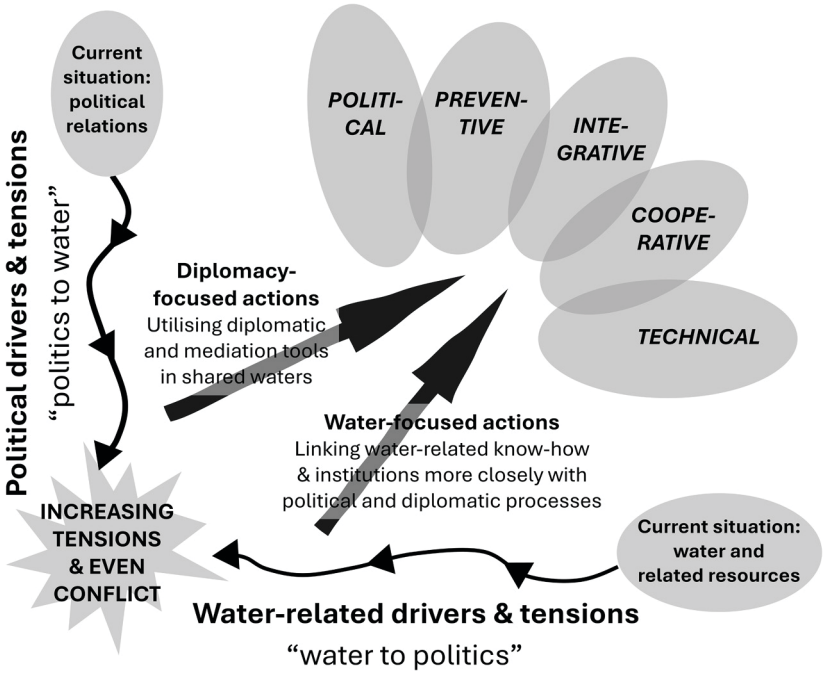



*Figure 9.2* Visualization of the water diplomacy matrix, considering first the water-related and political drivers (Step 3; horizontal and vertical axes) and then the related water-focused and diplomacy-focused actions (Step 4; arrows toward top-right).

strongly interlinked, we see that considering them separately may help to recognize better the full potential spectrum of different water diplomacy actions, including those that do not stem directly from water field and transboundary water cooperation arrangements.

The matrix also considers undesired scenarios where the possible future drivers may lead to increasing tensions and even conflict. While establishing such undesired scenarios may not be easy (at least jointly by the key actors), it helps to set the focus on water diplomacy actions that have the highest potential to prevent and mitigate the envisioned tensions. Following the logic of the matrix, the recognized actions can be divided into two categories; the more technical category is related to water know-how and cooperation mechanisms, while the more political category consists of broader, diplomacy-focused actions that aim to build trust and strengthen interaction between the parties more broadly (see also Keskinen et al. 2023). The end result is a set of water diplomacy actions that aim to turn the undesired conflict paths into desired WDPs.

### *Step 5: Categorizing Water Diplomacy Actions*

In the final step, the potential water diplomacy actions recognized in Step 4 are compared with the existing water diplomacy-related activities in the studied context in all relevant scales (subnational, national, and/or regional). Such comparison seeks to do two things: to recognize those existing activities that are important to maintain also in the future, and to identify novel actions that could be initiated due to possible gaps and limitations that the current activities have.

Recognizing and specifying both existing and novel actions also facilitate planning of those actions across different categories, such as their temporal (short-/medium-/long-term) and spatial (local/national/regional) emphases. Following the water diplomacy matrix visualized in Figure 9.2, the actions can also be categorized to those focusing more on technical/water-related aspects and those on political/diplomacy-related aspects, which may then also be sequenced in different ways. Such categorization may also help to see the key actors engaged in their implementation, as both the responsibility and resources for the implementation of actions in these categories are likely to be rather different. The resulting listing of different actions and actors helps to understand the variety of and linkages between both existing and novel water diplomacy actions and – at best – provides an 'action framework' that can be used to guide the resourcing and implementation of future water diplomacy actions.

## Discussion: Recognizing Future Water Diplomacy Actions

Water diplomacy is a dynamic, politically-oriented process that aims to prevent, mitigate, and resolve water-related tensions in shared waters by making simultaneous use of diplomatic tools, water-related know-how and cooperation mechanisms across multiple diplomacy tracks (Keskinen et al. 2021). In short, water diplomacy helps to bring diplomacy to water, and water to diplomacy (Keskinen et al. 2014).

While water diplomacy may sometimes focus on immediate, short-term problem-solving and conflict resolution, we view it ultimately as a conflict prevention and peace mediation mechanism. This, in turn, requires a long-term view and a commitment to proactive water diplomacy actions that focus on the issues at hand and do not shy away from potentially contested themes. The WDP approach presented in this chapter seeks to provide a structured way to understand a given water diplomacy context as well as to recognize long-term water diplomacy actions (and related actors) that are important to prevent future tensions from escalating to actual conflicts. We see that the strength of our approach lies in its strong orientation toward future, its simple, yet systematically applicable step-by-step approach, as well as the clear differentiation between water-related and political actions. In addition, we believe that the inclusion of undesired future scenarios – or the so-called conflict paths – helps to highlight the need for action (and/or the cost of inaction) as well as to encourage innovative "out of the box" thinking to complement the existing mechanisms and activities.

The WDP approach has its limitations as well. First, while taking broad stakeholder analyses as its starting point, the approach itself does not set any requirements or mechanisms for inclusion or ameliorating power asymmetries between actors. While the process itself can be positioned as *value free*, the water diplomacy spaces for its application are typically politically contested and exclusive settings (e.g. Vij et al. 2020; Warner and de Man 2020; Zeitoun et al. 2020). This also means that applying the approach with the key water diplomacy actors such as riparian country governments builds on the premise that there is a mutual agreement on the need for such analysis as well as willingness to participate in it – both of which may not exist, particularly in situations with existing tensions between the parties.

Second, and along the similar vein, Step 3 of undesired future scenarios and tensions is not likely to be welcomed by all actors – and yet it would best serve its objectives if done in collaboration with all key actors. The natural drawback of this kind of planning tool is that even a good end result (i.e., a comprehensive set of water diplomacy actions) does not guarantee success, if the parties involved are not committed to their implementation. Alternatively, the approach may be used just as an analysis tool, focusing on understanding a given water diplomacy context and the potential future tensions and related preventive actions.

Third, to address the root causes for both conflictive and cooperative potential in the given context, both the water-related and political drivers need to be understood in their broad sense, accommodating cross-sectoral interdependencies and political and economic actors also beyond the basin in question. If the WDP approach is applied in a light and limited manner, it may provide even a false sense of understanding about the complexities in a given context. On the other hand, the approach may also help to understand the limitations related to the existing water and/or diplomacy processes, providing thus a tool for recognizing a broader set of actors and processes with whom engagement is necessary to achieve the desired water security aims.

It is clear that water diplomacy is increasingly used, both as a concept and as an approach. Similarly clear is that water diplomacy draws an interest from a variety of actors, including those actually "doing water diplomacy" in a given context (e.g., riparian country governments) as well as those seeking to facilitate the application of meaningful approaches and mechanisms related to water diplomacy to promote regional cooperation (e.g., third-party mediators).

## The Role of Finland in Promoting Water Diplomacy

This chapter has been written by a set of water and diplomacy experts from Finland, and, in this way, the chapter also seeks to bring together some water diplomacy-related activities that Finland and Finnish actors are engaged in (see also Ministry for Foreign Affairs of Finland 2021; Hakala et al. 2023). Finland is engaged in water diplomacy with its own neighboring countries as well as by supporting and facilitating water diplomacy processes in other contexts. Finland shares important transboundary waters with all three of its neighboring countries and has a long-term experience from a challenging water diplomacy process, particularly with its eastern neighbor of Russia. Long-term commitment, a realistic view, and a step-wise process have all been important in the Finnish–Russian transboundary water interactions (Haapala and Keskinen 2022), and the WDP approach could provide one way to view also the future dynamics and tensions in that setting. Here, also the role of EU policies – including those related to water and more generally on cooperation – is likely to be of increasing importance.

Finnish actors promote and support water diplomacy also more broadly. At the global scale, Finland interacts closely with the United Nations and particularly with the UNECE Water Convention 1992, i.e., the so-called Helsinki Convention, which provides the key global institution for transboundary water cooperation and water diplomacy. Similarly important is the collaboration with the EU, as well as in selected water diplomacy contexts, for example, in Central Asia and Africa (Salminen et al. 2020). Such an active role is in line with Finland's International Water Strategy, which was agreed by five Finnish ministries in 2018, and where "Water for Peace" is one of the three main pillars (Ministry of Agriculture and Forestry et al. 2018).

Water diplomacy is an increasingly important part of Finnish foreign and security policy as well as development cooperation. Water diplomacy brings together Finland's long traditions and existing activities in both transboundary water cooperation and peace mediation, providing the possibility for leveraging the actions and creating additional connections between the two (Ministry for Foreign Affairs of Finland 2021). The Finnish Ministry for Foreign Affairs coordinates a water diplomacy network that brings together a diverse set of actors having expertise on different themes and contexts related to water diplomacy. To facilitate the cooperation, the network also seeks to recognize what kind of water diplomacy actions different contexts may require and what kind of contribution Finland and its partners could have: for this, the WDP approach provides one approach.

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# 10

# WATER DIPLOMACY AND THIRD-PARTY ENGAGEMENT

*Martina Klimes*

**Key takeaways**

- Third parties play critical roles in water diplomacy, from facilitators and arbitrators to observers, fact-finders, and technical experts, depending on the mandate and timing of their engagement.
- There is no single recipe for effective third-party engagement; it requires a blend of interpersonal skills, technical expertise, and the ability to connect with participants.
- Water diplomacy processes are deeply influenced by geopolitical context, which third parties must carefully navigate.

## Introduction

What role can third parties play in water diplomacy processes? What is the mandate of a third party? And what type of engagement tends to be most effective in building relations between actors that ultimately leads to more cooperative management of shared water resources?

Water diplomacy is not only about mitigating and resolving conflicts and escalated tensions over transboundary waters but also about building relations between actors sharing a water resource. Success is not limited to formal treaty agreements; establishing cooperative mechanisms for ongoing collaboration and information exchange is equally vital. Third parties thus can play an important role in facilitating dialogue, creating and advancing opportunities for the building of shared knowledge, and fostering a better understanding of what a shared future for disputants might look like. As Keskinen et al. assert in the previous chapter of this Handbook (Chapter 9), water diplomacy is also an important instrument of preventive diplomacy, and third parties play an important role in preventing the escalation of tensions and conflicts. Water diplomacy tools can accordingly be used at all stages of the conflict cycle (Lund 1996).

The engagement of external actors at different levels and scales in water diplomacy and cooperation processes remains, to a large extent, a relatively unexplored domain. While there are many known cases of third parties facilitating dialogue between countries sharing a transboundary river, lake, or aquifer, relatively little is written about the different levels of engagement of third parties and other roles external actors can play in these processes. This includes water diplomacy at all levels – local, subnational/national, and transnational. The type of involvement often depends on

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the mandate and capacity of the external actor and the riparian parties themselves. It can range from the provision of "good offices" and dialogue facilitation, with only limited involvement in agenda setting and the actual process, to arbitration, where the third party is provided with a mandate to settle a dispute. What factors water negotiators should consider when selecting a third party has also been largely overlooked. This chapter aims to partially fill this gap by exploring the different modalities of engagement by third parties, followed by recommendations both for actors planning to engage a third party and actors considering accepting such a role.

Finally, this chapter aims to debunk several myths about third-party engagement in water diplomacy and conflict resolution at large. These include the notions that third parties must be always neutral or impartial, that the role of a third party can be assumed only by states, or that engaging a third party automatically leads to internationalizing or politicizing a water negotiation process.

## What is a "third party"? Who, when, and how?

The term "third party" is used in this chapter to refer to an actor (or even a set of actors) that is not one of the parties to a given dispute but may play a role in enabling or supporting cooperative dialogue. This may range from good offices and dialogue facilitation to mediation and arbitration. *External actors* can be both third parties included within the dialogue process and those outside the process who indirectly exert influence. This can include bilateral and multilateral donors, technical experts, observers, and external stakeholders who can influence the process, such as the media. Similar to peace processes, each water diplomacy process is complex, and every actor has its own interest and purpose. According to Klimes (2015), third-party engagement can be defined as external assistance with various levels of involvement and leverage. This chapter primarily focuses on types of third-party engagement other than arbitration – specifically, on the various supportive roles in water diplomacy negotiation processes. It does not, however, examine arbitration and other legal dispute settlements in detail.

Third parties play an especially key role when they are involved at the *right place* at the *right time*. They can influence the nature of discussions between the disputants. This largely denotes an actor who has gained the trust of the negotiating parties to act as a dialogue facilitator or mediator; or an actor who emerges as the most suitable party from available alternatives when negotiation becomes inevitable. A third party is also engaged when each party individually believes that involving a third party will maximize their chances of achieving their desired outcome. Each case of negotiation is unique but lessons can be drawn to advance our understanding of how third parties contribute (and could contribute more) to water diplomacy processes in the future.

In the context of water diplomacy, third parties do not need to be limited only to actors facilitating dialogue between the parties. Roles like dialogue process observers, leaders of fact-finding missions, media, and independent technical experts, among others, play an important role in water diplomacy processes. Another important role third parties can play is securing finances for sustaining or incentivizing dialogue processes, supporting technical assessments and fact-finding, as well as providing the necessary funds for the post-agreement implementation of joint projects. The World Bank played such a role during the Indus Treaty process between Pakistan and India. Acting as a mediator, it worked with the parties toward the 1960 agreement as well as supported the implementation of the treaty through financing diverse joint projects.

As discussed in the first part of the Handbook, water diplomacy processes are often multisectoral and multilateral, including both political and technical tracks. This means that

there are also diverse needs for third-party skills and resources in different domains of any given water diplomacy process. Where political will to achieve a resolution on the side of the negotiating parties lacks, the role of third parties can be limited. Disputing parties always seek to advance their own interests. In some cases, they may want a third party to engage because they know it will eventually erode the process, allowing them to walk away without reaching an agreement. The most challenging task – gathering the necessary political will to reach an often difficult compromise – must be undertaken by each negotiating party internally, within their own domestic or organizational context. A third party can foster an enabling environment, create a safe space for dialogue, and provide the necessary technical and financial support; but the disputant parties themselves must lead the process of reaching a sustainable arrangement or agreement over shared water resources. Dialogue facilitators can support negotiating parties by preparing draft agreements, policy briefs and non-papers, press statements, and similar documents. At the same time, within a process, it is often the role of a successful third party not to be seen. External actors, even those not engaged directly in the process, can play a critical role in building political will. The UN, for example, by developing normative guidelines puts pressure on parties to behave in certain ways.

There is an abundant body of literature in both the academic and policy domains regarding third-party engagement in dialogue processes (Kleiboer 1996; Bercovitch and Houston 1996; Crocker, Hampson and Aall 2018; Kriesberg 2008; Zartman 2008; McCulloch and McEvoy 2018). The fields of conflict resolution, and alternative dispute resolution, in particular, provide theoretical and practical insights into the role third parties may play in the context of water diplomacy. Such literature broadly shows how third parties can play an important role in helping negotiating parties better understand different interests and underlying positions, and in opening new or alternative channels of communication.

At the same time, there is a growing appreciation for the role of the environment, including water, in peacebuilding activities. Several peace processes involving both internal armed conflicts and interstate conflicts have contained disputes over shared natural resources, including water. In the mid-2000s, the peace process between the Government of Sri Lanka and the Liberation Tigers of Tamil Eelam included negotiations over water supplies in the so-called "High Security Zones." In another example, the negotiation of the 2016–2017 ceasefires in the Syrian civil war involved talks on the dire humanitarian situation of water insecurity in the country.

Advancing knowledge of dialogue facilitation in the context of water diplomacy can thus contribute to furthering the conflict resolution field at large. One of the conclusions of the annual Oslo Forum in 2019, an annual retreat for dialogue facilitators, was that facilitators and mediators would benefit from better knowledge of climate (and water) issues in light of the increasing impact of climate change in conflict-affected areas.

The 2018 European Union (EU) Council conclusions on water diplomacy included a statement that the Council resolves to enhance EU diplomatic engagement on water as a tool for peace, security, and stability.[1] Other initiatives like the Stockholm International Water Institute's (SIWI) Shared Waters Partnership[2] (SWP) program and the Finnish Water Way – International Water Strategy[3] go further and envisage that dialogues on water can open the door for dialogues on issues beyond water. According to some definitions (Islam and Susskind 2013; Klimes et al., 2019; Keskinen et al., 2021), water diplomacy also has the ambition to assess whether dialogue on shared water resources can serve as a tool for strengthening regional stability and security beyond issues related to shared waters. In this context, third parties can play a role in harnessing these synergies between technical processes focusing on shared water resources and political processes aimed at

securing the necessary political will to implement the agreements. The sections below detail the tools used by different third parties in different types of water diplomacy processes.

### *WHO can be a third party?*

The short answer is anyone or any actor. This challenges the prevailing assumption of realpolitik that only a nation-state can assume the role of a third party in water diplomacy processes. In fact, individuals or a group of individuals – whether affiliated with a state, working under the auspices of a nonstate actor, an academic institution, or even independently – can also assume the role of a third party if they are nominated by the disputants. In addition, different types of nonstate actors can also assume the role of a third party. In 2022, the Swiss-based think tank Centre for Humanitarian Dialogue brokered an agreement on the sharing of freshwater between local fishermen and farmers among 20 different clans in Nigeria, thus ending decades of interclan violence.

The role of a third party can be assumed by a wide range of different actors with diverse characteristics, resources, and sources of leverage. In ideal circumstances, third parties are invited by negotiating parties based on the needs of the riparians and the capacities/capabilities of the third parties. In many cases, each of the negotiating parties looks for an advantage and that inviting external actors becomes a form of "venue shopping" where parties seek to change the format of the negotiation process to their benefit. Third parties can also support a single party and do not need to act jointly or on behalf of all. The assumption that all stakeholders must invite third parties is incorrect – many seek unilateral support. Disputants seek a third party to enhance their position – whether through skills, resources, or political leverage. They expect predictability, reliability, and honesty to secure their desired outcomes. Trust is not essential; they simply need to believe the third party improves their options. Politically strong upstream countries or regional hegemons from geopolitically contested transboundary basins usually oppose the involvement of a strong third party. This could be a third party with leverage in the basin or with global reach, such as a state or international organization. In these situations, upstream countries usually tacitly agree to the engagement of an actor with less (visible) leverage over the basin countries, such as an individual or a nonstate actor. The role of a third party, with varying levels of responsibility and mandate, can be taken on by the following actors.

#### *Individuals*

Individuals can play the role of a third party as independent or affiliated actors, or sometimes even as emissaries of states. They can be connected to a nonstate actor or an academic institution or be appointed on behalf of a state. Individuals can have limited resources and limited leverage. However, such individuals often rely on their personality, repute, historical understanding of a given context, or track record that may outshine any affiliation. This may be the case for retired high-level decision-makers, including former heads of state, prime ministers, and other ministers. Faith leaders may also play a special role as individual third parties, building on the position of trust they often have in different communities (Klimes and Koch 2023). When analyzing the work of individuals as dialogue brokers, the focus is often placed on personal characteristics in addition to their affiliations. Good listening skills are frequently highlighted as one of the most important attributes of dialogue brokers. Individuals can also play the role of a catalyst or strategic bridge in water negotiation processes. This includes introducing or suggesting suitable third parties like in the case of David Lilienthal, a former chairman of the Tennessee Valley

Authority, who suggested the engagement of the World Bank in the Indus Waters Treaty negotiations (Walton 2010).

### *Nonstate actors*

Nonstate actors comprise a diverse group that includes think tanks, academic institutions, foundations, civil society organizations, lobby groups, NGOs, and anything in between. Nonstate actors usually have different degrees of flexibility and leverage. While generally less constrained than a nation-state or an international organization in terms of not being bound to a formal position, they often possess more limited resources in terms of personnel, sometimes the breadth of capacity, and incentives they may bring to the process – compared, for example, to international financial institutions (IFIs) actors like the World Bank. The most suitable third party is an actor who is expected to behave in a predictable manner consistent with the interests of the parties, who is accepted by all engaged parties, and who has the resources to facilitate a process. In some negotiation processes, especially those involving a more powerful upstream country, a third party without leverage in the form of a small NGO or think tank is often a preferred option to a state actor or IFI. Several think tanks and other nonstate organizations across the globe have dialogue facilitation as one of the main products that they are offering. This includes organizations focused on water, such as the Geneva Water Hub (GWH) and the SIWI, as well as those specializing in conflict resolution, security, and development, including the Crisis Management Initiative (CMI), Chatham House, and the Atlantic Council.

Countries that have declared that they do not want to opt for external involvement in their negotiations have often accepted support (e.g., technical/legal inputs and capacity development) from nonstate external actors like research and knowledge organizations. It can be motivated by desire to gain more information about their counterparts to better inform their own efforts. This includes, for example, different Track 1.5 and Track 2 initiatives in the Euphrates and Tigris basin/s.[4] While Turkey and Iran have publicly rejected the engagement of third parties, they have nonetheless actively contributed to knowledge-sharing initiatives led by nonstate actors. This has included, for example, the Collaborative Programme Euphrates and Tigris (CPET, 2013–2018) jointly facilitated by SIWI and the International Centre for Biosaline Agriculture, with the support of four other expert organizations. The CPET process also yielded another lesson on the importance of good coordination between convening nonstate actors and strong facilitation skills among those chairing dialogue meetings. During one of the key meetings of the CPET Country Partners, which included government officials from Turkey, Iraq (including a delegation from the Kurdistan Regional Government), and Iran, the two chairmen of one of the two dialogue meetings, who had no previous experience in chairing Track 1.5 dialogue meetings, let the discussion get to a point where countries were asked during a project steering committee meeting in Istanbul in May 2015 to submit a written response whether the " 'Tigris and Euphrates basin' includes Shatt al-Arab and its contributing rivers." Iran, Iraq, and Turkey have different political positions on this question, and forcing them to submit a formal decision on this issue effectively pushed Iran out of the CPET dialogue process. Iranian representatives of the Ministry of Energy, which covers water issues, including transboundary waters, had to defer to the Ministry of Foreign Affairs, which recommended discontinuing the process. The situation was later interpreted by many as demonstrating a lack of will to cooperate between the relevant countries when, in fact, there was a willingness to work together jointly on a shared understanding of the Euphrates and Tigris.

The role of external parties in water diplomacy is not limited to dialogue facilitation. Nonstate actors can play an important role in creating an enabling environment, identifying issues of

urgency, and creating space for problem-solving. EcoPeace Middle East is a good example of a nonstate actor engaged in different regional efforts in the lower Jordan River Basin supporting enabling environment for cooperation on climate and water issues. The organization enjoys a unique coordination mechanism with offices in all three countries (Israel, Palestine, and Jordan). The organization supports regional efforts directed at environmental issues, including water, through locally driven analysis, tailoring solutions to the regional context, and advocating outside of the region for support for identified solutions. EcoPeace Middle East worked, for instance, on the Green Blue Deal (Bromberg et al. 2020), which was a stepping stone toward the Israel–Jordan water-for-energy deal facilitated by the United Arab Emirates. In summary, nonstate actors play an important role in creating spaces for enhancing understanding, building relationships, and facilitating discussions. Furthermore, dialogue processes that may be initiated as informal dialogues led by a nonstate actor can evolve into a process with linkages to formal Track 1 processes, such as the 2022 Israel–Jordan water-for-energy deal. Nonstate actors thus also play an important role in formal processes.

### *States*

State actors comprise another group of third parties. Nation states can play an important role in providing long-term support to water diplomacy processes, including regional dialogues on shared waters. Finland, Switzerland, Netherlands, the United States, and Slovenia, among others, are prominent supporters of water diplomacy processes. This includes, for example, financial support to programs working with dialogues on shared waters like the SWP hosted by SIWI or the Water, Peace, and Security initiative started by the Netherlands, but also direct financial and political support to different water diplomacy processes. States can also act as mediators and dialogue facilitators. States are often brought in to legitimize a process, provide incentives, or guarantee agreement monitoring or in some cases enforcement. The role of the World Bank in the 1960 Indus Waters Treaty and the influence of the United States in that process is such an example. Another example is the role of the United States in the Eastern Nile negotiations between Egypt, Ethiopia, and Sudan on the filling and operation of the Grand Ethiopian Renaissance Dam (GERD). According to the author's interview with a direct participant of the talks from one of the negotiating countries, the decision to engage the United States (Department of the Treasury) came when the process led by the African Union (AU) did not move forward. The United States was favored by one of the negotiating parties for its perceived political leverage in this case, even if it has subsequently been unable to bring negotiations to a successful conclusion. States also play a role in providing technical support to negotiating parties, such as environmental impact assessments and fact-finding missions. The 2022 agreement between Israel and Lebanon over maritime borders and gas-sharing in the Eastern Mediterranean is an example of successful mediation by the United States – and of a situation where the third party was selected based on its position of power in the region and relations with the negotiating parties. It is important to note that states can be prone to different geopolitical dynamics, changing of governments and national priorities as well as their own interests and agendas.

### *Regional organizations*

Regional organizations that do not have cooperation around shared water resources as their main objective still play an important role in facilitating and supporting dialogues over shared waters. Both the EU and the Organization for Security and Cooperation in Europe have supported several

dialogues on shared waters. The United Nations Regional Centre for Preventive Diplomacy for Central Asia has been a platform for discussions on regional shared waters. In Latin America, the Organization of American States has supported over 160 water diplomacy initiatives, while the Southern African Development Community has been the backbone of regional cooperation in southern Africa, including cooperation on shared waters. Between 2018 and 2020, the AU facilitated dialogue between the Eastern Nile countries (Egypt, Sudan, and Ethiopia) on the filling and operationalization of the abovementioned GERD. One of the reasons the AU was initially appointed as a dialogue facilitator in this complex issue was the desire among negotiating countries to engage a regional actor – "to find an African solution for African issues." The broader reason was that countries do not want to be seen as needing external support – especially when it is tied to colonialism. In addition, parties often influence the choice of the facilitating organization. For example, Egypt selected the AU to facilitate the GERD dialogue while holding the chairmanship. Regional organizations can also be limited by national strategies, political change, ambitions of their member states, and availability of resources.

### *River Basin Organizations (RBOs)*

A special case of regional organizations in this context is represented by RBOs, a type of organization mandated by its members to oversee the management and development of a watershed. It depends on the particular RBO treaty in question what type of mandate members give to a particular RBO. Many RBOs have a conflict resolution provision on how disputes among its members should be resolved. RBOs may also act as dialogue facilitators or mediators in disputes that do not engage its members if requested by negotiating parties. RBOs can also play a role in non-water issues, a case in point being the meetings of the Lake Chad Commission, which, at one point, served as the only regional platform where member states could discuss violence perpetrated by the group Boko Haram. This can be highly problematic for weak institutions, as they often face direct conflicts of interest.

Different types of multilateral organizations (state and hybrid, including IFIs) and their bodies play diverse roles in water diplomacy processes. As previously mentioned, the Indus Waters Treaty signed in 1960 by India and Pakistan was facilitated by the World Bank. The treaty was signed after nine years of negotiations and is an oft-cited example of a water agreement being concluded despite several security-related conflicts between the parties. Another more recent example is the role of the World Bank in negotiations over the Rogun Dam between Tajikistan and Uzbekistan. Overall, the World Bank plays an important role in providing incentives in the form of funding opportunities for joint projects during the implementation period. The intention is to provide incentives for the countries to reach an agreement on development projects. Its engagement as an observer in different dialogue processes thus creates important linkages with the implementation phase. The converse is also true. During the 2023 flare-up between India and Pakistan, the World Bank refrained from fulfilling its role under the treaty, fearing it might upset either party – both of whom are major clients of the WB. The Secretariat of the United Nations Economic Commission for Europe (UNECE)[5] Water Convention also plays a role as an intermediary between member states and provides a platform for dialogues on shared water resources. With a few exceptions, such as Finland and Slovenia, most upstream countries have declared that they do not intend to join the Water Convention; hence, this dialogue mechanism is not utilized in basins like the Euphrates and Tigris, Jordan River, Nile, and similar others.

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) plays an important role in water cooperation as a knowledge organization with access to large datasets, thus

providing member states with technical expertise. In 2018, UNESCO hosted water professionals from Iran and Afghanistan over their shared waters, within the framework of "From Potential Conflict to Cooperation Potential Project". The World Meteorological Organization (WMO) can play a similar role in providing technical data (i.e., State of Global Water Resources Report, Hydrological Status and Outlook System, WMO Hydrological Observing System), supporting different processes and making use of datasets for climate forecasting. While organizations like UNESCO and WMO have a limited mandate to engage in political disputes, their contribution to knowledge and data sharing can be valuable in many water diplomacy processes. The UNECE also provides an important platform for dialogue between parties of the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) and other countries accessing the convention. In addition, multilateral organizations can play an important role even when not directly engaged in a specific negotiation process by developing standards and guidelines. Even if not all negotiating countries are parties to the two global Water Conventions, the established guidelines provide a wider framework for water dialogues. In contrast, UN agencies and IFIs will be bound by their bureaucratic positions which can complicate sensitive processes. A recent example is the 2023 Indus disagreement where the World Bank abdicated its responsibility to implement the dispute resolution procedures.

### *WHEN is a ripe time for third-party engagement?*

Why is timing so important? When planning to engage, third parties must consider whether the conflict or process in question is *ripe* for resolution when they are invited to get engaged. Negotiating parties, especially if the invitation comes only from one of them, do not necessarily have to have the same understanding of what the ripe time for engagement is from the process perspective. There are many examples of third parties being invited in when the dispute is not ripe. In water dialogues, third parties usually get engaged when one disputant requests support or when the negotiating parties agree that there is a need and request external support (which may or may not be tied to ripeness); or when an external party decides that it is in their interest to insert themselves into a process. Some would argue that this was the case of the United States' engagement in the GERD process in 2021. Ripeness does not always determine when a third party gets engaged, but third parties should be aware of when is the ripe time for engagement. In most cases, third parties are entities with a long-standing interest who find ways to insert themselves into the process for their own benefit, reputationally or otherwise. Their understanding of ripeness in the given context can, however, determine the effectiveness of their engagement.

One of the main conflicting issues regarding shared waters is unilateral upstream development when an upstream riparian country initiates a water infrastructure project without securing agreement from its downstream neighbor/s. Assessing the ripe time for engagement is often related to different stages of the planning and construction process (both infrastructure and other projects affecting shared waters). Crocker, Hampson, and Aall (2004, pp. 93–94) identify four conducive entry points for conflict resolution efforts more generally. These include geopolitical shifts (e.g., the Russian war in Ukraine, increased tensions between the United States and China, and the Arab Spring), dramatic shifts in international conflict dynamics (e.g., in the context of water, a new leadership open to cooperation and loss of a major infrastructure funder), a major change in a state's internal leadership structure (e.g., new political leadership after an election and arrival of a new key minister), and the arrival of a new mediator. Such events can all influence conflict or process ripeness.

Conflict ripeness refers to a situation when parties reach a so-called *mutually hurting stalemate* (MHS) (Zartman 1995, 2007; Pruitt 1997; Hopmann 1996) – a situation when the parties perceive

that they cannot reach their objectives by continuing the conflict (armed operations in the case of armed conflict, or continuation of unilateral management in the case of disputes over shared waters). Continuing "conflict" in this situation entails more damage to the engaged actors by maintaining conflict behavior than by seeking a cooperative solution. An opposite concept is that of a *mutually enticing opportunity* (MEO), a situation when engaged parties can continue the conflict (have both means and resources) but realize that they would both gain more by cooperating. In the context of armed conflicts, ripeness achieved by MHS is far more common than ripeness achieved by MEO. Yet in the context of water diplomacy, there are some factors in favor of MEO. Actors sharing waters will be able to optimize water use when cooperating, generating benefits for everyone provided that they reach a shared understanding of the main issues in their shared basin, lake, or aquifer. This can mean setting up joint hydropower stations in upstream parts of the rivers and sharing benefits like in the case of the Senegal River Basin Organization (OMVS),[6] which has effectively put into practice the idea of equitable sharing between member states in terms of the ownership of infrastructure or wider benefits accrued from shared water resources. Reaching MEO is rarely the case for upstream countries when considering water alone. Therefore, benefits beyond water – such as trade, economic gains, political factors, and security – can play a crucial role in water-related processes.

In summary, the concept of MEO provides an opportunity to ripen a stalled negotiation process. Third parties can play an active part in ripening a negotiation process or a conflict situation. Experience demonstrates that providing access to new technologies, funding opportunities for joint projects, conducting benefit-sharing studies, or supporting professional networks in a river basin can help actors to see the long-term benefits of water cooperation. The impact of climate change and environmental degradation can also contribute to ripening a given situation. In 2019, SIWI convened exploratory talks between the Arab riparian countries of the Jordan River Basin (Lebanon, Syria, Jordan, and Palestine), building on the original idea of a basin-wide approach in the Johnston plan from 1953. Despite several thorny bilateral issues between the four countries, the increasing impacts of climate change on the region and the need to cooperate with neighbors constituted one of the pressing reasons for their participation in the talks.

Ripeness can also have an impact on power asymmetry between states. If the increasing impacts of climate change, like prolonged and more frequent droughts, are felt more urgently downstream, this can lead to *unilateral ripeness* when ripeness either in the form of a hurting stalemate or enticing opportunity is felt only by one of the negotiating parties. A third party can assist in this situation, explaining and providing evidence of the transboundary impacts of these negative trends upstream. This means that a third party can, for example, run scenario workshops on how the negative impacts of climate change will affect the entire basin, including upstream countries. The scope of this chapter does not allow a full analysis of how to think about the concept of ripeness but some of the key factors include the following: Do all the negotiating parties feel the same sense of urgency to reach a negotiated solution? Are parties negatively impacted by unilateral action or would they be better off finding a solution for the joint management of shared water resources? Do all the engaged parties have shared knowledge on possible benefit-sharing arrangements around a shared water resource?

### *HOW third parties engage in water diplomacy?*

As dialogue processes are discussed in detail in different chapters of this Handbook, this chapter will focus on the role of third parties in these different processes. Dialogue processes are usually conducted in three different tracks.

Track 1 often refers to official meetings between representatives of the engaged parties. This can often include a range of stakeholders from each of the parties, working groups, and both formal and informal mechanisms for communication. These processes are exceptionally formal and are typically characterized by agreed-upon agendas, minutes, and outcome documents.

Track 2 refers to meetings among well-connected "middle-men" and "middle-women," who are not official representatives of the parties but who often have strong connections and influence with decision-makers and can, for example, help inform different government policies and decisions. In many cases, these individuals are former government officials who can return to government roles, for example, with a new administration, and help to shape the discussions on water-related challenges. This includes members of academia, think tanks, media, civil society, interest groups, and anything in between. Jones refers to Track 2 as "a tool for stimulating reflective dialogues between people in conflict" (2015: 172). Track 2 engagements often produce nonnegotiated recommendations or thought pieces and are sometimes referred to as problem-solving workshops.

Track 1.5 processes often include both official representatives of the parties and external experts under the guise of an unofficial exercise where none of the attendees is officially representing their party's interests. The main difference between Track 1 and Track 1.5 is that statements and comments made during Track 1.5 meetings are not official statements of participating countries or other entities. This often creates space for parties to engage in learning discussions without political repercussions and provides an opportunity to discuss issues and solutions beyond the official line. This is considered particularly useful when countries or other actors do not have formal relations or do not have many opportunities for meetings to discuss shared challenges over transboundary waters. Track 1.5 meetings are often facilitated by a third party. Tracks 1.5 and 2 are sometimes referred to as *informal diplomacy.* Literature on conflict resolution (Crocker, Hampson, and Aall 2004) also includes Track 3*,* which refers to dialogue meetings between communities at the grassroots level. One of the best examples of a Track 3 process in the context of water diplomacy is the consultation meetings with local communities in the Lower Jordan River led by EcoPeace Middle East.

Different tracks can be useful at different points in the conflict management cycle. Tracks 1.5 and 2 are used during conflict prevention efforts and when setting up dialogue platforms to serve as a mechanism to coordinate interlinkages between the informal and formal tracks. Informal tracks play an important supportive role during the main phase where focus often shifts to Track 1 negotiations. Tracks 1.5 and 2 are often used to maintain alternative communication channels. And finally, for successful implementation and long-term cooperation toward sustainable peace – all tracks, including Track 3*,* need to be interlinked to maintain information and knowledge flow and to include all stakeholders. The real challenge, however, remains how to ensure that responsible decision-makers opt for solutions informed by scientific knowledge rather than other relationships and vested interests. For this reason, well-functioning synergies between the knowledge/technical tracks and political tracks are instrumental in advancing the value of water for peace.

As pointed out by Fischer (2006) and Klimes and Yaari (2019), coordination between different tracks is essential. A sustainable solution cannot be achieved only through informal diplomacy without reaching a formal agreement (which can have different forms, ranging from a memorandum of understanding to a formal treaty), and formal agreements that do not include the voices and perspectives from the nongovernmental sector also have less chance of being fully implemented.

In addition to the dialogue tracks, there are different levels of mandate that third parties obtain from negotiating parties. Figure 10.1 shows the different actions of third parties and the level of

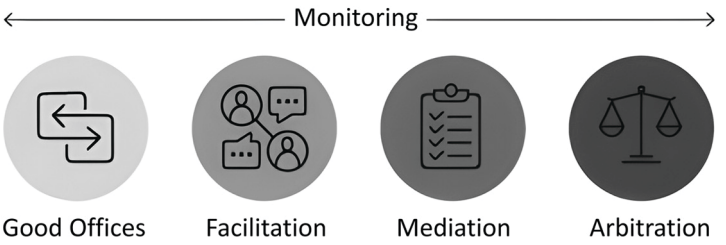



*Figure 10.1* The different actions of third parties and the level of mandate they receive.

mandate they receive. Monitoring can be executed throughout the entire negotiation process and beyond, including during the implementation period.

### *Observer*

An important function that external actors can play in water diplomacy and water cooperation at large is the role of process observer. The value of the observer is that their mere presence alone helps improve the discourse and the accountability of the parties. A process observer can be part of a negotiation process providing particular expertise. Observers are in most cases perceived as impartial by the negotiating parties, and they are engaged for their particular expertise on the source of dispute. An observer may have no role beyond simply observing, without providing technical or political advice. Their impact comes from the party they represent and the disputants' interest in maintaining a reputation for fairness and honesty. The World Bank and the EU External Action Service served as observers in the negotiation process over the GERD.

### *Monitor*

In some cases, the parties may agree to have a third party serve a formal role in dialogue process, implementation or monitoring of an agreement. This can be, for example, an expert organization, including private companies, who have particular expertise on dam filling or dam safety. Peace processes very often have a monitoring component comprised of a monitoring mission that observes possible violations of ceasefire agreements or implementation of agreed commitments of the negotiating parties. Agreement monitors are, however, less common in water diplomacy compared with peace processes. One example is the Indus Waters Treaty where the World Bank is a signatory to the agreement and has a formal role in the implementation of the treaty's dispute resolution mechanisms, even though it is not a riparian country. While approximately 40% of transboundary river basins are currently covered by some form of agreement, there is limited information on the extent to which these agreements are being implemented by the signatories.

### *Good offices and Facilitation*

"Good Offices" refers to an effort by a neutral third party to bring the disputing parties together through diplomatic means – for example, activities related to the building of political will (see Chapter 19). The processes related to "good offices" stop once the parties begin to negotiate. Facilitation is support given to the parties during the dialogue process. This could include process financing or support, capacity development, expert advice, and, in some occasions, providing

a venue. In other words, facilitators work to create an environment for success by ensuring the parties have the knowledge and resources they need to reach a peaceful solution.

An important rationale of these types of dialogue platforms is to establish norms for interaction between negotiating parties as well as to create a safe space to explore issues and solutions outside of existing comfort zones. In the context of water diplomacy, this means, for example, that if the formal Track 1 process is focused mainly on water allocation issues and historical grievances, informal dialogues can focus on issues like shared climate-related security risks, trust building beyond water issues, and discussion on possible shared benefits.

### *Mediation*

Mediators have a formal mandate from the parties to set the terms and structure of the dialogue process. In addition to being the process guide, the mediator will facilitate communications and identify and solve problems. Confidentiality and impartiality are critical to the mediator's role but there have been cases where openly biased mediators were engaged for their perceived ability to influence one of the parties (Kleiboer, 1996). In some cases, the parties may ask the mediator to communicate progress to other stakeholders but, in general, the mediator's role is internal to the process and not visible to those outside. Unlike the observer or facilitator, the mediator has a stronger mandate to frame issues and organize discussions or activities to facilitate the identification of the interests and positions of the parties and/or explore potential solutions. This gives mediators great power to influence the outcome which can make the selection of a mediator that is perceived to be neutral challenging. Mediators must also walk a fine line between the encouragement of one or more parties to move in a different direction and the perceived loss of neutrality. Within the context of shared waters, mediation is in general favored by downstream countries with the hope that the invited mediator can exert leverage over the upstream country to agree to concessions. By contrast, upstream or more powerful countries often openly declare their opposition to mediation for the same reasons – they wish to maintain their advantage. Countries like Turkey have preferred the more discreet engagement of a weaker nonstate third party whose main purpose is to create a meeting opportunity for informal exchange and knowledge sharing. Third parties should be aware of which approach is best suited for which situation and understand the positions and underlying interests of negotiating parties before designing an engagement plan.

### *Arbitration*

A special type of third-party engagement is arbitration, when negotiating parties give the third-party arbiter a mandate to render a decision on the issue under dispute. In such cases, parties present the facts and the decision that is often binding on the parties is rendered by the arbitrator. Examples include the Chamizal dispute between Mexico and the United States (the International Boundary and Water Commission was the arbiter) and the Gut Dam arbitration between Canada and the United States (a three-member international Lake Ontario Claims Tribunal was established for the arbitration). This happens in a situation where both parties agree to engage an arbiter. This process can happen outside of the judiciary system (international water law, International Court of Justice). While arbitrators have clearly defined roles, the distinctions between an observer, facilitator, and mediator can be less clear. A facilitator providing process support may inadvertently or intentionally influence the structure or content of discussions. Likewise, an observer who offers opinions or participates in discussions may, consciously or unconsciously, shape the debate or legitimize a particular perspective.

## What to consider when engaging a third party?

This section summarizes recommendations for actors seeking the help of a third party. To recap, third parties include not only states but also a wide array of nonstate actors, international organizations, regional organizations, and individuals. Disputants can select which type of third party is the most suitable fit for their situation and interest. There is a general perception among governments in many complex transboundary basins, particularly among upstream governments, that engaging a third party leads to inviting an external actor to "interfere" in what are deemed to be national water policy issues. No government is willing to share **all** their interests with an external party. Inviting anyone in risks revealing internal information that can always be used against them. So inviting third parties represents a real material and reputational risk that needs to be balanced against the potential gains. It is always up to the negotiating parties as to what type of third party they engage and what type of mandate they give them.

When selecting a third party, important questions to ask include:

- ***Why – why is this particular actor invited and what is the motivation of the selected third party?*** There are several countries and organizations (both intergovernmental and nonstate) that provide support to water diplomacy processes and negotiations over shared water resources as part of their mission and some are interested in advancing or establishing influence in a given region. Other actors are primarily interested in increasing stability in regions when conflicts over shared waters can exacerbate tensions and violence.
- ***How – how does the third party have the means to be an effective facilitator?*** This includes technical capacity (skills and knowledge) as well as resources (financial and also political resources if needed). This can include the ability to facilitate visa and other travel arrangements for all participants and everything else related to providing a safe space for meetings. There are cases in water diplomacy dialogues where multiple facilitators act as a consortium where each provides different resources. In this case, there should be a clear coordination mechanism between these actors and clearly outlined roles and responsibilities.
- ***What – what role is the third party expected to play?*** Both the third party and the negotiating parties need to have a clear understanding of what is expected from the third party and what its mandate is. The process of working out the specifics of how a third party will engage can be lengthy and can take place during the pre-negotiation phase. Negotiating parties should not underestimate the importance of clarifying the mandate of the engaged third party/ies. The negotiating parties should also know their objectives and desired outcomes from the process. A mediator can help the parties define those goals and objectives. A good working relationship with the third party is essential.

### *It is the negotiating parties who give the third party its mandate and define its scope*

The degree of engagement of a third party depends solely on the mandate given by the negotiating parties. Some processes may benefit from the engagement of a dialogue facilitator with limited political leverage, who instead acts as an honest knowledge broker. This can mean, for example, that the negotiating parties may prioritize building trust through different joint capacity development exercises and joint risk assessment studies over more sensitive discussions regarding the core issues of the dispute. Bringing in powerful external actors like the US, UN, or World Bank offers parties a strong, capable partner but also comes with challenges. These actors often seek to

steer the process and can be difficult to disengage if needed. External parties will inevitably gain insights into the disputants and key issues during the process, making it crucial to carefully consider whom to engage.

### *Know what you want – and you will get it*

Many actors when approaching possible third parties do not have a clear vision of what they expect from the process. This very often applies to downstream parties who may hope that the dialogue facilitator will help alleviate differences in technical capacity in an asymmetric process and in some cases even act as a bilateral advisor who can exert leverage over the upstream neighbor. Others clearly understand their objectives in the process and are strategic about whom they engage and why. For third parties, note that managing the expectations of what can be delivered by facilitators and other supporting external actors is instrumental to avoid setbacks and misunderstandings.

### *Different process stages may require different third parties*

Every part of the negotiation process has different priorities. The initial stage is about creating an enabling environment for the parties where they can build relations and communication channels. The needs for third-party skills and resources are therefore different here than during a phase where negotiating parties require incentives in the form of joint investment projects. A dialogue facilitator who helps parties to identify shared challenges and opportunities, in less sensitive issues than water allocation, may play a different role at the start of a process during Track 1.5 meetings than later in the process. It is nevertheless important that all engaged external parties, including third-party facilitators, share information about the different dialogue tracks.

## What to consider when engaging as a third party?

There is no one answer or blueprint on how to act as an effective third party. Important characteristics include a combination of interpersonal skills, the ability to relate to participants on their level, and an understanding of the technical solutions needed in disputes over shared water resources. There are different skills needed for the different types of third parties but the below recommendations apply to everyone. An arbitrator does not require technical or process expertise as the role is narrowly defined. The facilitator and mediator roles are much more complex. They do not need to be issue experts, but they need very strong process skills, resources, and commitment to the process (water dialogues are not a short-term affair). They also need to be exceptionally self-aware to know of their own influence in the process and to be able to take the blame when something goes wrong.

***Know the situation*** – especially who is who in the negotiating countries/entities, who needs to be engaged, and who should be at the table. Understanding all stakeholders affected by the situation is key for the sustainability of the process. Having all relevant actors engaged helps to identify benefits of long-term planning between different negotiation states. In water diplomacy processes, too much focus can sometimes be placed on the water-line minister or only on the ministries of foreign affairs without much coordination with other relevant actors. This is often an important factor in fragile countries where the government is fragmented and represented by different blocs. Before the return to power of the Taliban in 2021, Afghanistan, for example, had an efficient coordination mechanism. Initially supported through a World Bank project and later an EU project, this mechanism included the Ministry of Foreign Affairs, the National Water Agency,

the Ministry of Energy, and other government agencies which all worked with different aspects of water management.

***Context matters*** – water diplomacy processes do not happen in a political vacuum, and third parties need to be aware of the geopolitical context of the region where the process is occurring. Some actors with a more water-oriented background sometimes lack the right expertise to navigate a complex political environment. During the CPET process in the Euphrates and Tigris region, one of the implementing partners was a technical expert in hydrology. Underestimating the political sensitivity of data sharing, they found it surprising that the engaged countries did not want to share national data for the hydrological modeling of the study area.

***Listen and be open-minded about solutions*** – some of the most well-known negotiations over shared waters, such as the Eastern Nile, Lower Jordan, or Euphrates and Tigris, span over a long timeframe. In such situations, engaged external parties can, after a time, develop a preference for a specific solution. Working long-term with the same actors can potentially make facilitators in the process blind to other tracks and possible solutions. Therefore, third parties need to practice active listening and be open-minded about the preferences of the negotiators. Third parties also need to be able to leave a process if they are no longer fulfilling their role or if they have lost the trust of the negotiating parties. At other times, third parties should be prepared to step away if a new approach is needed. There is a certain degree of institutional rivalry between organizations working with water diplomacy, meaning that countries can often "shop around" for the third party that most directly advances their interests. This is the case especially for countries favoring the engagement of an advisor rather than an impartial facilitator. A variety of choice, however, can delay processes and, in the long run, riparian countries may even be negatively affected by a lack of coordination between third parties if multiple processes with similar objectives spread their focus too thin. In situations like this, it is up to the third party to evaluate which role it can play or what role it is comfortable assuming.

## Conclusion

Before engaging in a process, any third party should conduct a thorough self-assessment. Many may lack the necessary technical or financial capacity, be reluctant to assume reputational risks, or struggle to achieve internal consensus on how to provide support. It's important to clarify that there are two components to consider: (1) what the riparians want and can do, and (2) what the third party wants and can do.

Conflicts cannot be permanently resolved without addressing their root causes (Klimes 2015). Political will is essential for advancing both informal and formal dialogues and initiatives. Third parties play a role in creating an enabling environment and sustaining political will in water negotiations. In water diplomacy, success does not necessarily have to be the conclusion of a formal treaty agreement: the setting up of cooperative mechanisms that facilitate cooperation, knowledge, and information exchange over a longer period is also very important.

There are no general criteria to assess the quality of cooperation as every transboundary basin, lake, and aquifer is unique. In peace processes, success is often defined as 10% agreement and 90% implementation. Securing an enabling environment for the successful implementation of a cooperative mechanism is a must during any negotiation process. Flexibility in terms of what tools are used, harnessing technical expertise, and making effective use of different kinds of third parties in varying roles will all be increasingly needed as climate change impacts shared water resources.

## Notes

1 The EU Water Diplomacy Conclusions are foreign policy guidelines adopted by the European Union's Council of Foreign Affairs on November 19, 2018, that recognize water as a prerequisite for human survival and dignity while acknowledging the potential of water scarcity to affect peace and security. The conclusions outline the EU's commitment to enhancing diplomatic engagement about water as a tool for peace, security, and stability, promoting transboundary water management, and supporting the human right to safe drinking water and sanitation. For the full text of the conclusions, visit: www.consilium.europa.eu/en/press/press-releases/2018/11/19/water-diplomacy-council-adopts-conclusions/

2 The Shared Waters Partnership (SWP) is a global programme designed by SIWI to improve cooperation over transboundary waters, particularly in regions where water can be a source of conflict or serve as a catalyst for peace and stability. The SWP offers a dialogue platform, knowledge, and tools to strengthen transboundary water cooperation through engaging stakeholders such as governments, regional organizations, civil society, media, academia, and young professionals. For more information about the partnership's approach and activities, visit: https://siwi.org/shared-waters-partnership/

3 The Finnish Water Way – International Water Strategy is a joint ministerial project by Finland's Ministry for Foreign Affairs, Ministry of Agriculture and Forestry, and Ministry of the Environment that supports proactive foreign and security policy by strengthening the links between Finland's mediation and water expertise, with the ultimate goal of achieving a water secure world through preventing and resolving water-related conflicts. For more information about the partnership and Finland's including links to recent reports, visit: https://sdgs.un.org/partnerships/water-cooperation-and-peace-finnish-water-way-water-diplomacy-project

4 Turkey regards the Euphrates and Tigris Rivers as constituting one basin while Iraq, Syria, and Iran regard the rivers as two independent basins. When working with the countries, SIWI uses the term "basin/s" instead of "basin" or "basins."

5 The Water Convention refers to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes adopted in Helsinki in 1992. Initially negotiated as a regional instrument, the convention was opened up globally for accession to all UN member states in 2016.

6 The acronym reflects the organization's name in French: *L'Organisation pour la mise en valeur du fleuve Sénégal*.

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# 11

# ACTORS IN WATER DIPLOMACY

## The good, the bad, and the ugly

*Susanne Schmeier and Tobias von Lossow*

**Key takeaways**

- State actors have primarily driven water diplomacy, but nonstate actors are gaining increasing importance.
- Actors other than states shaping water diplomacy include civil society representatives, local communities, nongovernmental organizations, private businesses, investors, and illicit or criminal groups.
- The way nontraditional actors shape water diplomacy varies greatly as does the impact of their actions on water conflict and cooperation.

### Introduction: The variety of actors in water diplomacy

Water diplomacy can be succinctly defined as the "use of diplomatic instruments to existing or emerging disagreements and conflicts over shared water resources" (Schmeier, 2018) and "applying foreign policy means, embedded in bi- and/or multilateral relations" (Sehring et al., 2022), thus referring to relations traditionally limited to state-to-state interaction. While succinct definitions are useful for communicating high-level ideas, they necessarily exclude or leave implicit important details. This also relates to the question who actually does water diplomacy. In recent years, water diplomacy has seen an increasing engagement of nonstate actors such as nongovernmental and civil society organizations, private businesses and investors, researchers, and water users but also armed opposition and illicit, criminal, extremist or terrorist groups.

Examples of actors other than states engaging in conflict and cooperation over shared water resources have become plentiful. In the Colorado River Basin, for instance, environmental nongovernmental organizations (NGOs) have not only lobbied successfully for addressing low flows in the lower part of the basin but significantly contributed to the drafting of Minute 319, the formal intergovernmental decision-making instrument that commits both countries to ensuring that the river's water reaches the delta again (Buono & Eckstein, 2014; Wilder et al., 2020). In the Euphrates–Tigris Basin, terrorist groups such as the Islamic State (ISIS) acted as self-declared or de facto authorities over certain territories and, as such, entered negotiations with neighboring states, namely, Turkey, over water allocation and dam operation (von Lossow, 2020; HSToday, 2019). In 2017, the Holy See engaged in the international water conflict discourse through a dedicated summit and issued a statement calling for cooperation over shared waters (Holy See, 2017).


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This multitude of highly diverse actors shaping conflict and cooperation dynamics raises the question of which actors actually engage in water diplomacy, how they do so, and what effects such an engagement has on the governance systems in addressing key challenges relating to the transboundary nature of more than 300 rivers and lakes (Turgul et al., 2024), more than 600 aquifers (IGRAC, 2021) and more than 300 wetlands (Rosenblum & Schmeier, 2022).

These questions are not unique to the study of transboundary waters: Over the past decades, international law and relations theories have debated whether the state was indeed the main and an independent actor in the international system or whether other nonstate actors would at least shape state behavior in the international system or even become actors themselves and what consequences this has for the international system as well as the study of it (Fearon, 1998; Hobson, 2000; Betsill/Corell, 2001; Biersteker, 2007; Bianchi, 2011; d'Aspremont et al., 2015). While this chapter does not attempt to go into the details of this debate, it acknowledges that the water-specific international system – that is, the system of interactions over internationally shared water resources and the legal and institutional arrangements governing it – has also increased in complexity over the years with regard to the number and the diversity of actors involved as well as with regard to their objectives and intentions of engagement, their means of engagement, and the implications of such engagements for conflict and cooperation.

In this chapter, we clarify the types of actors involved in water diplomacy processes, their influence on such processes, and their outcomes for conflict and cooperation over shared water resources. This chapter sets out to identify the different actors involved in water diplomacy and to unpack their specific roles and functions. By reviewing the variety of actors potentially engaged in conflicts and cooperation over shared water resources and assessing their specific characteristics, the chapter concludes that while water diplomacy in the more narrow sense (defined in Sehring et al., 2022) is still largely a state-shaped process, a wide variety of other actors attempt and sometimes also succeed to shape conflict and cooperation outcomes between states over their shared water resources, in manners that can be perceived as "good", "bad", or sometimes even "ugly".

## State actors in water diplomacy – Governments at the forefront of conflict and cooperation?

At first glance, the state remains the primary actor in conflict and cooperation over internationally shared water resources and organizes, governs, and implements water diplomacy. With nation-states, as entities with the sovereignty over a specific territory and a specific population, being the primary actors in the international system, their mandate in interstate affairs includes the governance of and interactions with other states over shared water resources. Moreover, the sovereignty of states over their natural resources, including water resources – albeit limited by the principle of limited territorial sovereignty in international water law (Dellapenna, 1994; Leb, 2015; Schrijver, 2021; Sindico, 2021) – determines their role in governing these resources vis-à-vis other states. Finally, the state's role in providing basic services, including drinking water and water for economic activities, as a key element of the social contract (Houdret & von Lossow, 2023), makes the state the prime actor in decision-making over water resources, including when they are shared with neighboring states.

This dominant role of the state in water diplomacy is expressed in multiple ways: States possess the capacity to negotiate and conclude international treaties, a key mechanism through which states prevent or mitigate conflict over shared water resources and engage in cooperation with their co-riparian states. Only state actors –namely, the president, the prime minister, and the minister of foreign affairs – have what is called "full powers" in treaty negotiation processes,

that is, the mandate to take decisions on behalf of a specific country. With more than 650 such treaties adopted until today (Turgul et al., 2024), states have clearly made wide-ranging use of this capacity.

States also continue to not take advantage of nonstate water diplomacy attempts if not considered in their interest. The example of the Jordan River Basin, where civil society organizations have invested massive efforts into developing cooperation mechanisms over water and have successfully shaped the perceptions of multiple actors toward a more cooperative approach to managing the basin's water resources but have so far not succeeded in translating those into any binding legal mechanism between states, illustrates this (Zeveloff, 2019).

Beyond shaping conflict and cooperation in basins they share with co-riparian states, states also engage as third-party actors in other basins. This is usually based on (geo)political, economic, environmental, or peacebuilding considerations for which government actors (or actors hired by these governments) apply facilitation, mediation, or conciliation tools to a specific water conflict in another basin. The United States (US), for instance, has facilitated negotiations between Ethiopia and Egypt in the dispute over the Grand Ethiopian Renaissance Dam (GERD) in 2019 and 2020 (AfricaNews, 2019; Foreign Policy, 2020), albeit with no success, as did Germany and other European states (von Lossow et al., 2020). More successfully, Germany, through its development cooperation work, has supported the establishment and the development of basin organizations in Southern Africa (with support to, e.g., the negotiation of the treaties for the Kunene and the Cuvelai river basins) and in Western Africa (with support to the development of the Annexes to the Niger Water Charter under the Niger Basin Authority (ABN) (World Bank, 2018)).

When analyzing the state as an actor in water diplomacy, there is an increasing need to pay attention to state actors other than central governments. In federal countries, states sometimes play a role independent of their central governments in international relations, treaty-making, or institutionalized cooperation. The International Meuse Commission, for instance, was established by and consists of the governments of Germany, France, Luxemburg, and the Netherlands, but also the Brussels Capital Region, the Flemish Region of Belgium, and the Walloon Region of Belgium, the latter three acting as independent subjects of international law. Other actors include, for instance, indigenous nations and tribal governments within states that got involved in the recent renegotiation of the Columbia River Treaty, acting alongside the federal governments and the states/provinces of the US and Canada (Baltutis & Moore, 2020) or have been lobbying for a more decisive role in the International Joint Commission (IJC) that governs the boundary rivers between the US and Canada, including turning it from a binational (US–Canada) into a multinational structure (i.e., a structure that acknowledges the nationhood of indigenous communities) (Ettawageshik & Norman, 2020). This is reflected in recent calls for a more multi-scalar approach to transboundary issues (Peters et al., 2025).

## International organizations in water diplomacy – Subsidiary actors or water diplomats themselves?

Relatively early in the development of the modern international system, states have acknowledged that relations with other states required not only ad hoc diplomatic exchanges but also a more long-term institutionalization. They recognized that key issues emerging in modern times, including deadly disease, telecommunication, and also water resources, did not stop at national borders. In fact, some of the earliest international organizations were set up to coordinate states' use of international rivers, such as the Danube and the Rhine commissions, governing navigation on these transboundary rivers.

And in particular, since the 20th century, with a short interruption by World War II, international organizations mushroomed in a wide variety of topics. Today, they feature among the main actors of global governance (Klabbers, 2015: 6). At the same time, they vary immensely in their legal bases, functioning, setup, funding, and internal workings, making them somewhat "puzzling creatures" (Klabbers, 2015: 11). This has attracted ample scholarly research attention from disciplines as diverse as international law, international relations, and public administration, among many others.

International organizations' power to engage in specific matters originates from states' acts to create them by adopting international agreements that not only establish the respective organization but also define its objectives, functions, mandate, and setup. International organizations are therefore often considered subsidiary to states and thus "partial" or "derivative" subjects of international law.

Nonetheless, this power accorded to international organizations by states is often considerable. In some cases, and increasingly frequently, this goes as far as allowing or even demanding international organizations to sanction undesirable (as defined by a community of states) behavior, which fundamentally questions the original concept of state sovereignty (Biersteker, 2007: 178). This applies to international humanitarian interventions (such as those sanctioned by the UN Security Council) or the work of the International Criminal Court on international criminal law. Moreover, it also includes conditionalities of, for example, the World Bank or the International Monetary Fund (IMF), as well as the rulings of international tribunals as set up in the context of the World Trade Organization (WTO) or regional and bilateral investment treaties.

Especially in the field of international environmental governance, international organizations have taken an increasingly proactive role in identifying issues that require international attention, supporting treaty negotiations and treaty-making, or mitigating disagreements between states sharing natural resources or the environment at the global or regional level. Examples include the initiation of and support to the 1972 Stockholm Conference and the 1992 Rio Conference, which paved the way for environmental treaty and policymaking worldwide, the provision of treaty negotiation platforms, such as the 1992 Convention on Biodiversity (CBD) or the more recent 2023 Biodiversity Beyond National Jurisdiction Treaty (BBNJ).

The issue area of transboundary water resources is no exception. The UN has, for instance, provided the platform and the institutional and technical capacity for the development of the 1997 UN Convention on the Non-Navigational Uses of Transboundary Watercourses (UN Watercourses Convention), while at the regional level, the UN Economic Commission for Europe (UNECE) was the birthplace of and remains the institutional home for the 1992 Helsinki Convention/Convention on the Protection and Use of Transboundary Watercourses and International Lakes. Most recently, the UN was behind gathering state (and nonstate) actors in the 2023 UN Water Conference.

At the regional level, various UN agencies have supported cooperation in specific basins. The UN Development Programme (UNDP), for example, supported the negotiations among the four lower Mekong River Basin riparian states in the early 1990s, leading to the adoption of the 1995 Mekong Agreement. Other international organizations also played and continue to play key roles, such as the World Bank in its formal dispute settlement role in the Indus River Basin based on the 1960 Indus Waters Treaty or its long-term support to the Nile cooperation process and the establishment of the Nile Basin Initiative (NBI).

In addition, disputes over shared water resources that are being referred to judicial dispute resolution typically end up before another type of international organization: international courts and tribunals, set up by states through international treaties to serve peaceful dispute resolution

functions. In the specific field of transboundary water resources, examples include the 1997 Gabčikovo-Nagymaros and the 2010 Pulp Mills cases at the ICJ.

There is a very specific type of international organization that directly addresses transboundary water issues in a basin (or a set of basins). Basin organizations, as "mini-UNs", manage, develop, and protect shared basins for the riparian states that have established these organizations and fulfill a variety of typically technical, but increasingly often also diplomatic functions (Kittikhoun & Schmeier, 2021). With more than 120 such basin organizations worldwide today, covering a large share of the more than 300 transboundary basins (Turgul et al., 2024), they have become essential actors in water conflict and cooperation dynamics.

Overall, international organizations – at the global, regional, and basin levels and with a focus on broader international peace and security, environmental governance, or water specifically – are highly important actors in water diplomacy. Their role has been ever-increasing over the past decades, highlighting the benefits they provide to riparian states and other actors in ensuring the peaceful and sustainable governance of shared water resources. At the same time, they have also received various criticisms, often focusing on their effectiveness or their legitimacy.

## Nongovernmental actors in water diplomacy – Water diplomacy beyond the state

Despite the central role of the state and international organizations, they are long not the only actors in the international system anymore – both with regard to the international system as a whole and in the specific issue area of transboundary water resources. Especially since the 1990s, other actors that do not directly represent or emerge from state actors have gained more agency and taken more diverse roles. In some cases complementing and in others contesting the role of traditional actors but in any case diversifying the voices in water diplomacy. In water diplomacy specifically, they are particularly active in tracks 2 and 3 diplomacy processes (Sehring et al., 2022).

Such nongovernmental actors take many shapes and forms and defy a systematic characterization beyond the fact that they are all not state actors (and not subsidiary actors deriving their legitimacy from state action). The following sections nonetheless attempt to categorize these actors, differentiating broadly between civil society/nongovernmental organizations, private sector/economic actors, epistemic communities of scientists, and extremist, terrorist, or illicit groups.

### *Civil society actors and nongovernmental organizations*

NGOs or civil society organizations are probably the most prominent but also very diverse nonstate actors in international relations in general and in environmental and water governance more specifically. Accordingly, they have also been studied much more extensively than other nonstate actors in the field of transboundary water governance and water diplomacy (Bruch, 2003; Denoon et al., 2020; Curtin, 2005; Louka, 2008; Kranz & Mostert, 2010; Sangbana, 2017; Espindola & Villar, 2023).

The involvement of NGOs in water diplomacy can take many different forms and shapes: They can engage in awareness raising for specific matters to be addressed in water diplomacy processes, including through public consultation processes often related to basin management. In the Okavango River Basin, for example, the work of "Every River has its People," a transnational cooperation between NGOs on the Botswana and the Namibia side of the basin, has supported awareness of local people's interests in sustainably managing the transboundary basins (Kranz

& Mostert, 2010). In the Mekong River Basin, regional and local civil society groups and NGOs participate in stakeholder consultations that are a formal part of the Procedures for Notification, Prior Consultation, and Agreement (PNPCA) process (see, e.g., the Luang Prabang Dam PNPCA Process; MRC, 2019), while in the Danube River Basin, NGOs contribute the drafting of the Danube River Basin Management Plan, as required under the EU Water Framework Directive (CIS, 2002).

NGOs can also formally contribute to water governance activities by engaging through basin organizations. In the Danube River Basin, for instance, NGOs can be formally associated with the basin organization through its Guidelines for Observership (ICPDR, 2005), allowing them to attend governance meetings all the way up to Commission meetings, the highest governance level of the International Commission for the Protection of the Danube (ICPDR).

Finally, civil society actors can also engage in negotiation processes aiming at advancing cooperation or institutionalizing it through treaties or aiming at addressing a specific dispute, either together with state actors or without and beyond them. In the Dniester River Basin, for example, NGOs from riparian countries Moldova and Ukraine did not only raise awareness for the need to cooperate over the environmental challenges the basin was facing, but also drafted the International Convention on the Use of Water and Biological Resources and Conservation of Landscape and Biological Diversity for the basin, which was later adopted by the riparian countries (Trombitsky, 2007). And in the Colorado River Basin, NGOs went beyond awareness raising only, where they highlighted the consequences of the overallocation of the river's resources for the delta and its ecosystem (Gerlak, 2017; Rivera-Torres & Gerlak, 2021), and actively contributed to a negotiated solution between the US and Mexico, formally adopted by the governments in Minute 319 of the International Boundary and Water Commission (IBWC) (Buono & Eckstein, 2014; Wilder et al., 2020). The IBWC is discussed in greater detail in Chapter 43.

### *The private sector*

The private sector typically refers to private companies, businesses, investors, and other actors whose purpose is to conduct economic activities for a return on the investment. They are nonstate actors that are headquartered in a specific state (and thus *a priori* fall under this state's legislation) but often operate not only in that state but also in others. They are not subjects of international (and thus public and interstate) law but are regulated by international commercial law in addition to the law of their country of origin. The increase in their activities beyond the boundaries of their states of origin since the second half of the 20th century has led to an increasing need to regulate their activities and thus to a convergence of public international and private international/investment and commercial law (Kim & Milner, 2021).

While the role of the private sector is widely recognized in the study of international law and international relations more generally, the specific field of water conflict and cooperation has so far accorded limited attention to the role of private sector actors in transboundary water issues in general and water diplomacy in particular. This is surprising, especially as private companies (or state-sponsored/public–private entities that nonetheless act like private businesses and fall under the respective international legal regimes) shape many developments along international watercourses (Rieu-Clarke, 2015). Especially in the development of large-scale infrastructure, private construction companies, as well as private (or public–private) investors, play a key role, increasingly challenging traditional notions of water law, cooperation, and diplomacy (Rieu-Clarke, 2020; McIntyre, 2024). In the Mekong River Basin, for instance, hydropower developers from outside the basin states play an important role in dam development (Middleton et al., 2008;

Merme et al., 2014; Middleton et al., 2014). Their work is also often funded by private banks from the same countries.

While private sector actors would not typically see themselves as part of an international water conflict, they can nonetheless become a part of it and even play a role in it. In the Mekong River Basin, for instance, the Finnish-Austrian company Pöyry, which the Government of Laos hired to conduct engineering work on Xayaburi Dam, took a very proactive public stance in the dispute over Xayaburi Dam, adamantly defending the Government of Laos in its claim that the dam would not have any adverse environmental and social impacts on downstream countries. Not surprisingly, Pöyry – with a vested interest as it was shortly thereafter also hired for the engineering work of this very dam – found that the project was entirely in compliance with MRC rules. This was heavily criticized not only by NGOs (IRN, 2013), but also by downstream governments and third-party governments. For example, a complaint was filed against Pöyry with the Finnish Government by civil society group, arguing that the company's engagement in the dam was an ethical misconduct according to the OECD Guidelines for Multinational Enterprises. These Guidelines reflect a global standard that Finland had committed to hold all Finnish companies accountable to (IRN, 2012; Government of Finland, 2013). This demonstrates how a private actor, initially starting its engagement through business interests only, can become entangled in, if not an active part of, a water conflict and a tool in one country's water diplomacy strategy.

### *Epistemic communities*

The scientific community also plays a key role in shaping environmental and water resources governance, as scholars have discussed in the more general environmental governance debate (Underdal, 2002; Gupta et al., 2012), but less in the field of water resources governance (exceptions include Blatter, 2001; Quevauviller et al., 2005; Weller & Popovici, 2011) or even water diplomacy (Milman et al., 2020). The engagement of scientific and academic actors (i.e., the epistemic communities) can take the form of scientific collaborations and the generation of scientific knowledge in support of sustainable basin management or the identification of solutions for specific challenges, advancing scientific evidence for the need for cooperation, potentially leading to water diplomacy efforts by riparian governments, the participation in governance processes, for example, through basin organizations, or – much less commonly though – the involvement in actual water diplomacy processes that aim at addressing a specific challenge or conflict to maintain or improve cooperation between riparian states.

In the Guaraní Aquifer, for instance, cooperation among riparian states started at the scientific level, with academics from Brazil and Uruguay (later joined by the other riparians to the shared aquifer, Argentina and Paraguay) initiating joint research projects and acquiring financial support from international donors such as the Global Environment Facility (GEF) and the World Bank. The outcomes of this first Guaraní Aquifer System Project did not only consist of sound scientific analyses that supported the need to manage the aquifer cooperatively, but also of a network of both governmental and nongovernmental actors from all countries that practiced cooperation and built trust (Crystal, 2023). This developed into a sound basis of cooperation, ultimately supporting the negotiation of a treaty among the riparian governments in 2010: the Guaraní Aquifer Agreement.

In the Danube River Basin, for instance, the International Association for Danube Research does not only coordinate research on various Danube-related issues, but also uses its observer status with the ICPDR to share its work with decision-makers (Bloesch, 2009; Haidvogel et al., 2023). It also participates in ICPDR-led activities, such as the Joint Danube Survey, a collaborative river monitoring activity regularly carried out by the ICPDR and its member states, which

not only fosters joint research on emerging issues in the basin but also provides opportunities for trust-building across countries, and provides direct input to other science-based ICPDR work, such as the development of the strategy on Sustainable Hydropower Development in the Danube Basin (ICPDR, 2013).

In the Mekong River Basin and the dispute over the Xayaburi Dam, individual scientists from MRC member states, as well as renowned experts from other parts of the world, were involved in specifically established expert groups that assessed the potential environmental and social impacts of the dams in the context of the PNPCA process, reflected in the final PNPCA report for the Xayaburi Dam (MRC, 2011), but also in broader studies of the basin and the impacts various developments would bring (such as MRC, 2010).

### *Illicit, separatist, extremist, and terrorist groups*

This category of actors within the larger set of nonstate actors might be the most difficult to characterize and certainly defies a single-lens perspective on them. Actors such as Afghanistan's Taliban – before or after the takeover of the de facto authority in Afghanistan in August 2021, the so-called Islamic State (ISIS) in Syria and Iraq, separatist minority groups in Myanmar fighting an oppressive regime, or the Kurdish authorities in Northern Iraq are clearly very different in their very nature, their objectives, and their role in diplomacy in general, but also in water diplomacy more specifically. They only have in common that they do not operate on a legal basis, and also cannot claim a moral or ethical legitimacy that broader parts of society – beyond their immediate followers – would support. Instead, the very rejection of state structure, and the alternative concepts of organizing state authority and state services – often combined with the use of force – is often one of their key characteristics. While typically not their primary goal, they occasionally participate in or at least shape water diplomacy. Their role in water diplomacy has, however, hardly been researched, with the limited attention that has been paid to such actors in water governance more broadly, largely focusing on the national and local levels (Schillinger & Özerol, 2023).

In Iraq and Syria, for instance, ISIS made the headlines regarding their use of water as a weapon (von Lossow, 2016, 2020), but also engaged in water conflict and cooperation dynamics in the Euphrates-Tigris Basin as a water diplomacy actor. For instance, ISIS was in exchange with the Syrian state over hydropower production and the operation of dams in the territory occupied by ISIS. And ISIS discussed water, among other matters, with Turkey via its de facto ambassador in Turkey. After Turkey had significantly decreased the flow of the Euphrates to 150 cubic meters/second at a time when ISIS was holding considerable portions of Syria, the militia referred to an existing agreement between Turkey and the formal government of Syria and insisted on the earlier determined flow volume of 400 cubic meters/second for Syria to be met. After negotiations with Turkey in 2014, Ankara went back to the 400 cubic meters/second. The bargaining chip was apparently security and reassurance that ISIS would not consider Turkey an enemy and committing to not attack Turkey or any areas or matters of Turkish interest (Speckhard & Shajkovci, 2019). This was largely driven by maintaining hydropower generation and irrigation for their constituencies in the ISIS-held territories in Syria and to present ISIS as legitimate and functional ruler, even if the militia had limited capacities in water management (HSToday, 2019).

In the Helmand and Harirud river basins, the Taliban – before their takeover of de facto power in 2021 – was involved in the water conflict between Afghanistan and Iran in so far as it allegedly attacked construction sites of dams in Afghanistan, managed by the then government, that Iran contested due to the dams' potential impacts on downstream Iran, and allegedly did so with Iranian support and funding (Aman, 2016). Since the takeover of de facto power in 2021, the role of the

Taliban has changed and they are now formally yet irregularly participating in negotiations with Iran over the use and development of these two rivers (Faizee & Schmeier, 2023).

In Myanmar, on the other hand, ethnic minority and opposition groups such as the Kachin adamantly opposed the Myitsone Dam project on the Irrawaddy (as well as other such dams), developed by the Myanmar central government with financial support from China (Kirchherr et al., 2017; Fawthrop, 2019). The Kachin viewed the dam construction and its expected impacts on forests, ancestral lands, and local livelihoods—along with the forced resettlement of Kachin people—as deliberate government actions aimed at undermining their position in a long-standing conflict with the military government. As a result, a 17-year ceasefire between the Kachin and the central government ended. Moreover, the protection of the dam construction site by the military violated earlier agreements between the Kachin and the central government. As a consequence, the Kachin became an actor involved in a local conflict, but also a conflict dynamic on a transboundary river, in which China acts not only as a riparian state but especially also as an investor very proactively supporting and protecting its investments and economic interests (Motta et al., 2023; Kim, 2024). Similar developments could be observed in the context of Mong Ton Dam, with Shan State groups opposing the government and Chinese companies (Motta et al., 2023).

## Conclusion: More than the state

This chapter provided an overview of the different actors engaging in or influencing water diplomacy. It showed that these actors can take many shapes and forms and engage in many different ways. In addition to state actors and international organizations, part of a state-based international order, nonstate actors are gaining increasing importance in water diplomacy and shaping water diplomacy processes – even if not always directly involved in them – in ever more complex ways.

This does, however, not mean that the role of the state would diminish in water diplomacy. Instead, states and the international, regional, and basin organizations they have established to support their cooperation over shared water resources remain highly relevant and provide the backbone of water cooperation and diplomacy. However, developments beyond the state – in addition to circumvention but sometimes also in opposition to the existing state-based system – can be observed. The implications of these actors' engagement vary considerably, ranging from an urgently needed improved awareness of environmental or social concerns to the strengthening of decision-making processes through science; but also from the use of violent and illicit groups as a means to attack undesired water infrastructure in the context of a water dispute to the strengthening of terrorist groups as they become de facto negotiators in (albeit informal) water diplomacy processes.

While nonstate actor involvement is typically regarded as something "good" in current international relations and water diplomacy discourses, this chapter highlights that the multitude of potential actors – including the "bad" and the "ugly" – and their drive and motivation to get engaged in water diplomacy needs to be considered and analyzed. It cautions that to understand the actual influences and impacts of an ever-growing variety of actors involved in water diplomacy a more nuanced approach based on more research is needed.

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## SECTION III

# Common Water Diplomacy Challenges



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# 12

# MAPPING THE WATER DIPLOMACY PROBLEM SPACE

*Shafiqul Islam and Aaron Salzberg*

**Key Takeaways**

- Identifying the problem space is perhaps the most critical first step in framing, developing, and implementing resolutions to water problems by engaging relevant stakeholders with divergent values at appropriate scales of interventions.
- Effective identification will categorize and identify the problem as simple, complicated, or complex and explore different intervention strategies given the capacity and constraints and enabling conditions for the given problem context.
- A carefully designed problem identification process – guided by the five steps discussed in this chapter – is likely to provide mutually agreeable and nearly self-enforcing intervention strategies to resolve many water problems, whether simple or complex.

## Introduction

By using the term "water crisis" it is acknowledged that the problems associated with water are significant and warrant immediate attention. Yet when we ask "what are the most challenging water problems of our time?," the response often starts with: It depends. It depends on whom you ask, what region or country you're talking about, and often why you are asking.

Consider these three observations spanning the global, national, and community scales: (1) water insecurity poses a broad-based threat to global economic development; (2) chronic underinvestment has made water infrastructure outdated and on the verge of collapse in many places across the United States; and (3) the people in Kibera slum in Kenya have no reliable access to safe drinking water. While all three are water problems, the sources, impacts, actors, and the physical and political domains in which these problems exist are all different. Understanding these "problem spaces" is critical to informing our response to addressing these problems, each within its unique context, capacity, and constraints.

So, how does one define the problem space, and who needs to be involved? We propose that this can best be done by exploring the interconnected landscape of water availability, access, and use as it crosses physical, social, and political boundaries and that mapping this space will inform our understanding of who is involved in a water crisis (stakeholders) and why (values); the historical

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context for natural, societal, and political systems; and how existing actors and institutions have shaped the crisis. Identifying the problem space is an essential first step to diagnosing what matters and why and provides important insights into what can be done given the capacity and constraints imposed by a given problem context. It also creates an opportunity to engage stakeholders to build a shared appreciation for how these problems may impact others and facilitate the reconciliation of competing and conflicting perspectives. A carefully designed and executed problem-defining process – as discussed below – can elicit and lead to mutually agreeable and nearly self-enforcing intervention strategies to resolve most water problems, be they simple or complex.

Let's start with the idea of a water crisis. Whenever there is a conversation about a water crisis, terms like "water stress," "water scarcity," "water risk," and "water access" are often used interchangeably by stakeholders and decision-makers, but they may mean vastly different things. For example, the Democratic Republic of Congo (DRC) and Colombia have similar water availability on a per capita basis, yet only 12% of the households in DRC have access to safely managed drinking water compared to 74% in Colombia. Saudi Arabia is considered to be one of the most water-poor regions of the world, but it can meet most of its water needs. Such broad characterizations of water stress often ignore that physical scarcity of water may not always lead to water stress for all regions equally. The context, capacity, and constraints matter. Beyond their often confusing and interchangeable terminology, such characterization of the water crisis makes it hard to diagnose the exact problem space and determine the appropriate response.

Many of the complex water problems of our time are usually framed within contested terrains, created by physical, political, and jurisdictional boundaries, markets, institutions, laws, and social norms, in which various stakeholders compete to protect their interests. Consequently, the interventions proposed for many of our water problems often depend on who is defining and addressing the problem, on behalf of whom, for what purpose, at what scale, and at what cost.

Yet not all water problems are complex. In many cases, we have reliable information to define the problem and develop or identify evidence-based solutions that would provide measurable benefits to all parties. Strong relationships and a robust history of cooperation may provide a foundation for joint problem resolution. We call these simple problems. In the other end of the spectrum, the problems or solutions may be difficult to identify, the uncertainty within the system may be large, and the potential distribution of cost and benefits may be unequal, and/or long-standing animosities may make dialogue between the parties difficult. Most water problems lie somewhere between this simple and complex spectrum. Misdiagnosis of a problem in either direction (i.e., simple as complex or complex as simple) can lead not only to the misallocation of time, treasure, and talent but also to outcomes that may be harmful to the communities we are trying to serve (Islam and Smith 2019). Consequently, an accurate diagnosis of the problem space is critical to design and implement appropriate interventions at an appropriate scale.

Thus, our suggested identification of the problem space begins with the following steps: (1) recognize water problems cross boundaries, domains, and scales; (2) determine who decides who gets how much water and how; (3) categorize the water problems as simple, complicated, and complex; (4) acknowledge differences among complexity, causes, and conditions; and (5) synthesize scientific and social facts. To operationalize these propositions in mapping a problem space, we suggest the following set of terminologies, tools, and techniques.

## Water as a Boundary-Crossing Problem

The most challenging contemporary water issues arise when water crosses boundaries between natural, political, and societal systems. In that sense, the term "boundary" does not refer exclusively

to physical boundaries between natural systems, nor strictly to political boundaries between states or administrative units, but also includes cultural and sectoral boundaries that water crosses as it transforms from a polluted river into a sacred entity. Taken together, we find that as water crosses these natural, political, and societal boundaries, it often creates complex couplings between natural and human systems. To map water problems that cross boundaries, we need to be cognizant of (1) domains, scales, and levels, and (2) watersheds, problem sheds, and policy sheds.

### *Domains, Scales, and Levels*

The mapping of water problems is challenging because many of our water issues cross domains (natural, societal, and political), scales (space, time, jurisdictional, institutional, knowledge, etc.), and levels (area: patches to global; knowledge: a specific case to generalized principles). Following Gibson et al. (2000) and Cash et al. (2006), we define "scale" as the spatial, temporal, quantitative, or analytical dimensions used to measure and study any phenomenon. We define "levels" as the units of analysis located at different positions on each scale (e.g., for temporal scales, levels refer to seconds, days, seasons, decades, etc.). Many water management problems stem from what Islam and Susskind (2013) describe as the competition, interconnection, and feedback among variables, processes, actors, and institutions that act across scales or operate at different levels. Accurate mapping of a water problem will require evaluation at different levels and along multiple scales. While the natural sciences have long understood the importance of scale, approaches to thinking about and measuring what is happening at different scales and levels in the social sciences have been less explicit and more variable (Gibson et al. 2000). The growing need for interdisciplinary work across the natural, societal, and political domains, however, demands that we adopt a common vocabulary about scales and levels when we talk about defining and managing complex water management problems.

Scale and level considerations are important in mapping complex water problems, yet their importance is often ignored. The framing of a problem on a community, subnational, or transnational scale is not without consequences. A water policy formulated at a subnational scale will affect and be affected by what happens at other scales and levels. Moreover, what is appropriate at a subnational level may well be considered inappropriate at a community or transnational scale. Often, actors in the same water management dispute refer to different and conflicting scales and levels when they frame their questions and concerns. This will be further explored in our section on watersheds, problem-sheds, and policy-sheds.

Linking scale and level issues from the natural domain (e.g., flood forecasting at a community scale or seasonal water availability for irrigation at the subnational scale) to the societal domain (e.g., responses to floods or planning for food shortages due to a predicted drought) is important for the improvement of current water management practices. Currently, theory and practices in the natural domain tend to focus on adaptive behavior and aspects of spatial and temporal data related to water quantity, water quality, and ecosystem function and services. While in the societal domain, water management focuses more on levels and scales of the different institutions that manage or are impacted by water management decisions as well as temporal concerns. Political reality demands cross-scale and cross-level interactions for effective water management. In general, the lack of fit between the societal domain (e.g., the scale of water governance) and the natural domain (e.g., water allocations at each scale) creates serious scaling problems for water management (Cash et al. 2006). Our review of the literature suggests that terms such as "scale" and "level" are used interchangeably, and key concepts related to scale are defined quite differently across disciplines. For the sake of clarity, it is important to adopt a common vocabulary – for

example, terminologies and definitions suggested by Gibson et al. (2000) – while mapping the problem space.

The scale and level at which a water problem is defined, as well as the scale and level at which it can be addressed (which may not necessarily be the same since the former may be more politically influenced), will define the solution space and the stakeholders which can dictate certain outcomes, which can make them potentially contentious issues and over-complexify the process. Each boundary represents a different unit of analysis which can exponentially complicate any analysis of the problem space but may be critically relevant to arriving at the proper solution. The goal in mapping is to understand the relative strength/importance/impact of each boundary variable and how their impact changes as the scale and levels change – in other words, the goal is to appreciate the complexity and associated nuances of the problem space mapping by understanding at which level or scale these boundary challenges matter most and why.

### *Watersheds, Problem sheds, and Policy sheds*

A watershed is a hydrologic unit: an area of land draining into a common body of water such as a lake, river, aquifer, or ocean. There are over 2,110 watersheds in the continental United States that cross county, state, and national boundaries. For example, the Mississippi River watershed is the largest in North America. With its many tributaries, the Mississippi's watershed drains all or parts of 31 states and eventually reaches the Gulf of Mexico. Contrast this definition of the watershed as a hydrologic unit with the definition proposed by geographer John Wesley Powell as: "that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community" (Powell 1957). In Powell's definition, the natural domain (a bounded hydrologic system) is coupled with the societal domain (living things are linked and become part of a community).

Over the last 10,000 years, Native Americans have lived along the Mississippi. Most were hunter-gatherers or herders and some formed prolific agrarian societies. The arrival of Europeans in the 1500s forever changed the structure of the water network in the Mississippi watershed. With increased scientific understanding of how the global water cycle is affected by warming and cooling of the Pacific Ocean during El Niño or La Niña over the last several decades, we now know that the Mississippi watershed is not a bounded hydrologic system – even from a natural domain perspective. It is affected by global teleconnections including El Niño and La Niña. Yet, the use of the watershed as a unit of analysis is common in both the natural and societal domains (e.g., "watershed user association" as a governance unit).

Cohen and Davidson (2011) argue that there are at least five recognized challenges associated with a watershed approach to water resource management: the difficulties of boundary choice; accountability; public participation; and asymmetries with "problem sheds" and "policy sheds." First, even when the boundary choice from a hydrologic perspective is clear, the choice about which boundary to use for governance is often unclear. The choice of which watershed boundary to use is a political decision as much as a scientific one (Blomquist and Schlager 2005). Indeed, the nested nature of watersheds (ordering of streams, sub-watersheds, and tributaries) lends itself to a number of different boundary options. Decisions about which hydrologic boundary to use for the purposes of governance or management should be based on a combination of natural, societal, and political considerations. Second, watersheds are usually not aligned with electoral or jurisdictional boundaries. Consequently, the usual means of ensuring accountability do not necessarily apply. Watershed-scale organizations may not necessarily be responsive or accountable to those living

and working within the watershed (Blomquist and Schlager 2005). Third, the watershed approach represents both a scaling up from the local level and a scaling down from the national or state level, but the notion of working at the watershed level has largely been framed in terms of decentralization since the political decision-makers may not act at the national level. Fourth, asymmetries between problem-shed and watershed may create challenges for water professionals and decision-makers. A problem-shed is defined as a "geographic area that is large enough to encompass management issues, but small enough to make implementation feasible" (Griffin 1999). Watersheds frequently influence – and are influenced by – factors outside their boundaries. Consequently, it is important to identify an appropriate level (e.g., choice of problem-shed may be more appropriate than watershed) when we think about mapping the problem space and assigning water management responsibilities. Fifth, another set of challenges arises from asymmetries between watershed boundaries and traditional administrative scales (i.e., policy-sheds).

Difficulties created by these challenges and asymmetries among watersheds, problem sheds, and policy sheds will complicate every dimension on the transboundary process from data collection to political decision-making to financial, administrative, and management responsibilities. Efforts to address these challenges could involve adjusting boundaries as each water management problem arises to obtain an accountable and participatory result. It is not to suggest that the watershed is not a useful boundary. In some situations, watersheds may work well. However, questions should be raised about how and when to use the watershed boundary and how watersheds are linked to problem-sheds and policy-sheds. For example, what decisions (interventions) should be made at the watershed level, and which (interventions) should be made at other levels? Like domains, scales, and levels, the defining the problem-shed as the watershed, policy-shed, or some combination will define the landscape for negotiations. What's included and what's not included may prejudice certain outcomes and certain stakeholders. For these reasons, it's important to have a collaborative/negotiated approach to map the problem space, incorporating what has been discussed regarding stakeholder engagement, domains and scales, and problem boundaries.

## Water Access, Allocation, and Use: Who Gets How Much Water and How?

Determining who decides how much water and how allocations are made is perhaps one of the most challenging problems we face. The challenge is so ingrained in generations of water professionals that we now summarize it as a collective action problem (CAP). A CAP is a situation in which all individuals or institutions would be better off cooperating but may fail to do so because of conflicting interests between individuals that discourage joint action, including selfish behavior. These conflicting interests can arise from a real or perceived unequal distribution of costs and benefits or different economic, political, or security concerns. There is no single way to define and address a CAP but mapping the CAP is a critical step in understanding the problem space and informing potential solutions/approaches. The process of understanding the CAP may also be an important first step in advancing dialogue into action among the parties.

Identifying and managing any CAP – from community management of natural resources in Sukhomajri (Chapter 49) to restoration of the Urmia Lake at the subnational scale (Chapter 46) to the allocation of water from the Jordan River at the transnational scale (Chapter 41) – faces a range of challenges if cooperation and collective action are to be achieved and sustained. The challenge in mapping a problem space is to find mutually beneficial ways to identify, implement, and sustain access and use of a limited resource. Such a mapping will often involve competing and conflicting needs and demands of a range of stakeholders.

It can be helpful to think in terms of four broad communities of stakeholders to address water challenges: The first is the *knowledge community*, which comprises experts who can contribute to scientific, legal, or process knowledge; research; technical analysis; and stakeholder education. The second is the *decision-making community*, which is made up of those often with the process experience and with the authority to create and prioritize policy, make decisions, and establish formal arrangements, agreements, or regulations. The third is the *resource community*, which encompasses all who want to bring resources to the table to support water diplomacy processes. The fourth is the *impacted community*, that is, those who will be affected by the decision and will ultimately need to adapt to any implemented changes. In a general sense, the knowledge community provides objective input, the decision-making community makes decisions, the resource community supports the process and facilitates implementation, and the impacted community benefits (or suffers) from the resultant action. These communities can be seen as cogs that must work together for a functioning water system – the knowledge community provides evidence-based insights and technical legitimacy; the decision-making community balances competing interests and formalizes agreements; the resource community ensures implementation feasibility and sustainability; and the impacted community provides crucial contextual knowledge and adaptation feedback. Often, the inertia of one cog can drive the others, as each cog can put pressure on another, driving changes in other communities. In choosing the stakeholders for a given problem context – say, issues of water security in the Jordan Basin – we need to be aware of how insights emerging from the knowledge community can be refined concerning the values and interests of the impacted community and, ultimately, made implementable within the political context.

Irrespective of the problem context, we hypothesize that these four communities will always be involved. The nature and intensity of their engagement, however, will be different depending on the problem context. For example, the relative distribution of stakeholders from different communities and their nature of engagement and interactions will vary significantly for the Jordan, the Urmia Lake, and the Sukhomajri. Understanding and mapping these relationships can help guide how and with whom to engage from these four communities to identify potential solutions within their unique context.

One way to begin this process is to develop a Stakeholder Assessment (Susskind and Thomas-Larmer 1999; Reed et al. 2009) to identify and engage stakeholders from the four communities through expert opinion, semi-structured interviews, and a snowball sampling method. This needs to be an iterative process to help reduce the risk of excluding relevant stakeholders. The Stakeholder Assessment is both a process (of identifying parties to engage in strategic collaboration) and a method of involving stakeholders in designing the joint fact-finding – an example of joint fact-finding in mapping the problem space is available in Chapter 20 – and problem-solving conversations that need to follow.

## Problems of Complexity

We recognize that many of our water problems arise from a coupling of natural and human systems. Historically, it has been commonplace to draw conceptual boundaries between "natural" systems and "human" systems. Roughly speaking, this distinction has been made between problems governed by invariant physical laws (natural systems) and those involving norms and behaviors (human systems). Natural systems are often taken to be describable in context-independent ways, while descriptions of human systems are usually context-dependent. While we think it is important that water professionals are aware that such distinctions remain prevalent in professional practice today, it is not necessary to accept the designations of natural and human as the appropriate

system signifiers. Rather, one may adopt these terms as a colloquial shorthand – while mapping a problem space – to allow one to distinguish between the physical laws that suggest that water will flow downhill (natural), and the social norms may dictate that water may flow uphill to money and power (human).

Until the middle of the 20th century, most water resource planning decisions were guided by the notion of maximizing the efficiency of water use. This was done by providing marketable goods and services without much regard for associated impacts and externalities. Water resource planning and management is a dramatically different enterprise now (e.g., Boland and Baumann 2009; Kiang et al. 2011). A growing emphasis on societal values has led to increased demand for analytical techniques that will allow us to predict the outcomes of interventions in coupled natural and human systems. Consequently, it is important to move beyond the familiar framing of water problems as technical tasks that can be passed along to experts who will find nonpolitical solutions (Stone 2002). Instead, many water problems are best described in terms of differences in values and how to translate those values to policies and actions within the political domain (Stone 2002; Layzer 2006).

Efforts to theorize and map water problems have been vast, but the tools and techniques available to pursue and implement these theories in practice have often led to science that is "smart but not wise." This is because we do not have what we need to integrate "scientific learning" with the "contextual reality" of water problems that are filled with uncertainty, ambiguity, nonlinearity, and feedback. Mapping of most real-world water problems demands the integration of such contextual realities. Consequently, water professionals who attempt to map these problems cannot easily translate solutions derived from scientific findings into the messy context of the political world, where natural and societal dynamics must be considered.

A significant insight that policy science has generated is an understanding that the problems that must be addressed in a public policy context are not like the problems for which the tools of systems engineering or optimization were designed. This realization is often conveyed in terms of the "messiness" or "wicked" nature of the problems that arise when science, policy, and politics are intertwined with uncertainty, ambiguity, nonlinearity, and feedback (e.g., Rittel and Webber 1973; Bar-Yam 2004; Milly et al. 2008; Orlove and Caton 2010).

Studies of these problems – colloquially referred to as "messy" or "wicked" – suggest that we need to distinguish among three types of water problems: simple, complicated, and complex (Liu et al. 2007; Islam and Susskind 2013). *Simple* problems are amenable to optimization because they involve easily identifiable and neatly bounded elements of water management that respond in predictable ways and pose challenges about which there is almost complete agreement with regard to means and ends. They often exist within a supportive political environment among stakeholders with a history of cooperation. *Complicated* water management problems are those that involve water networks that operate in somewhat unpredictable ways, where the means and ends of action are highly contested, and/or the political environment is not supportive. *Complex* water problems lie in the zone between certainty and uncertainty and between agreement and disagreement. Islam and Susskind (2013) discussed attributes of simple, complicated, and complex problems in the second chapter of their book *Water Diplomacy: A Negotiated Approach to Managing Complex Water Networks.* The design of a water-efficient flushing toilet is an example of a simple water problem. While getting water from the Quabbin reservoir to take a shower on the 18th floor of an apartment in Boston is a complicated problem, it's still solvable because with careful study one can map what each component of this water distribution network does and how to control it. A complicated system is knowable, predictable, and controllable. Consequently, the mapping of simple and complicated water problems can be guided by rational and objective analyses. On the

other hand, complex water problems are those in which natural and societal elements get intricately linked, for example, the inundation of four towns and displacement of people from those towns that were required to create the Quabbin reservoir.

The traditional problem-mapping approaches usually assume the coupling of natural and human systems exists but then treat them as largely independent of each other, avoiding the complexity often created by accounting for the interactions between natural and societal components. Complexity, used here, is not intended to describe the degree of difficulty involved in solving such a problem, but to characterize an intrinsic property of the system from which the problem arises (Bar-Yam 2004). In contrast to simple and complicated systems, complex systems are characterized by unclear and/or poorly defined and understood cause–effect relationships, broad and often irreducible uncertainty, and emergent properties and other externalities that can dominate system behavior and response (Islam and Repella 2015). Table 12.1 is adapted from Islam and Repella (2015).

Islam and Smith (2019) used the ongoing sanitation crisis in Lowndes County, Alabama, as an example of a problem that has arisen out of a coupling of natural and human systems. They have argued that this coupling creates intrinsic complexity that cannot be adequately mapped by methods and techniques developed for complicated or simple systems. To highlight the importance of recognizing this complexity, they explore how the identification of a system as simple, complicated, or complex puts important constraints on the solution space and how problems arising from these systems need to be addressed. They use the example sanitation crisis in Lowndes County, Alabama, to help make these distinctions clear. They first examine the crisis as if it were the product of a simple system and examine the approach and proposed actions that might entail. Then, they contrast those outcomes with what one might expect to see if the system were actually complicated. Finally, they argue why the sanitation crisis in Lowndes County is neither simple nor complicated, but rather inherently complex.

Just like the other problem spaces described earlier, Islam and Smith (2019) argue that the way one diagnoses and maps a problem shapes their response to address the problem. If one maps the problem as simple, one expects that one can rely on experts (or the marketplace) to develop repeatable solutions that treat root causes and adopt widely available and tested "best practices."

*Table 12.1* Comparison of simple, complicated, and complex problems and their key characteristics

| *Category* | *Simple* | *Complicated* | *Complex* |
|---|---|---|---|
| The causal relationships are… | Well-understood and identifiable | Often ambiguous; not easily identified | Not easily identifiable; only perceivable in retrospect |
| The system is… | Knowable and predictable | Somewhat unknowable; not always predictable | Often unknowable and unpredictable due to emergence |
| Effective interventions can be achieved with… | Application of "best practices" | Collaboration among experts with contextual knowledge | A synthesis of natural, societal, and political elements; often requires negotiation and adaptation |
| Nature of uncertainties… | Limited and quantifiable uncertainties | Derive from natural and engineered systems, uncertainty can be estimated | Derive from interactions of natural, political, and social systems, difficult to estimate and quantify |

If one diagnoses the problem as complicated, one may seek diverse expertise to create locally tailored solutions that meet a required level of service. If one diagnoses the problem as complex, one acknowledges that expertise is no substitute for the knowledge and understandings derived from inclusive, early, and ongoing stakeholder engagement with an explicit recognition of the capacity and constraints imposed by the context. Misidentification of a problem in either direction (i.e., simple as complex or complex as simple) can lead not only to the misallocation of time, treasure, and talent but also to outcomes that may be harmful to the communities they are trying to serve. Faizee (Chapter 39) provides an excellent case study on how expanding the scope of a process added complexity that ultimately doomed a deal between Iran and Afghanistan on the Helmand River.

Choudhury and Islam (Chapter 49) present a conceptual framework to analyze water management problems as an evolving process of a coupled system. They examine the evolution of interactions of system elements (variables, processes, actors, and institutions) of a coupled natural and human system using Sukhomajri as a case study. They show how phase changes in problem dynamics – from simple to complicated to complex – are manifested in this case. Their study identifies how the processes that arose in different phases were managed or neglected as well as the interventions that either facilitated, blocked, or misinterpreted the emergent nature of a coupled system. They show some of the consequences of not fully appreciating the formulation and implementation of different intervention strategies as an evolving problem with emergent properties. They show how the meteoric rise and fall of the effectiveness of Sukhomajri may be related to (mis)understanding and (mis)alignment of different problem-mapping strategies and related management interventions as the system evolved and phase changes occurred. From an operational perspective, a key takeaway lesson is to recognize the evolving nature of coupled system dynamics. Additionally, it is important to pay particular attention to identifying the problem space and implementing interventions as phase changes occur – from simple to complicated to complex systems – for desired outcomes.

## Understanding and Addressing Complexity, Causes, and Conditions

A key difference between predictable problems (e.g., simple and complicated problems) and complex problems is rooted in the notion and framing of causality (also referred to as cause and effect; causation; etc.) and conditions for emergence. Understanding the relationships and differences among complexity, causality, and conditions is critical to map a water problem. To contextualize this notion of causality and conditions, consider the following three elements of a problem:

> A mega-city in a poor, Pacific rim nation; seasonal monsoon rains; a huge garbage dump. Mix these ingredients in the following way: move impoverished people to the dump, where they build shanty towns and scavenge for a living in the mountain of garbage; saturate the dump with changing monsoon rain patterns; collapse the weakened slopes of garbage and send debris flows to inundate the shanty towns. That particular disaster, which took place outside of Manila in July 2000, and in which over 200 people died … starkly illustrates the central point that disasters are characterized and created by context. The disaster was not inherent in any of the three ingredients of that tragedy; it emerged from their interaction.
>
> *(Sarewitz and Pielke, 2001)*

Complexity science suggests that we need to view emergent conditions (in this case the Manila disaster) not as isolated phenomena, but as a result of interactions and feedback within or between

elements of a system linked through causality. In the Manila disaster, one could retrospectively argue that each of the three elements was a causal factor; but the disaster can't be traced back to any of the three elements individually, as any one existing independently would not have resulted in the same tragedy. It emerged because of the interactions among all three elements.

### *Rethinking Cause–Effect and Conditions for Complex Systems*

From a natural science perspective, a causal relationship is inferred when one element causes a change in another element of a system. A broader discussion of causality that addresses philosophical issues and the meaning of causality in societal phenomena is discussed in Choudhury and Islam (2018). Cause–effect relationships are usually determined experimentally by looking at the changes in one element resulting from changes in another or in the system as a whole. Such experiments can only be done in a controlled setting where all other elements can be kept constant while changing the one variable of interest and observing the effect on the system's performance. Conducting such experiments in the real world are extraordinarily difficult and often yields highly contested results – especially when these systems are complex and little is known about the causal relationships among the system variables.

Let's examine a case related to flood forecasting as an example. Rainfall is a necessary condition for flooding, but rainfall is neither a sufficient condition nor a deterministic causal factor that would enable one to forecast flood as an effect. Not all rainfall events cause floods. Other conditions within the system interact with the rainfall event to either increase or decrease the likelihood of a flood. The intensity and duration of rainfall, soil characteristics, topographical conditions, and human interventions (e.g., a city may create a detention pond to store excess rainfall and artificial canals to move water quickly during excessive rainfall) may all be mitigating or exacerbating factors. So, while rainfall is necessary to have a flood; just because it rains doesn't mean there will be a flood.

Despite these complications, causal reasoning remains a fundamental approach to mapping the problem space, explaining a phenomenon, informing policy, and designing intervention(s) for the desired outcome(s). While this is likely appropriate for simple systems with a few well-defined interactions, it can be highly misleading when applied to complex systems. In complex systems, the conventional notion of causality needs to be reconsidered within the context of the broader interactions that exist within complex problems that yield a high degree of uncertainty, a lack of reducibility, and unpredictability.

Rather than seeking to identify and quantify causal linkages, one needs to look for emergent patterns that are neither deterministic nor random; neither perfectly predictable nor entirely unpredictable; neither reducible from the macroscale nor transformable from the microscale. Emergence is a characteristic of complex systems and should be distinguished from causes and conditions when mapping the problem space (Choudhury and Islam 2018; Islam and Susskind 2013).

The challenge is to identify emergent patterns and to relate them to potential enabling conditions as one maps the problem space. As demonstrated above, emergence refers to the existence or formation of a pattern that results from the interaction of elements within a complex system that produces effects that could not occur in the absence of these interactions. In describing patterns, emergence refers to how system responses arise from the properties of, and interaction among, the individual elements of the system. One way to think about emergence is to shift one's perspective. In other words, we need to see the trees and the forest at the same time to see how the trees and the forest relate to each other. If one is focused on the trees, one may not see the broader influence

of the forest. Those who consider the forest do not see how the individual dynamics of the trees might impact the forest. We need to shift our perspectives back and forth to fully understand which aspects of the trees and their relationship with other trees are relevant to the description of the forest and vice versa. Understanding this relationship of the importance of scales of observation (tree versus forest) is critical to mapping the problem space effectively.

It is only retrospectively that we can see the emergent properties of a complex problem and the relationships that may exist between these emergent properties and enabling or emergent conditions and various interactions that exist within the system. Enabling conditions are different from causes: a cause must result in an effect; an enabling condition may, but does not necessarily, cause or contribute to an effect (e.g., oxygen, on its own, will not cause a fire but is necessary to have a fire – it is an enabling condition for an emergent characteristic, not a cause). Thus, it is critical to identify and assess the role of enabling conditions to better understand the dynamics that might impede or drive the development and implementation of technical and politically acceptable solutions.

There are numerous challenges to mapping the problem space based on conditions from the natural domain (e.g., water flows downhill due to gravity) and the societal domain (e.g., water flows uphill to power). To extend the reasoning and logic of natural sciences (e.g., laws of motion for water flow) to social sciences, efforts usually focus on using frameworks and worldviews as the necessary condition (e.g., realist, institutionalist, structuralist, interpretivist, etc.), and on identifying the antecedent conditions of conflict or cooperation as the sufficient conditions of explanation (Choudhury and Islam 2018). This is because we do not yet have laws of power asymmetry for water flow. As a result, a combination of reasonings from both the natural domain (e.g., availability of water) and societal domain (e.g., sustainable governance of water) will be needed for mapping the problem space.

## Understanding and Synthesizing Scientific and Social Facts

Think of the flow of water as a fact. On the one hand and in the simplest of cases, it flows downhill following the laws of gravity. On the other hand, in the American West, as the saying goes, water flows uphill toward money as water is siphoned from the Colorado River to sustain the city of Los Angeles. If we were to map water problems for societal good, we would need to understand and appreciate the differences between these two types of facts: the flow of water as an object (a particle with no purpose) and the flow of water uphill (defying laws of gravity) as a resource controlled by people with purpose (Islam 2024).

### *Scientific Facts*

Physics is not psychology. Psychology is not political science. Yet these three disciplines claim to be science. Given the nature of the subject of study (people or object), and the unit of analysis, physics, psychology, and political science use scientific methods differently because both the subjects of the study (particle versus people) and the specific questions being addressed are different. Each discipline has its own unique challenges for applying the scientific methods. Scientific facts are measurable, reproducible, falsifiable, and generalizable. They are not opinions, feelings, or preferences but the best representation of the evidence at the time. That said, scientific facts are not immutable – scientific facts are tentative and subject to revision as new observations become available. We recognize that this can (and will) complicate the mapping of the problem space. Yet we must emphasize that while the methodological choice to derive scientific facts needs

to be consensus-based, the reliability and credibility of scientific facts are not based on consensus but on their observability, replicability, falsifiability, and generalizability.

The concept of objectivity, when approaching scientific facts, can serve us well when mapping well-structured problems. If we assume that water is a molecule consisting of hydrogen and oxygen that behaves like a particle, then applying scientific facts (classical mechanical theory) can describe its behavior and we can objectively map and design the problem space. This class of problems is well-structured, and their dynamics are autonomous, not intentional. We can (and will) continue to improve our methods, processes, and protocols to make significant advances in mapping this class of problems that we have called simple and complicated earlier.

These advances, however, will likely not improve our ability to address problems that are coupled with physical and societal variables, processes, actors, and institutions (Rittel and Webber 1973). What happens when water is no longer just an object but also a resource? Now water suddenly can defy gravity because economic and political factors may force it to flow uphill. This class of problems is complex and rooted in contexts, values, and intentions and is dominated by social facts.

### *Social Facts*

Social facts consist of a collective way of believing and acting toward a problem (Durkheim 1894). They exert influence that extends beyond the experiences and intentions of individuals. They operate at a collective level and shape social dynamics. Social facts can be observed through their external manifestations, such as markets, laws, customs, rituals, symbols, social roles, or organizational structures. These observable aspects provide evidence of the existence and influence of social facts in decision-making. Social facts pertain to social phenomena, collective human behavior, and social interactions within a particular group. Social facts are influenced by subjective interpretations, cultural relativism, and social constructions. They are shaped by collective beliefs, values, and norms, which may vary across different societies or contexts. Unlike scientific facts, social facts cannot be easily generalized as they often vary across different contexts, societies, cultures, or historical periods. There appears to be an increased recognition that social facts exert significant influence in shaping the dynamics of collective decision-making (Islam 2024).

### *Synthesizing Scientific and Social Facts*

Given the intricate coupling of scientific and social facts in shaping CAP, a carefully crafted synthesis of the principles of scientific methods and the pragmatism of social facts is needed in mapping the problem space. In data-driven mapping, scientific facts and social facts complement each other by providing a holistic understanding of the physical and social worlds. They help decision-makers integrate empirical evidence, scientific principles, and social considerations to make informed and responsible decisions that align with both scientific knowledge and societal values. An explicit recognition of synthesizing the notion of social facts with scientific facts in defining the problem space is not an attempt to define "the truth" but to agree on "a truth" that is negotiable and implementable given the capacity and constraints of a problem and its context. The power and pragmatism of recognizing social facts are not in their replicability or generalizability but in arriving at an implementable consensus of the problem space by remaining focused on the principles of scientific methods (Islam 2024).

## Concluding Remarks

Most water problems are reasonably simple. The issues are well known, easily understood, and characterized by easily identified cause–effect relationships, and take place within a broader context of cooperation. Many water problems are complicated. They may cross physical, political, or technical boundaries and their causal relationships are somewhat ambiguous. The distribution of costs and benefits for these problems may be difficult to assess or inequitable. Understanding these problems and implementing appropriate interventions to address these problems will require collaboration among experts with contextual knowledge. A few water problems are complex. For these problems, many boundaries are crossed at multiple scales and levels. There is no apparent equitable distribution of costs and benefits. Facts are hard to establish. Unresolved animosities polarize the stakeholders. And broader political or security interests, whether said or unsaid, drive the parties apart. Accurate identification and characterization of complex problems are often difficult and unpredictable. Effective intervention to address these complex problems will require a synthesis of natural, societal, and political elements.

Which problem are we addressing: simple, complicated, or complex? Identifying the problem space is an essential first step to diagnosing what matters and why. Such a problem identification and related mapping process provides an opportunity to engage stakeholders to understand and reconcile their competing and conflicting perspectives through careful negotiation. A collaboratively designed problem-defining process – guided by the five steps discussed in this chapter – is likely to provide mutually agreeable and nearly self-enforcing intervention strategies to resolve many water problems, be they simple or complex.

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# 13

# MANAGING WATER DIPLOMACY PROCESSES

*Sebastian Kratzer and Lina Hillert*

**Key takeaways**

- When dealing with issues or conflicts around water as a valuable resource, scientific and evidence-based technical solutions may appear straightforward, yet environmental and climate activists, experts, and officials frequently struggle with the political sensitivities surrounding these issues and the resulting difficulty in finding mutually acceptable solutions.
- This chapter proposes to approach water-related disputes and negotiations from the perspective of political negotiations and peacemaking processes, with a focus not only on official processes but also on informal (and at times confidential) dialogues that can be a useful way to develop cooperation in the absence of a wider political solution.
- Water can serve as an entry point and a confidence-building measure between parties to a conflict, but also be the topic of negotiation.
- This chapter adopts a third-party perspective and lays out the various process options negotiators and interlocutors could consider, and explains the different stages of a process and how to increase a negotiation's process chances of success by getting its design right.

## Introduction

When dealing with issues or conflicts around water as a valuable resource, scientific and evidence-based technical solutions may appear as straightforward. Yet, the lack of reliable data, high degree of uncertainty, and the biases embedded within calculations that impact the distribution of costs and benefits can make these exceptionally difficult. On top of that, officials, negotiators, experts, and activists dealing with water conflicts frequently struggle with political or security issues surrounding their negotiation. Many of these disputes exist in the space between science, technology, and politics, which can make finding mutually acceptable solutions extremely challenging.

This is why this chapter proposes to approach water-related disputes and negotiations from the perspective of, and building on lessons learned from, managing peacemaking processes. Writing from the perspective of a third party – actors (states, organizations, and individuals) external to the dispute (United Nations (UN) 2012) – this chapter lays out the various process options stakeholders can consider and explains the different stages of a process and how to increase a

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process' chances of success by getting its design right. To illustrate what various options can look like in practice, the chapter showcases examples from real-life environmental and water-related negotiation processes in different contexts.

This chapter first presents different types of conflict resolution processes available to water diplomacy practitioners before providing insights and guidance on how to design the right process, selecting the right format, agenda, participants, and promoting inclusive participation. The chapter then shares lessons on handling engagements with the media and public perception, managing a science–politics process, and what potential deals and collaborations could look like.

## Choosing the right process type

When setting out to resolve a water dispute, parties to that dispute must decide what kind of process they want to embark on, and what kind of third-party engagement they want, as the absence or differing levels of independence and decision-making power of a third party will influence the potential outcome of their process.

Negotiations are a bargaining process between the parties only, with the aim to reach a mutually acceptable agreement. Parties may prefer this option if they have sufficient trust in the other side, that their interests will be sufficiently met, and the agreement respected.

A mediation process involves a third party that assists them, with their consent, to resolve their dispute (UN 2012). This voluntary approach tends to be fitting when trust between parties is lower but win-win solutions can lead to optimized mutual resource benefits, as is often the case in water-related disputes.

On the other end of the scale, conflict parties can opt for more formal or legal processes, which include arbitration, judicial, and even legislative decisions, whereby a third party makes nonbinding or binding decisions on a dispute between them.[1] These approaches will often be necessary when dealing with deep-rooted structural issues that require more profound reforms in order to address the conflict adequately (UN Department of Political Affairs (DPA) & UN Environment Programme (UNEP 2015).

If asked to help resolve a water dispute, it can be useful for third parties to be aware of the different types of processes available to them and the parties. Official negotiations tend to be more structured and formal, often play out on higher political levels (referred to as Track 1 when they involve political or military leaders), and focus on reaching a tangible agreement or concrete output. On the other side, many dialogue formats tend to be defined in broader terms around open-ended communication and transformative outcomes. Such dialogue processes (often referred to as Track 2 or Track 3, if they involve civil society or community actors, respectively) can lead to an increased understanding between parties, building trust between interlocutors, and informal (often technical) cooperation, even in the absence of formal or signed agreement.

The type of engagement selected will have important repercussions further down the line and strongly influence what stakeholders can and will get out of their interaction. Formal negotiations or mediation and even arbitration may all be necessary strategies for resolving issues between parties, but will not necessarily result in process skills of the parties nor satisfying or lasting solutions if they are the only strategies used. Implementing a 'mixed' method, stakeholders can, for example, pursue a Track 1.5 approach in which official and non-official actors work together to resolve conflicts.

Another important aspect for consideration in managing water-related negotiations is the strategic use of discreet informal spaces and processes. Especially in disputes around natural resources or environmental issues where experts from all sides of a conflict can develop technical or evidence-based solutions in dedicated spaces, informal (and at times confidential) dialogue can be

a useful way to develop real cooperation in the absence of a political solution. These advances can then also feed into official negotiations (see Box 13.1) or provide opportunities for deescalating violence in armed conflicts.

**Box 13.1 Environmental cooperation in Ukraine**

Prior to the 2022 invasion of Ukraine by Russia, the Donbas region of eastern Ukraine had already been affected by armed conflict (since 2014). In the early days of the conflict, ecological experts highlighted the risk of direct or accidental hits of chlorine tanks or toxic waste storage, as well as power cuts to coal mines' pumping stations, which could cause massive ecological disasters.

With the official political process stuck (the Minsk process), the Centre for Humanitarian Dialogue (HD) – a private third party – used the environment to get conflict parties across the contact line to cooperate and act in support of the official dialogue. This evidence-based dialogue track developed informal cooperative mechanisms on the environmental and public health risks of the conflict. It discreetly brought together officials, environmental experts, and scientists, and combined robust environmental studies with joint learning and training on how to address the problem with technical cooperation on ecological risks and disasters. With the official political process blocked, it was one of the few places where the conflict parties could agree on exchanging and, even, indirectly cooperating. The fact that studies were conducted on both sides of the contact line by representatives of each side and validated in reputable laboratories made it difficult for any party to ignore or dismiss the findings and proposals coming out of this dialogue.

One of the most visible effects was the impact of the informal dialogue on the formal political negotiations and negotiators. It ensured that the issue of ecological threats was included in the Minsk negotiations (despite its absence from the text of the Minsk accords) and various security-related dialogues and policies. The track convinced the Organization for Security and Co-operation in Europe's Special Monitoring Mission to Ukraine to appoint a special environmental adviser and to train monitors as ecological focal points to observe vulnerable sites on the frontline. Another outcome was that the Trilateral Contact Group integrated ecological experts and issues from the informal dialogue group into their official working groups.

As a result of this process, findings of informal water sampling could be used by official scientific entities and government experts to design forecast papers or recommendations based on lab protocols from nongovernment-controlled areas. Using the mediator to guarantee the credibility of scientific data provided government-liaised experts with the opportunity to have a comprehensive picture of the situation in the entire region, covering government and nongovernment-controlled areas.

When designing a water-related political dialogue process, using science as an entry point for discussions between the conflict parties can be an effective strategy, especially in protracted or "frozen" conflicts with a geopolitical dimension. Assessments of the impact of climate change and conflict on the availability and quality of water or marine resources can speak about shared concerns by the parties, offering a relatively neutral topic to bring them to the table (see Box 13.2). Discussing environmental or water-related data and monitoring may also offer "a context for countries to express their perception of the region without being influenced by nationalistic, political or economic factors" (Borton 2021). Yet, not every environment- or water-related issue

may be suitable. Some topics risk being so nonsensitive that they do not generate enough attention or impetus for action. This, for example, was the case in the South China Sea, where the issue of marine plastics put forward by HD did not attract enough interest from the claimant states to get a process off the ground. Another risk is that science itself may not be (perceived as) neutral, if it suggests that one party is right and the other wrong, or if it undermines negotiating positions.

To avoid such situations and achieve results, it is thus important to focus on a specific water-related or environmental issue that (1) affects parties' core interests and (2) cannot be resolved by the parties on their own, and (3) draws on scientific input by both sides.

**Box 13.2 Science diplomacy in the South China Sea**

Even though the case of the South China Sea is not a water diplomacy case in the strict sense, it serves as a useful example for using science and data as the basis for engagement between negotiation parties. The South China Sea is a geopolitical flashpoint characterized by rising tensions and mistrust amid disputed territorial claims by China, Brunei, Malaysia, Vietnam, Taiwan, Indonesia, and the Philippines (Borton 2021). It is also an environment at risk of ecological collapse where fish stocks have depleted by 70–95% since the 1950s, intensifying the conflict between the claimant states while threatening the livelihoods and food security of millions (Basu & Chaturvedi 2021; Center for Strategic and International Studies 2017).

Since 2018, HD has informally convened policymakers and experts from China, Indonesia, Malaysia, the Philippines, and Vietnam to identify practical steps that will ensure the sustainability of South China Sea fisheries management. Sustainable fisheries management is a common concern shared by all countries, and by involving scientists and marine biologists in the discussions and tabletop exercises, HD was able to depoliticize the issue to a certain degree. So far, dialogue has resulted in creating a better evidence base for policy decisions, as well as shared norms and processes for cooperation between scientists. In September 2022, scientists affiliated with governments from the five countries also published a Common Fisheries Resource Analysis that leveraged regional expertise and information to produce a shared evidence-based update on the status of key fish stocks. This type of regional cooperation furthers environmental protection while simultaneously serving as a confidence-building measure between the parties. Through this work, scientific cooperation activities can contribute to addressing transboundary maritime issues to deal with environmental problems and improve interstate relations (Borton 2021).

## Designing and implementing the right process

Once the process is selected, it is crucial to design and plan for the different stages of this process. Rather than embarking directly on exchanges with the other side, negotiators are better served to structure the process in a way that increases the chances of a successful outcome. Conflict resolution practice often uses a few basic key steps to design an engagement process, which will also serve water diplomacy practitioners. These steps can be roughly divided into five phases, depicted in Figure 13.1.

There is no clear separation between those phases, and water diplomacy practitioners should not see them as strictly linear, but they provide a simple and useful framework for designing a process.[2]

The assessment phase is where negotiators and third parties identify the key conflict dynamics and actors, including environmental, economic, social, and security factors. In the case of water disputes,

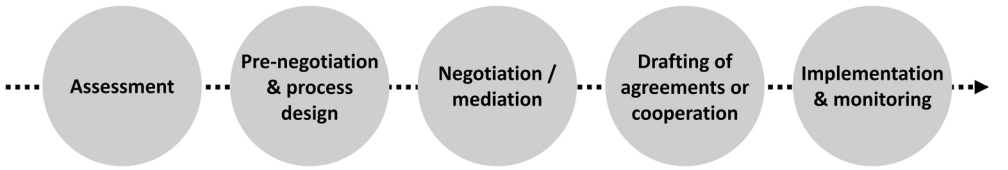



*Figure 13.1* Phases of a mediation process (adapted from the UN Guidance for Effective Mediation 2012).

this could involve a combination of conflict and environmental analysis. Various concepts and tools can assist water diplomacy practitioners in this task. For example, the Actors, Content, Context, Process Conflict Analysis Framework is a simple and systematic way of understanding conflict for the purpose of a mediation engagement.[3] While it may not be necessary to apply the full framework to every conflict, it is a useful mindset for water diplomacy practitioners to underpin their efforts.

Other classic conflict resolution concepts include the Positions-Interests-Needs (PIN) analysis[4], as well as the Zone of Possible Agreement (ZOPA)[5], which help negotiators move beyond interlocutors' stated positions toward identifying and addressing their real interests and needs. Done systematically or in an ad hoc manner, these tools allow negotiators and third parties to learn more about their options and red lines in solving a water conflict.

In the case of water-related conflicts and tensions in particular, it is important to take into account the gendered dimensions of water access, management, and governance, which influence the impact of these conflicts on women, men, girls, and boys. A gender-sensitive conflict analysis enables third parties to refine their understanding of the conflict to better uncover, target, and address root causes of violence, and to ensure that dialogue outcomes do not cause unintended harm.

Following the assessment phase, conflict and third parties establish negotiation objectives and design a corresponding engagement plan. The pre-negotiation phase, or "talks about talks," will include shuttling and (often separate) negotiations. The outcomes of this phase can include details on the agenda, format, and participation. The below visual (Figure 13.2) taken from a real-life negotiation between two political groups supported by an impartial third party showcases the different elements related to these three dimensions of process design. It includes pointers to the key options to consider when planning and discussing elements in terms of agenda, format, and participation.

## Agenda and format setting

Setting the appropriate agenda and format is what can make or break the negotiations. This involves deciding on the sequence of discussions (which topics to approach first), if and how to have parallel tables for different topics, and how often to meet and for how long. It also requires setting ground rules, such as speaking order, decision-making procedures (e.g., nothing is agreed until everything is agreed, or agreement per theme), and communication methods (who can share what when). It can also involve deciding on a venue, or order of entry into the negotiation space – issues that may seem banal but often impact the flow, mood, and chances of success of a process.

Various creative process design options will come up at this phase, especially as negotiations around water cannot ignore technical information and expertise, making it crucial to reflect on the role of science as part of the dialogue process. Political and technical processes can be combined in numerous ways, ideally in such a way that they enhance the effect each has in developing trust, common understanding, and political will among the parties.

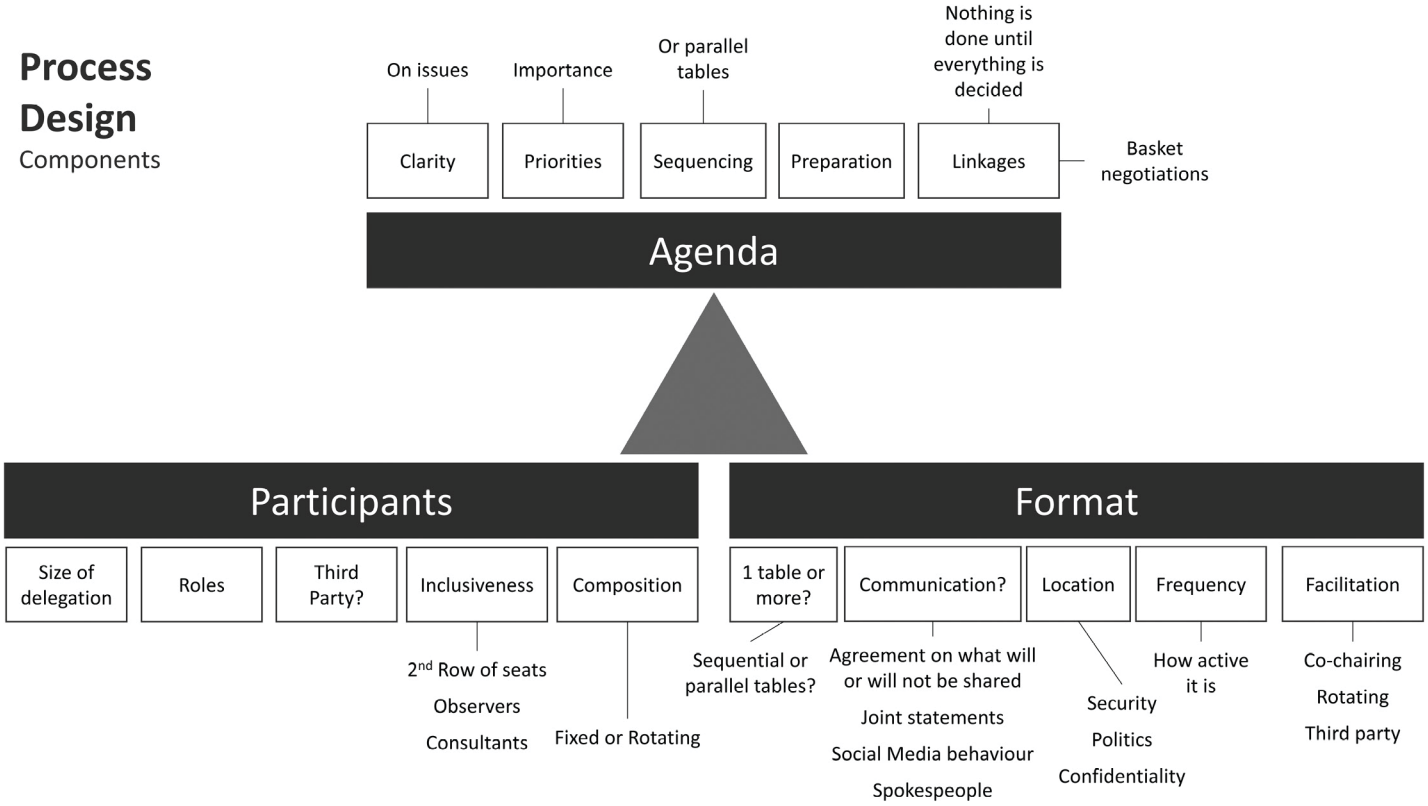



*Figure 13.2* Process design of a real-life political process.

## Selecting the right participants

Another key component of process design is selecting the right participants and deciding in which way various stakeholder groups can contribute to and influence the negotiations.

Even though a third party's influence on participation in the actual negotiations may be limited, the decision ultimately lying in the hands of the conflict parties, mediators can shape the selection of participants to increase a process's chances of success. They can identify and approach suitable participants, make suggestions to the conflict parties, or link up with sponsors to encourage broader, more inclusive participation (Lanz & Siegfried 2016).

For water-related disputes, specifically between states, it is important to understand the nature of the division of power within governments, relevant ministries and departments, as negotiations will typically require the involvement of various technical experts and officials from the countries concerned. In addition, when planning a dialogue with scientists and diplomats, carefully mapping relevant scientists becomes central as scientists work differently from diplomats or policymakers and may have different incentives to participate in a dialogue. Therefore, it is crucial to think about "what's in it" for water experts and scientists and how to leverage potential power differentials. Identifying those experts who are more policy-focused could be useful and might require fewer efforts by mediators to prepare them for the discussions (more on how to manage processes with participation from scientists is presented in the section "Managing a science–politics process").

Particularly at the interstate level, negotiation processes focusing on water and other environmental issues are often still male-dominated and exclusive (Barua & Deka 2023), with participation limited to high-level policy experts and scientists. This risks ignoring the perspectives of diverse stakeholders affected by water conflict (including women, youth, minorities, and others) and limiting the diversity of background, perspective, and expertise that can be useful in identifying solutions and reducing potential negative unintended consequences. To mitigate this risk and increase otherwise excluded stakeholders' potential for meaningful participation, third parties or lead negotiators should engage in an inclusive stakeholder mapping, identifying civil society organizations or individuals who are affected by water conflict, and have experiences and expertise relevant to the management of this type of conflict. In situations where negotiation parties are reluctant to engage in such exercises, third parties can still undertake them in order to have a comprehensive view of all actors involved and affected, and look for opportunities to leverage this knowledge in pursuit of a more inclusive process and outcome.

In circumstances in which it is not possible to have processes with broader participation and direct representation from excluded stakeholders, for example, when negotiations happen at higher levels and involve political sensitivities, third parties can still support affected stakeholders in positioning themselves in relation to the process and to increase their chances of making their voices heard.

They can do this by creating parallel fora, facilitating parallel discreet and/or public consultations, or organizing side meetings whose insights and reflections subtly inform the main negotiations. Various stakeholders can also choose more public advocacy-based options to influence the negotiations or create public pressure, which the third party or negotiators should try to be aware of and potentially help shape.

## Managing the media and public perception

In addition to selecting the right participants, determining how negotiating parties should approach public communications and the media is an important part of process design. While a publicly led

negotiation process bears many risks and obstacles to making progress, an agreed-upon approach in dealing with the media and the public can help negotiators find the right balance between confidentiality and transparency. That, in turn, can help set more realistic expectations for the public, prepare the ground for a potential compromise, and prevent or react to misinformation/disinformation campaigns by potential spoilers. Practically speaking, this should involve the establishment of ground rules between the parties on who communicates what and when. Parties can, for example, designate a spokesperson, jointly decide on key messages after each round of negotiations, and decide on the most appropriate and useful communication channels and partners to use.

**Box 13.3 Water and border delimitation deal between Kyrgyzstan and Uzbekistan**

A useful example to illustrate the importance of managing participation and public communication is a deal between Kyrgyzstan and Uzbekistan that aimed to resolve a border dispute between both countries. Part of the long-standing dispute and its resolution was an important water reservoir located on both countries' shared border.

The border agreement is accompanied by various other agreements, ranging from cooperation on customs protocols to energy, agriculture, and industry. It stipulates a land swap, with Uzbekistan receiving the land containing the disputed water reservoir. In turn, Kyrgyzstan receives pasture land as well as a separate section of the border as compensation. An additional agreement relates to the joint management of the reservoir's water, in the form of an enterprise in which both sides will have a 50-50 share to jointly manage the dam (Putz 2022).

What seems like a technically straightforward solution, however, has caused anger among border communities and a public outcry in Kyrgyzstan, putting the Kyrgyz government under political pressure and tainting what could otherwise have been a full water diplomacy success.

Opponents publicly denounced not only the outcomes of the deal as depriving their country of an important water reservoir, but also the process of consultations as insufficient. When the initial border agreement was reached in 2021, local communities expressed frustration at not being consulted beforehand. In an effort to address this, the Kyrgyz government organized a public meeting for local actors to engage with the negotiations. However, this move led to accusations of excluding local stakeholders and media from the proceedings. In the midst of this growing dispute, the President issued stern warnings to protestors, and the police detained over 20 local activists.

The Kyrgyzstan–Uzbekistan border agreement serves as a stark reminder of the importance of proactive process design, which should incorporate meaningful engagement with local voices and concerns. Such an approach could have not only averted public criticism but also bolstered acceptance and support for the proposed solutions.

## Managing a science–politics process

Following the pre-negotiation phase, the process typically moves to the main and side negotiations, where technical solutions and political compromises will be developed and tested.

In terms of how science can feature in the negotiations, various approaches are possible. The first option is to have scientists and other technical participants attend meetings with representatives of the conflict parties and directly participate in the discussions. This requires carefully selecting suitable participants (as explained above) and thorough planning as scientists might

not necessarily be familiar or at ease with joining facilitated meetings between conflict parties, lacking an understanding of the conflict context, the sensitivities and the format of the discussions. In addition, inviting too many scientists to the table may run the risk of getting lost in technical details, which could negatively affect the outcomes of the dialogue. To mitigate such risks, "conflict-sensitizing" scientists becomes particularly relevant. Mediators should ensure scientists receive a summary of the conflict context and the dialogue's theory of change before the meeting. Moreover, providing scientists with a brief induction, especially on the humanitarian principles of neutrality and impartiality, is important. During the meeting, an agenda with specific questions and active facilitation to guide the conversation can ensure that discussions remain targeted. For better conversations, mediators should also watch their own language to avoid jargon and do their best to grasp the science at the basic level. It may also become necessary to address the security of technical experts. If these are selected from within the conflict parties, then they or their families may be threatened if their views do not support those of their principals.

Overall, when planning a dialogue with scientists and diplomats, determining the right moment to involve scientists is critical. While it may seem reasonable to immediately integrate environmental or scientific discussions with political tracks, having separate environmental and political dialogue formats might be easier to start with. A scientific track could provide a space for scientists to discuss and come up with suggestions related to technical issues, without having to navigate political sensitivities. This would reduce the risk of environmental or scientific issues turning into a political football. Once the environmental or scientific track has produced concrete ideas or action points, scientific discussions could be merged with the political tracks with great care.

The second option is to involve scientists by commissioning scientific studies and assessments before or as part of the dialogue. These studies and assessments can provide the scientific basis for the discussions, but it is not necessary to involve scientists directly as part of the dialogue. This can be a useful approach to avoid bias of, or personal risk for, scientists who would join the actual negotiations. An example of how this could look like in practice is HD's role in facilitating dialogue between the two conflict parties in Ukraine prior to 2022 (see Box 13.1). To inform the discussions, research on issues such as water, soil, and the effects of radiation was commissioned. One of the commissioned studies assessed the impact of drinking water sources of mines in the Luhansk region on the health of the population living in the contaminated territory. Another report focused on environmental disaster scenarios for the flooding of mines as a direct consequence of the armed conflict. Both studies enabled increasing awareness among the conflict parties and helped the two sides to develop a shared understanding of the urgency of preventing an ecological catastrophe in the region.

A combination of the two options presented above is possible too. Yet, despite the differences, the intended outcomes of science-based diplomacy and dialogue processes will be relatively similar: to promote cooperative scientific activities that serve as a confidence-building measure among the involved parties and "establish a useful starting point for regional cooperation to deal with international environmental and perhaps geopolitical problems" (Borton 2021).

## Getting to a deal, and beyond

Once sufficient trust and buy-in are established, parties can lock in their preferred solution(s) through the drafting of either partial or comprehensive arrangements or agreements, which ideally also contain details on the implementation and monitoring of the agreed points. Third parties can play a key role by proactively proposing options and funnelling various potential end-state scenarios to the table, acting as a sounding board for different ideas (Moore 2014).

The specific content of an agreement will depend on the level of negotiations, ranging from local agreements to national and transboundary ones (see the UNECE Practical guide for the development of agreements or other arrangements for transboundary water cooperation, and Box 13.4 and Box 13.5 for insights on the structure and clauses of different agreements). Yet, strong agreements have certain common characteristics water diplomacy practitioners can and should aim for. The mediation literature talks about agreements being strong, and hence more likely to last, when they are *substantive (*i.e., include *specific* and *tangible* exchanges), and lead to a *comprehensive*, *detailed*, *permanent*, *final*, *nonconditional*, and *binding* solution (Moore 2014). Some water disputes lend themselves well to fulfill these criteria, as agreements can include win-win exchanges related to the ownership, access, or benefits of the disputed water resource. For example, in the border deal between Kyrgyzstan and Uzbekistan (see Box 13.3), negotiators established a detailed "land for water" exchange in which Uzbekistan received the 4,957 hectares on which the water reservoir sits, plus 19.5 hectares related to the dam. In exchange, Kyrgyzstan received 1,019 hectares of pasture land, as well as 12,849 hectares in a separate section of the border as compensation (Putz 2022). The agreement also defined a 50-50 split in the economic benefits gained from the associated dam through a joint venture, effectively locking in the agreed arrangements for the future.

In many conflict settings, however, political agreements or the "formalization" of technical solutions may be out of reach, or simply no longer appropriate given the changing relationship between the parties.

Yet, even in these cases, water issues may present opportunities for de facto cooperation between the parties that will not require larger political accommodation or recognition. Practitioners and negotiators can aim for negotiation outcomes such as cooperation plans, joint business ventures, or shared agendas, targets, and action plans. Any agreement that lays out the process on how the parties will work together in the future can be as meaningful as (or more meaningful than) an actual allocation treaty. If too politically sensitive, it may be best to move to their implementation while keeping these commitments unwritten.

Box 13.4 provides an example of the structure and clauses of a local water-related agreement in Mali.

**Box 13.4 Structure and clauses of a local water-related agreement, Mali**

The Sahel is a region grappling with a multitude of peace and security challenges, one of them being the increase in local conflicts between farmers and pastoralists (UN News 2019). These agro-pastoral conflicts primarily revolve around access to and the use of scarce natural resources, such as water and land, but also have an ethnic and religious dimension (Climate Diplomacy 2021).

As part of its mediation efforts in the Sahel, HD has facilitated agreements between local communities to encourage the peaceful and sustainable management of natural resources. These mediation processes have resulted in the signing of the so-called *Conventions Locales* – local agreements defining the rules for the management of specific natural resources. Several of these conventions are concerned with water governance and address the management of ponds. For instance, the *Convention locale de la mare d'Agoufou* in Mali is based on the habits, customs, and cultural traditions of natural resource exploitation in the area, and draws on national legal texts regulating the management of natural resources and the protection of the environment. The Agreement contains clauses on the following issues:

- The users of the pond and the scope of the local agreement
- The problem of pond management
- The objectives of the local agreement
  - Rules for the management of the pond and natural resources
  - Chapter 2: Agriculture and market gardening (e.g., Article 8: "The installation of fields in areas set aside for the purpose of agriculture or market gardening must respect an easement of 1 km from the major bed of the pond")
  - Chapter 3: Sedentary and transhumant livestock farming (e.g., Article 11: "Pastoralists should not allow their animals to roam within a 20 km radius of the pond")
  - Chapter 4: Fishing in the Agoufou pond (e.g., Article 16: "The use of motor pumps to evacuate water to gain access to catfish is strictly forbidden")
  - Chapter 5: Brick makers around the pond (e.g., Article 18: "Access to the pond for making building bricks is free, especially during the dry season. It remains forbidden during the rainy season. To avoid conflicts with other users of the pond, brick making should be done in the area indicated for this purpose")
  - Chapter 8: Domestic use (water consumption, etc.)
- Management bodies of the pond and other resources
  - Creation of two committees: a supervisory or surveillance committee (decision-making body composed of village chiefs and/or traditional chiefs), and a management committee (executing body composed of user representatives)
- Sanctions for not respecting the conventions' provisions and other practices considered to be infringements (e.g., stealing animals)
- Financial provisions
  - Income from the management of the pond: 35% of revenues must go to pond management; 15% must go to the management bodies; 50% of revenues must go to the two communities

Though true for all agreements, especially in natural resource and water conflicts, getting the implementation modalities of an agreement right is at least as important as the agreement itself. Ideally, negotiators will tackle and answer questions such as an agreement's political, legal, and technical implementation modalities, the role or involvement of specialists or affected groups, and how the parties will manage unexpected developments or disputes related to the agreement. Monitoring mechanisms can include the parties themselves, joint committees composed of party representatives, or a select third party. In the case of water conflicts, joint/independent monitoring committees as well as technical/scientific follow-up committees may often be the best choice. Ad hoc and permanent spaces for continued negotiation in the implementation phase are also important to consider (Lanz 2019). The Indus Waters Treaty between India and Pakistan (see Box 13.5) presents an agreement outlining in detail the follow-up expected of both sides, how progress would be monitored by a permanent dedicated commission, and in what way and sequence parties could bring emerging disputes to the table and resolve them. Yet, despite offering multiple dispute resolution tools, the treaty has no mechanism for resolving differences when one party wants to use one tool, and the other another one – showing the pitfalls of even well-thought-through implementation mechanisms.

**Box 13.5 Structure and clauses of the Indus Waters Treaty between India and Pakistan (UN DPA & UNEP 2015)**

A long-lasting dispute over the allocation of water resources from the Indus Basin between India and Pakistan was resolved through an almost decade-long mediation process by the World Bank, culminating in the Indus Waters Treaty in 1960. The Treaty contains the following clauses:

- Article 1 – Definitions (agreement on names and types of affected rivers and lakes)
- Article 2 – Provisions regarding Eastern Rivers (agreement that India would receive unrestricted use of the Eastern Rivers, which Pakistan would allow to flow unimpeded)
- Article 2 §5 – a ten-year transition period (during which water would continue to be supplied to Pakistan according to a detailed schedule)
- Article 3 – Provisions regarding Western Rivers (agreement that Pakistan would receive unrestricted use of the Western Rivers, which India would allow to flow unimpeded)
- Article 5 – Financial Provisions (a fixed schedule for India to provide fixed financial contribution in ten annual installments) during the transition period
- Article 6 and 7 – Exchange of Data and Future Cooperation (parties to notify each other of any work that would affect water flow and to provide relevant data upon request)
- Article 8 – Permanent Indus Commission (made up of one commissioner of Indus Waters from each country, to meet annually, promote cooperative arrangements for the treaty implementation and cooperation between the parties in the development of the waters of the Indus system)
- Article 9 – Settlement of Differences and Disputes (sequentially, through the Indus Waters Commission, a neutral expert, or a court of arbitration if either party concludes that the dispute is not likely to be resolved by negotiation or mediation)
- Annex (settlement of a specific but linked dispute between the East and West Punjab Governments regarding water supply by East Punjab to West Punjab)

## Conclusion

The above descriptions present a set of considerations and techniques for producing mediated or negotiated solutions to water conflicts. Water diplomacy practitioners or third parties aiming to support efforts to resolve or prevent water-related conflicts will often find a messier reality, where water issues may intersect with (armed) conflicts, political interests, complicated socioeconomic and ethnic dynamics, as well as other contentious resources. However complicated the situation, we can strengthen the chances for a successful dialogue and negotiation process and outcome by applying some of the insights and lessons of process design thinking and methodology outlined in this chapter.

## Notes

1 See *Alternative Dispute Resolution*, Legal Information Institute: www.law.cornell.edu/wex/alternative_dispute_resolution

2 The UN Guidance for Effective Mediation, for example, only lists four phases: Assessment – Preparedness – Negotiation – Implementation (UN 2012). The denomination of those steps matters less – what is important is that users realize and adapt to the different requirements of the various phases a process moves through.

3 See ETH Zürich: https://mas-mediation.ethz.ch/tools/accp-conflict-analysis-framework.html
4 The PIN model is a tool that can help mediators understand and unravel complex conflict situations (see, e.g., www.beyondintractability.org/essay/interests for explanation of the concept and www.linkedin.com/pulse/pin-framework-mastering-conflict-resolution-bryant-galindo/ for a visual and practical application of the model.
5 ZOPA refers to the space between the conflict parties' minimally acceptable outcomes and red lines, i.e., the range in a negotiation process where parties can find common ground (Fisher & Ury 1981). Identifying the ZOPA can help mediators with determining the appropriate process design and mediation strategy.

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# 14

# THE ROLE OF SCIENTIFIC UNCERTAINTIES IN TRANSBOUNDARY WATER NEGOTIATIONS

*Animesh K. Gain*

**Key takeaways**

- The chapter reviews the extent to which existing transboundary cooperation treaties account for uncertainty globally.
- The impact of uncertainties on water diplomacy is illustrated using the Ganges Treaty between India and Bangladesh.
- The findings underscore the complex connection between scientific uncertainties and water diplomacy, emphasizing the importance of solid strategies to address and navigate uncertainties in negotiations over transboundary water resources.

## Introduction

### *How do different types of uncertainty affect transboundary water management?*

With more than 280 transboundary river basins spanning 145 countries (UNEP-DHI, 2016), water diplomacy has increasingly become the focal point of international cooperation and conflict resolution (Islam and Susskind, 2013). However, the dynamic and complex nature of water systems, coupled with the uncertainties arising from multiple sources, can significantly impact the efficacy and outcomes of diplomatic efforts related to shared water resources (Choudhury and Islam, 2018). Therefore, it is imperative to investigate the role of uncertainty in water diplomacy to enhance our understanding of the challenges and opportunities that lie ahead.

For reducing global carbon emissions, Barrett and Dannenberg (2012) found that uncertainty about a temperature threshold can impede successful climate negotiations. For example, if a threshold for catastrophic climate change could be identified with certainty, countries very likely would propose a collective target certain to avoid catastrophe, would pledge to contribute their fair share to the global effort, and would act to fulfill their promises. However, the thresholds for abrupt and catastrophic climate change are inherently uncertain. Therefore, countries are very likely to propose to do less collectively than is needed to avert catastrophe, pledge to contribute less


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than their fair share of the amount proposed, and end up contributing even less than their pledge (Barrett and Dannenberg, 2014). Similarly, uncertainty is an inherent feature of transboundary water resources (Islam and Susskind, 2018), and it plays a critical role in water diplomacy and transboundary water management.

There are several reasons why uncertainty is important in transboundary water management. Firstly, uncertainty about the availability, quality, and management of water resources can lead to distrust and suspicion between different stakeholders, such as nations, regions, communities, and individuals. This can make it difficult to agree on common goals, priorities, and strategies, and create barriers to cooperation and collaboration (Bruttel et al., 2022). Secondly, uncertainty about the availability and quality of water resources, as well as the potential impacts of different management strategies, can create challenges in the planning and management of water resources.

This can result in inadequate or unsustainable management practices, which can have long-term implications for water availability and quality (Alcamo and Henrichs, 2002). Thirdly, uncertainty can increase the risks of conflicts and disputes over water resources, as well as exacerbate the challenges of water scarcity and environmental degradation (Bernauer and Böhmelt, 2020; Wolf, 2007). This can have serious implications for social, economic, and political stability, as well as human well-being and the environment.

While there is a growing body of literature on water diplomacy, there are several research gaps related to the role of uncertainty in water diplomacy. While there are many case studies and examples of water diplomacy in practice, there is a lack of empirical research to understand the different types of uncertainty that arise in different water-related issues, and how they affect negotiation and management (Islam and Repella, 2015). Besides hydrological variability and institutional dynamics, there is a need for more research to understand the broader socio-economic, political, and environmental drivers of uncertainty.

Addressing these research gaps, this chapter aims to examine scientific uncertainties in water diplomacy that pervade transboundary water management and negotiations. To accomplish the objective, I first conduct a review to examine the degree to which uncertainty is taken into account in existing global transboundary cooperation treaties. Next, I investigate various sources of uncertainty, encompassing both variability (aleatory) and epistemic uncertainties in transboundary water resource assessment and management. This chapter utilizes a case study of the Ganges River Basin to demonstrate the uncertainties that impact diplomatic endeavors and decision-making procedures.

## Uncertainty in the Transboundary Freshwater Dispute Database (TFDD)

The TFDD is a comprehensive and widely recognized database that compiles data on global water treaties, disputes, and cooperative efforts related to transboundary freshwater resources (McCracken and Wolf, 2019; Wolf, 1998). The TFDD was developed and is maintained by the Oregon State University, College of Earth, Ocean, and Atmospheric Sciences, in collaboration with the Northwest Alliance for Computational Science and Engineering, with the aim of facilitating research, policy analysis, and cooperation in transboundary water management (Wolf, 2007).

In the TFDD, there were 2,117 treaties globally, and among them, 1,158 treaties (54.7%) were coded to analyze the frequency with which a water treaty explicitly mentions some form of uncertainty in its text. Based on our review, about 24% of the coded treaties do not consider any form of uncertainty in the database. The different forms of uncertainty, along with their frequencies, are summarized in Table 14.1.

*Table 14.1* Different forms of uncertainty and their distribution in the Transboundary Freshwater Dispute Database (TFDD). The total sum is more than 100% because one treaty might consider multiple forms of uncertainty

| *Form of uncertainty* | *Frequency (in %)* |
|---|---|
| Not coded | 45.3 |
| No consideration of uncertainty | 23.9 |
| Environmental | 7.6 |
| Treaty implementation | 2.1 |
| Political | 1.9 |
| Data | 0.5 |
| Financial | 2.0 |
| Treaty regime | 1.5 |
| Scientific | 1.8 |
| Infrastructural | 8.7 |
| Demand Uncertainty | 1.8 |
| Economic | 0.1 |

In the TFDD, only 10.8% of treaties address flood management, while a mere 2.2% and 4.3% of treaties focus on water scarcity and the combined issue of floods and water scarcity, respectively. A small fraction of treaties, 3.68%, recognize the need for variability in transboundary cooperation. Only 12.7% of treaties contemplate "alternative scenarios," which refer to situations where different developments can occur, and alternative actions are specified. Furthermore, only 5.2% of treaties mention existing mechanisms for forecasting specific future events, such as flood occurrences (McCracken and Wolf, 2019; Wolf, 1998).

The above review of TFDD suggests that uncertainty is inadequately considered in historical treaty design and implementation. This can lead to several negative consequences for transboundary water management such as insufficient flexibility to adapt to changing conditions, i.e., climate change, inequitable allocation of water resources among conflicting parties, and ineffective conflict resolution mechanisms (Drieschova et al., 2011).

## Sources of uncertainty in transboundary water resources

Uncertainty in transboundary water resources arises from various sources. Walker et al. (2003) proposed an uncertainty matrix as a heuristic tool to classify and report the various dimensions of uncertainty for better communication among analysts, policymakers, and stakeholders in identifying, articulating, and prioritizing critical uncertainties. There are two relevant types of uncertainty: variability uncertainty and epistemic uncertainty. The uncertainty from variability refers to the inherent randomness and variability in environmental processes and natural systems, while epistemic uncertainty refers to the uncertainty arising from incomplete knowledge or understanding of the system being modeled (Srikrishnan et al., 2022). Following Walker et al. (2003) and Apel et al. (2004), different sources of uncertainty for transboundary water resources are summarized in Table 14.2.

Locations of uncertainty for transboundary water resources assessment can be broadly categorized into three main types: context, model development, and model outcome. Context uncertainty encompasses the ambiguities related to external economic, environmental, political, social,

*Table 14.2* Different sources of uncertainty for transboundary water resources

| *Location* | | *Variability (aleatory uncertainty)* | *Incomplete knowledge (epistemic uncertainty)* |
|---|---|---|---|
| Context | Climate change | Natural variability of precipitation and discharge pattern | Gaps in scientific knowledge about the impacts of climate change on monsoon and glacial melting. |
| | Economic development | Spatial and temporal variability of socioeconomic factors | Gaps in knowledge about economic factors |
| | Political | Unexpected changes in political leadership, geopolitical events, or crises | Gaps in knowledge about or incomplete information about the political or institutional landscape |
| | Sociocultural | Spatial and temporal variability of socioeconomic factors | Gaps in knowledge about sociocultural factors |
| Model development | Model structure | Spatial and temporal variability of precipitation, river flow, and water quality | Inadequate representation of complex physical processes<br>Computational limitations |
| | Inputs | Variability in input data due to inherent randomness in environmental processes and natural systems. | Uncertainty in input data due to incomplete, inconsistent, or inaccurate measurements or data coverage. |
| | Parameter | Variability in model parameters resulting from natural variability in the processes they represent. | Uncertainty in model parameters due to assumptions, expert opinions, or statistical methods used for estimation. |
| | Model calibration and validation | Variability in model performance during calibration and validation is due to the inherent randomness in system behavior. | Uncertainties in observed data and model structure can lead to inaccuracies in model calibration and validation |
| Model outcome | Scenario | Variability in outcomes across different plausible future scenarios or pathways. | Uncertainties associated with the assumptions and projections made for future scenarios |
| | Prediction | Prediction error due to randomness | Prediction error |
| | Model comparison | Variability in model performance when comparing different models in terms of their outcomes. | Uncertainty in model performance due to incomplete understanding, model structure, or parameter uncertainties. |
| | Propagation of uncertainty | Variability in model outcomes resulting from the propagation of aleatory uncertainties through the model. | Uncertainty in model outcomes resulting from the propagation of epistemic uncertainties through the model. |

and technological factors that shape the backdrop for managing and distributing water resources that span across political borders. Climate change-related uncertainties primarily stem from the restricted ability of General Circulation Models (GCMs) to precisely capture the processes that generate precipitation. For instance, GCMs display varying degrees of accuracy in representing different aspects of rainfall in the Nile Basin, but all have their limitations. As a result, when evaluating climate impact studies for the Nile, it is crucial to take into account the specific GCMs used by researchers, since some may generate wetter projections for East Africa, while others might produce drier predictions (Barnes, 2017). Political uncertainties are associated with the competing interests and priorities among parties, which can further complicate negotiations and agreements on water allocation and usage. For example, the construction of the Grand Ethiopian Renaissance Dam by Ethiopia has created tensions between Ethiopia and downstream countries, Egypt and Sudan, over concerns about water allocation and potential impacts on water security (Wheeler et al., 2020). Socioeconomic uncertainty refers to uncertainty in predicting future water demands and potential conflicts due to varying levels of socioeconomic development among parties, that is, countries. The varying water demands due to population growth, agriculture, and industrial development in India, China, Bhutan, Nepal, and Bangladesh across the Ganges–Brahmaputra River Basin create uncertainties in water allocation and distribution (Yao et al., 2022).

Modeling transboundary water resources is highly complex, and this refers to developing model structure, inputs, parameters, and model calibration and validation. In each of these steps, there are various sources of uncertainty. Model structure uncertainties refer to uncertainties related to the representation of physical, hydrological, and socioeconomic processes within models, including simplifications, approximations, and assumptions made in the model's design and structure. For example, hydrological models often use simplified spatial resolutions that may not accurately capture the complex topography and land-use patterns in the Indus River Basin, shared by India, Pakistan, China, and Afghanistan (Shah et al., 2020). This can lead to uncertainties in predicting water availability, river flows, and the impacts of infrastructure development, such as dams and reservoirs. Limited or inaccurate data for model inputs, calibration, and validation can introduce uncertainties in model predictions. Transboundary water resources often face data limitations due to a lack of data sharing or inconsistencies in data collection methods among countries. For example, limited data on river flows, precipitation in the Ganges–Brahmaputra–Meghna River Basin, can introduce uncertainties in hydrological predictions (Gain et al., 2011).

Uncertainty in parameter values or assumptions made while selecting parameter values can lead to inaccuracies in model predictions, affecting the understanding and management of transboundary water resources. For example, soil moisture is a critical parameter for hydrological models estimating water availability and river flows in the Nile River Basin. However, soil moisture measurements can be subject to errors due to sensor inaccuracies, sparse ground-based observation networks, and limitations of remote sensing techniques, leading to uncertainties in model predictions. Uncertainties in observed data and model structure can lead to inaccuracies in model calibration and validation, affecting the reliability of model predictions.

Model outcome uncertainty refers to the uncertainty associated with the results or predictions generated by a model. It arises due to the combined effects of various sources of uncertainty present in the modeling process, such as uncertainties in data, model structure, model parameters, and model inputs. Uncertainties associated with the assumptions and projections made for future scenarios, such as climate change, land-use change, and socioeconomic development, can impact the reliability of model outcomes and decision-making. Uncertainties in model structure, parameter values, and input data can propagate through the model and result in prediction errors in the model outcomes, such as water availability, quality, and distribution. Using an ensemble of models

or simulations can help account for various uncertainties in model structure, parameter values, and input data. However, the ensemble itself can introduce uncertainties in the form of spread or disagreement among the individual models or simulations. As models are linked or their outputs are used as inputs for other models, uncertainties can propagate through the modeling chain, affecting the overall uncertainty of the final output. Model outcomes can be sensitive to uncertainties in parameter values, input data, and model structure. Sensitivity analysis can help identify the key sources of uncertainty and guide efforts to reduce them.

Barnes (2017) analyzed the uncertainty of the modeling study at the Nile River Basin and found that the hydrological modeling of the Beles River within the Upper Blue Nile Basin, using the downscaled data from the different models, yielded mean flows for 2040–2069 that ranged from –5% to +18%. Comparing two hydrological models, VHM and NAM, Barnes (2017) also found that the mean annual flow of the Nyando River (White Nile Basin) for 2046–2065 varied from –27% to 118% using the VHM simulations (with a 1971–1990 baseline) and –34% to 149% using the NAM model. Therefore, he suggested to exercise caution when interpreting or utilizing the output of only one downscaling model or any specific hydrological model.

## Role of scientific uncertainty in the Ganges Treaty

Uncertainty plays a significant role in the Ganges Water Treaty between Bangladesh and India, as it can influence the effectiveness and sustainability of the treaty's provisions related to water sharing, cooperation, and management of the shared river. The Ganges River's flow is subject to natural variability due to factors like precipitation, evapotranspiration, and groundwater recharge.

The treaty does not explicitly address the need for maintaining minimum environmental flows to preserve the ecological health of the Ganges River. Uncertainties related to the impacts of water abstraction, pollution, and ecosystem degradation on the river's ecological integrity can undermine the treaty's long-term sustainability and create tensions between the two countries. The limited institutional mechanisms established under the treaty to oversee its implementation may not be sufficient to address the broader uncertainties and challenges related to the Ganges River's management and development.

The treaty's water allocation formula, based on historical flow data, may not fully account for these fluctuations and the impacts of climate change, which can exacerbate hydrological uncertainty and contribute to disagreements over water sharing. For example, the treaty's indicative flow did not account for the decreasing trend of flows at Farakka during the post-Farakka period. Examining flow availability during specific years, Rahman et al. (2019) revealed recurring low flow at Farakka in drier years following the treaty. Extremely low 10-day average flows at Farakka were often observed after 1996, such as 1372 $m^3/s$ in 1997 (March 21–31), 1487 $m^3/s$ in 2008 (April 11–20), 1465 $m^3/s$ in 2010 (March 21–31), and 1429 $m^3/s$ in 2016 (March 11–20). During the post-Farakka period (1975–1996) until the treaty implementation, the average dry season flow consistently remained lower than that of the pre-Farakka period (1949–1974), with the exception of May, suggesting that the treaty's indicative flow (according to the water sharing formulas described in the treaty) did not account for the declining trend in flows at Farakka following its implementation (Rahman et al., 2019). Thus, the treaty underestimated the impact of climate variability. By analyzing the post-treaty data (1997–2016), Rahman et al. (2019) found that 65% of the time Bangladesh did not receive its guaranteed share (which is 991 $m^3/s$ flow in every alternate 10-day cycle) during critical dry periods with high water demand. In the treaty design, the declining trend of historical flow during dry seasons as well as shifting of flow was not taken into account.

Dominant context uncertainty in the Ganges includes climate change, political dynamics, hydropower development, socioeconomic factors, and cultural practices. Climate change can cause accelerated melting of glaciers and changes in snowpack dynamics in the Himalayas, which feed the Ganges River (Surinaidu et al., 2020). Climate change, characterized by rising temperatures, unpredictable shifts in rainfall patterns, increased glacier melting, stronger monsoons, water-related catastrophes, and rising sea levels, is expected to alter the hydrological equilibrium of the Ganga Basin, thereby presenting new challenges to water management (Jeuland et al., 2013). Climate models predict a potential increase in monsoon rainfall in the future (Immerzeel et al., 2010; Pervez and Henebry, 2014), and a reduced dry season flow (Biemans et al., 2013). However, uncertainties vary largely due to differences in the GCMs and Hydrological Models (HMs) employed (Nepal and Shrestha, 2015). Vetter et al. (2017), for example, found that GCMs and HMs are two main uncertainty contributors in the Ganges Basin. These uncertainties stem from our limited understanding of hydrological processes, evolving socioeconomic patterns, and the diverse definitions employed to characterize the extreme events (Khandu et al., 2016). For model parameterization, soil moisture in the Ganges Basin are highly uncertain with regard to climate change, which can be an important factor for accurate assessment of hydrological model (Masood et al., 2015).

In addition, uncertainties may also occur due to future changes in sediment supply from the catchment area, construction of dams, barrages, and irrigation canals, net subsidence within the delta, delta management practices, and future sea level changes (Wilson and Goodbred, 2015). The Ganges Treaty did not consider these uncertainties at all for assessing the distribution of water resources between India and Bangladesh. In order to deal with these uncertainties and to predict reliable water flow, future treaty should be based on a thorough scientific investigation, incorporating multi-model ensemble of GCMs and HMs taking into account climate change and human impacts jointly by Indian and Bangladeshi scientists.

Domestic political dynamics in the countries sharing the Ganges River Basin can influence water management policies and priorities. Changes in political leadership or public opinion can result in shifts in water resource management strategies, creating uncertainties for other riparian countries (Williams, 2020). For example, the changes of political regime for both West Bengal, Indian central government, and Bangladesh significantly affect the treaty negotiation between Bangladesh and India. Rapid population growth, urbanization, and economic development in both India and Bangladesh can result in increasing water demands and uncertainties in future water use patterns. These uncertainties can strain the existing water sharing arrangements under the treaty and hinder the development of long-term, sustainable water management plans. Therefore, the treaty design should be based on diverse socioeconomic scenarios.

In addition, the lack of adequate and reliable data on the flows of the Ganges River has been a challenge for researchers and water managers. Several factors contribute to this data scarcity, including limited monitoring stations, inconsistent data collection methods, and restricted data sharing between countries (Faisal and Nishat, 2000).

## Conclusion

This chapter has identified various sources of uncertainty in water diplomacy, particularly in the context of transboundary water resources. As evidenced by the TFDD and the Ganges Treaty, consideration of diverse sources of uncertainty and their management is essential for fostering cooperation, preventing conflicts, and ensuring equitable and sustainable water management among riparian nations.

Climate change and hydrologic model development are identified as two key sources of scientific uncertainty in relation to the Ganges Treaty. Changes in temperature and precipitation patterns due to climate change can alter the water flow into the Ganges River, potentially increasing it due to accelerated glacial melt, but also leading to a severe reduction in the long term. Climate change can also result in more frequent and severe floods and droughts, exacerbating water scarcity. These uncertainties complicate water resource management and indicate a need for the integration of climate science into the interpretation of the Ganges Treaty to help policymakers prepare for different water availability scenarios.

In addition to climate change, hydrologic model development introduces significant uncertainties to the interpretation and application of the Ganges Treaty due to several factors. Firstly, these models often inadequately represent or omit complex physical processes within the Ganges basin, such as groundwater recharge, surface runoff, evaporation, and plant water uptake. Secondly, input data uncertainties arise due to variable and often limited accuracy in measurements like rainfall, temperature, and river discharge, as well as the lack of high-resolution data across the entire basin. Lastly, parameter uncertainties, particularly concerning soil moisture – a critical determinant of the river's water balance – contribute to overall model uncertainty due to challenges in accurately measuring soil moisture at the basin scale.

Addressing uncertainties in the Ganges Basin, stemming from climate change and hydrologic model development, calls for an integrative approach. Enhanced climate research through multi-model ensemble is needed for a better understanding of local patterns and future projections, with potential collaborations with international institutions for region-specific models. Developing adaptive water management strategies is crucial to handle climate change uncertainties, preparing for various scenarios, including changes in water flow and increased drought severity.

In addition, improvement of hydrologic models is necessary, focusing on refining the representation of physical processes within the Ganges Basin. Furthermore, it's essential to enhance data collection and utilization across the basin to reduce input data uncertainties. This can be achieved by investing in better monitoring infrastructure and utilizing advanced remote sensing technologies. Special attention should be given to soil moisture monitoring, a critical factor influencing hydrologic models, with the incorporation of technologies like satellite remote sensing for basin-wide data. Encouraging cross-border cooperation and information sharing can lead to more comprehensive understanding and effective management of the river's resources. Lastly, capacity building in regional and local institutions, including personnel training in climate science and hydrologic modeling, is important for research and monitoring. By addressing these uncertainties, it is possible to make more informed decisions aligning with the Ganges Treaty's objectives.

Both countries should commit to conducting and sharing transboundary environmental impact assessments for any major developments or changes in land use in the Ganges Basin. This can help identify potential impacts and uncertainties before they occur, allowing preventive or mitigative actions to be taken.

To address the uncertainties in the Ganges river basin, the Ganges Treaty between Bangladesh and India could be revisited to include provisions for regular data sharing, joint monitoring, and the establishment of a more comprehensive institutional framework for cooperation and coordination. Additionally, incorporating adaptive management principles, considering climate change impacts, and ensuring the maintenance of environmental flows could help create a more robust and sustainable treaty that accounts for the uncertainties affecting the shared river system. This requires the development of robust, transparent, and inclusive decision-making frameworks that incorporate uncertainty analysis, risk assessment, and stakeholder engagement.

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# 15

# THE ROLE OF DISTRUST IN TRANSBOUNDARY WATER RELATIONS

*Ana Elisa Cascão*

**Key Takeaways**

- Transboundary water interactions are usually marked by a long-lasting lack of trust among riparian countries; however, this does not mean that cooperation does not exist.
- Distrust between parties can have a constructive role in international negotiation processes, contrary to the idea that it is always negative and disruptive.
- Examples from major transboundary river basins in the world show how 'distrust' has not prevented states from entering into informal talks or formal negotiations with the riparian neighbours, or even establishing transboundary cooperative mechanisms and/or endorsing legal agreements.
- Trade, economic, and financial incentives have the potential to contribute to overcoming distrust and simultaneously contribute to transboundary collaboration/cooperation.

## Distrust, Conflict, and Cooperation

Trust is a fundamental element in interpersonal interactions – and as trust is by nature relational, it needs to be mutual and nurtured in order to be sustainable. As Schröder (2017, p. 11) notes, "Trust is not something that can simply be demanded or enforced by another" and potential breaches of trustworthiness cannot be ruled out. A similar reasoning can be applied to political relations between state actors (interstate) as well as their interactions with/within the global political and economic system. Whatever definition one adopts, 'trust' cannot be taken for granted and it cannot be built in a day; and even when trust exists, the latent risk of its being undermined at a certain point in time cannot be overlooked (Sztompka, 1997). However, *in this chapter, the central concept is that of 'distrust' and its potential constructive role in international relations, including hydropolitical ones.*

Conceptually, *trust* and *distrust* are distinct – even if related – concepts (Van de Walle and Six, 2014). 'Lack of trust' is the opposite of 'trust'; and 'lack of distrust' is the opposite of 'distrust' (Bertsou, 2019). In international relations (IR), the absence of *trust* does not mean parties are in perpetual conflict whether the conflict is real or (only) perceived. Besides, cooperation at the international level might not even require trust as an entry point (Milders, 2012). In fact, *distrust*


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between parties can have a constructive role in international negotiation processes – contrary to the idea that it is always negative and disruptive.

This chapter analyses what *role distrust plays in transboundary water relations* – be they conflicts about water itself or, what is more often the case, related to enduring mutual distrust on other political, economic, and strategic matters. This distrust usually stems from decades or centuries of deep and historical political grievances and economic competition. Examples from major transboundary river basins show how *'distrust' has not prevented states from entering into informal talks or formal negotiations* with riparian neighbours, or even from establishing transboundary cooperative mechanisms and/or endorsing legal agreements. As an analysis of specific transboundary settings will show, this is not a contradiction in terms. The Nile and Euphrates-Tigris (ET) basins demonstrate how these dynamics have played out over the past decades.

*Distrust* and conflict/peace/cooperation processes in international relations are closely related. The numerous intra-European wars from the 16th century onwards (Schröder, 2017*)*, the Ottoman–Persian wars between the 16th and 18th centuries (Husain, 2021), and the 20th-century US–USSR rivalry (Kydd, 2005) were not just about spheres of political influence. In fact, they are major examples of geo-economic warfare. Even today, distrust informs *regional and global competition* over valuable natural resources and strategic trade routes. The mirroring effect – what guides 'peace and cooperation' processes – is a wide range of *economic incentives* ('carrots and sticks'), such as favourable trade protocols and financial packages, usually lengthily negotiated among the parties.

In short, trust is not necessarily a starting point for international cooperation and peace processes. It is mainly geo-economic ambitions that guide interstate/international relations in tandem with dynamic geopolitical changes. The same reasoning can be applied to transboundary water interactions. Water-related cooperation and negotiations, including economic incentives, can influence or trump issues of distrust at the transboundary level.

The main arguments of this chapter are:

1 Interstate relations in transboundary river basins do not operate in a vacuum and reflect historical and ongoing large-scale political-economic processes at regional and global levels.
2 The transboundary 'water portfolio' is only one of the elements in international negotiations between riparian states. Water may not even be the most strategically important issue, but it can be used as a political card by riparians in other fields of foreign policy.
3 Transboundary water cooperation is intimately connected – both overtly and covertly – with higher level economic, financial, and political transactions.

## To Trust or Not to Trust?

Mainstream literature in the field of transboundary water relations tends to adopt a linear approach to conflict and cooperation whereby trust is regarded as crucial to moving forward towards higher cooperative outcomes, even beyond the river (Sadoff and Grey, 2002). Since the 1990s, the notion of 'water wars'– that is, interstate conflicts over water resources – has given rise to a discourse of 'trust- and confidence building' as precursors for conflict management and resolution (Keskinen et al., 2023). However, transboundary realities on the ground disprove the existence of a linear correlation. Hydropolitical processes are far too dynamic to fit such a model. Trust and distrust are relative rather than absolute and are manifested in processes to varying degrees. More critical scholars consider that transboundary water conflict and water cooperation, in fact, co-exist and that those interactions are impacted by broader and higher level IR – whether interstate, regional,

or global (Zeitoun et al., 2019). This chapter goes further still to argue that (perceptions of) *trust and distrust also co-exist* in transboundary interactions.

Trust and distrust can be complementary in the international arena (Milders, 2012; Schröder, 2017). On the one hand, distrust or only limited trust can lead to political instability and conflict, and it can delegitimise political processes. On the other hand, distrust can serve as leverage for wider engagement between antagonistic parties when both have a pressing interest in decreasing perceptions of uncertainty (such as those related to regional or national alliances) while increasing economic gains.

### *Distrust as a leverage for international cooperation*

The fraught history of Europe as a continent is an example of *longue-durée distrust* among different monarchies, empires, and what later became sovereign nation-states. This culminated in two world wars in the 20th century. Despite deep distrust, a desire to prevent future violence saw European countries embark on a long journey to *build and institutionalise regional cooperation* (economic, social) and *even pursue integration* (political and foreign policy). In particular, *geo-economic dimensions* played a pivotal role in bringing countries together to 'operationalise' cooperation (trade, markets, currency, and taxation) in major economic sectors despite enduring political distrust. Accordingly, the European Union project is an example of 'institutionalising distrust for the sake of trust' (Sztompka, 1997).

The Cold War period (1947–1991) illustrates how *distrust* steered global political and economic relations. Although *geopolitical and geo-economic warfare* was mainly between the two superpowers – the United States and the Soviet Union – it spilled over and had repercussions for international organisations, multilateral negotiations, and treaties. Despite high levels of mutual distrust between the United States and the USSR, it did not prevent the two powers from *'cooperating' in order to curb massive conflict escalation*. As such, both sides agreed to restrain and deter the use of nuclear power as a strategic weapon – doing so *through legal and institutional arrangements aimed at establishing deterrence.*

Historical examples show that distrust is a common element in international relations and is at the core of major conflicts and wars. However, it has not prevented the negotiation of legal and institutional mechanisms between adversaries. Given its prevalence, "it is puzzling why political distrust has been such an under-theorised and neglected concept" (Bertsou 2019, p. 213). In the following sections we will explore why the *role of distrust should not be ignored or neglected*.

### *Why Does This Matter for Transboundary Water Processes?*

Major rivers around the world are located in geopolitical and geo-economic hotspots characterised by long-term tensions and conflict – ranging from trade, religion, culture and enduring historical perceptions of enmity, to occupation, border disputes, and economic competition. The Nile and ET are among the most geostrategic regions worldwide. Its waters are vital for the riparian countries themselves and the wider regions in which they are situated in terms of sustaining socio-economic development, social cohesion, and cultural structures. The development of the rivers has also been crucial in the building of hydraulic societies (e.g., Mesopotamia) and state-building (e.g., modern Egypt). Of particular significance to this chapter are the symbolic political dimensions that these rivers have had – and continue to have – in the wider conflict-ridden geopolitical relations.

The conflicts in the Nile and ET regions are not only – or even mainly – about water. Rather, historical enmities continue to reinforce conflict dynamics on the ground and perceptions of collective

distrust. Pervasive distrust has prompted countries to politicise and securitise water issues and link them with other overtly (and sometimes covertly) strategic political agendas (Zeitoun et al., 2019). In most cases, water has been mainly used as a diplomatic-cum-security political card in over-complex regional and global diplomatic settings (Cascão et al., 2018).

In a situation where at the highest interstate levels *distrust is actually the norm and not the exception*, it is difficult to imagine neighbouring riparian countries cooperating specifically over water based on trust and 'trust building' exercises alone. The suggestion in this chapter is that, as in the European and US–USSR examples, the riparian states of these river basins *assume the existence of generalised political distrust as the baseline* for transboundary water interactions, negotiations, and cooperation processes. Distrust may persist even in a scenario of transboundary cooperation.

It is argued here that *distrust can, in fact, play a role* in bringing riparian actors together and can even lead to the establishment of joint transboundary arrangements. This was the case when, in the late 1990s, all Nile riparian states (including Egypt) embarked on two parallel tracks of negotiations – technical (the Nile Basin Initiative) and legal (Cooperative Framework Agreement). The potentially enabling role of distrust does not occur in a political vacuum and is intimately linked to changing geopolitical and geo-economic factors, as explored later in this chapter. In the 1990s, political dynamics in the Middle East and North Africa, as well as the Horn of Africa region, were in flux. Mitigating a possible conflict between Egypt and upstream neighbours was crucial for Western countries for a number of geopolitical reasons.

## Distrust Embedded in Transboundary Water 'Cooperation'

Besides being a natural resource, water is also a political and strategic resource. It invokes perceptions of competition, risk, dispute, and even open conflict among communities. When international borders cross water resources, perceptions of distrust are then amplified. By force of the cross-border nature of rivers, interdependence among riparian states is incontestable and unavoidable (Selby, 2013). Some level of cooperation might exist, but this does not mean cooperation is (always) good. Indeed, "water cooperation is never politically neutral and not always benign" (Selby 2013, p. 1). Examples from the Nile basin show how transboundary cooperation is immersed within a context of highly politically charged interstate relations and interlinked regional security complexes (Cascão, Tawfik, and Zeitoun, 2018).

### *Nile Basin: Geopolitical Water Agreements*

In the hydropolitical setting of the Nile Basin, Egypt is the largest user of the total Nile flows. This causes it to be distrustful of its neighbours where any upstream development is perceived as a potential risk or threat. Distrust is bidirectional and a self-reinforcing process. In theory, by taking advantage of their hydrological and geographical position, upstream countries can decide not to cooperate; by contrast, Egypt's vulnerability means it cannot afford not to negotiate or not cooperate with its neighbours. This is particularly the case with large-scale projects such as the Grand Ethiopian Renaissance Dam (GERD) (Nicol and Cascão, 2011). Therefore, Egypt strives to maintain and achieve advantageous binding water agreements, such as the bilateral agreement with Sudan (1959) and a desired trilateral agreement with Sudan and Ethiopia, which is subject to ongoing negotiations.

Egypt's concerns over the potential future water users of Sudan led the two countries to a five-year-long negotiation process that culminated in the bilateral 1959 Agreement for the Full

Utilization of the Nile waters, including the establishment of specific volumetric water allocations to both countries (Agreement 1959). Distrust between Egypt and the would-be independent Sudan guided the codification of every single article and clause of the document, which constituted a very sophisticated 'cooperative' language for that time. They subsequently also established a bilateral water Joint Committee that continues to meet regularly to ensure the implementation of the agreement, particularly water withdrawals. Therefore, Egypt has achieved its goal of containing Sudan's water utilisation. In exchange, Egypt has become Sudan's major economic partner and, above all, a supporter of the various Sudanese regimes over the past decades. Ultimately, the 1959 Agreement is an example of 'institutionalised distrust' over shared waters between two countries – and one that has furthermore survived regularly changing political alignments and rivalries between both states.

Even more antagonistic is the centuries-old distrust between Egypt and Ethiopia. This has not prevented the countries from consulting and negotiating over the GERD. Since the mega-project was announced in April 2011, there have been hundreds of technical, legal, and political meetings (Yihdego, Rieu-Clarke and Cascão, 2017). In 2015, for the first time in the Nile's history, a trilateral legal agreement called the GERD Declaration of Principles was signed and adopted by the heads of state of Egypt, Ethiopia, and Sudan. Even if the agreement is mainly a declaration of intentions, the fact that it was signed by the countries' heads of state and supported by their intelligence chiefs can be regarded as a peculiar example of 'institutional distrust' (Cascão, 2021).

While, as of 2025, a final GERD agreement is not yet in place, the last decade has been marked by persistent trilateral and externally supported cooperative attempts to find an agreement – which in itself is a positive outcome. The same can be said about the 20 years of multilateral cooperation under the Nile Basin Initiative, established in 1999 by all the Nile riparians (although Egypt is not an active member since 2011). While this has fallen short of initial ambitions, countries have largely continued to engage at a transboundary multilateral level. In summary, *deep distrust has not been an obstacle but rather has prompted the Nile riparian states to collaborate and/or cooperate at different levels*, which, in some cases, has led to the establishment of legal and institutional frameworks.

From the 1950s to the present day, cooperation in the Nile has been dominated by deep asymmetric power relations between Egypt and other Nile countries. Egypt has the upper hand in hydropolitical relations, benefiting from (1) its geographical location between Africa and the Middle East as well as between the Red and Mediterranean Seas; (2) years of diplomatic experience in fraught international negotiations (e.g., the peace treaty with Israel during the 1970s); (3) political-security ties with the US and the financial benefits that accrued; (4) extensive linkages with global economic powers (e.g., through trade in the Suez Canal); and (5) influence and bargaining power within international organisations. These factors have enabled Egypt to maintain its hegemonic position in the Nile Basin.

## The Geo-economic Drivers of International Cooperation

*Political competition and distrust usually come in tandem*, and beyond the legalities of international agreements, there is always 'financial capital' – trade/economic cooperation and financial packages – that can lead countries to engage and collaborate. The previous sections mentioned how *economic incentives play(ed) a role in international negotiations, agreements, and the establishment of multilateral organisations*. The EU started with the 1951 European Coal and Steel Community, and as the name indicates, it had two precious mineral resources as the basis for intra-European cooperation. The *economic incentives outweighed political distrust* that was by then at

its highest levels. The several conflicts between the US and USSR during the Cold War period were as much about ideologies, political agendas, and security concerns as they were about global *geo-economic spheres of influence*. Agreements between the two superpowers were endorsed at different periods of time, with the objective of striking an economic balance of power, namely, through the trade of strategic resources such as oil, gas, uranium, and other precious minerals, in addition to trade routes and global market expansion.

Despite – and because of –distrust, the US and Soviet Union have not only radically changed their own political economies but, by extension, the global economic architecture. *Why does this matter for transboundary water interactions and dynamics?* Examples from the Nile Basin and the ET Basin are used next to explore how transboundary cooperation can emerge in the presence of economic incentives that have the potential to outweigh distrust among parties.

### *Washington Nile Negotiations: Drop per Dollar*

Despite the vital social, cultural, and economic importance of water resources, water is not considered a strategic resource to the extent of justifying large international negotiation processes. Yet, it is strategic enough to be included in the packages of negotiations between countries. In some regions, such as the Middle East, water is considered and treated as a strategic component in foreign policy and its respective economic, political, and security arms. Egypt is a prominent example of water securitisation: the Nile is present in all aspects of its economic and political relations with other neighbouring riparian countries. As such, Egypt has strong bilateral relations with Uganda, Kenya, and Sudan – the Nile riparians with the largest irrigation potential and, therefore, the actual threat to Egypt's current Nile water utilisation (Cascão and Nicol, 2016). But the Nile is also a political card for Egypt, which it constantly deploys in its political relations at the highest international political level with the US, UN, EU countries, Arab neighbours, and African Union, as well as relevant international actors such as China or Russia (Cascão, Tawfik and Zeitoun, 2018; Tawfik, 2019, 2023). Indeed, the 'Nile portfolio' is part of every international diplomatic process that Egypt is involved in.

Focus on the Nile reached its apex during the GERD's Washington negotiation process and its aftermath (2019–2021). High-level Egyptian diplomats frenetically embarked on unprecedented globetrotting diplomacy in order to achieve a legally binding agreement for the GERD filling and long-term operations. US President Donald Trump himself 'opened' the negotiations. Later, the issue of the GERD was even brought to the UN Security Council (UNSC), to the surprise of many diplomats within the UN. Extensive political and discursive accounts on the 'evolution' and details of the Washington and UNSC processes highlight how relentless the negotiations have been (Helal, 2020; Geneva Water Hub, 2022). Despite all the efforts, no agreement was reached. As a consequence, *levels of interstate as well as public distrust have skyrocketed*. Non-state actors – ranging from institutions and universities to influencers and ordinary citizens – have been actively involved in disseminating fear and anger in the media as well as on social media. Populist campaigns and relentless mutual accusations of unfair negotiations have, therefore, negatively influenced the GERD diplomacy processes (Seide and Fantini, 2023).

In spite of this, partially contributing to the highly accelerated negotiations between Egypt, Ethiopia, and Sudan was the presence of economic and political incentives promised by third parties vis-à-vis an agreement over the GERD. Egypt would get a GERD agreement favourable to its current and future utilisation of the Nile, assuming the minimum water releases agreed upon would pre-empt Ethiopia's future uses of the Blue Nile, and particularly if water withdrawals for irrigation development are included. On the other hand, in parallel to the GERD negotiations,

Sudan and Ethiopia were deeply involved in concomitant negotiations with the Trump administration on more strategic issues. Accordingly, in exchange for an agreement over the GERD, Ethiopia and Sudan would get much-needed debt relief, substantial financial packages and loans, support for economic liberalisation and privatisation, and foreign exchange advantages, among others (Cascão, 2021).

While all eyes were on the high-level GERD negotiations, in parallel, *several political-cum-financial negotiations* were ongoing between the three Nile countries and the powerful external actors mediating the negotiations. This perhaps explains the important involvement of the U.S. Department of Treasury and the World Bank (and implicitly the International Monetary Fund) during the process. Financial incentives to reach a GERD agreement were made available and often used as a 'carrot and stick.' A startling result was the lifting of 20 years of economic and political sanctions on Sudan, leading to access to international financial credit and IMF packages. Pledges made included the forgiveness of most of Sudan's 50 billion dollars of total debt as of the end of 2019 (IMF, 2021). At the same time, the US has provided political support to the post-revolution government of Sudan. The provision of support was also connected to Sudan's political normalisation of relations with Israel as part of the Trump administration's Abraham Accords, whose text was finalised in October 2020 (The New York Times, 2020) after long negotiations, including around the GERD Washington negotiations.

Large-scale financial support was also provided to Ethiopia to catalyse political and economic reforms in favour of a liberalisation of the economy and markets. IMF support packages were part of this. For example, in December 2019, at the same time as the GERD negotiations in Washington, the IMF approved around 3 billion USD for Ethiopia through Extended Credit Facility and Extended Fund Facility to support Ethiopia's so-called 3-year Homegrown Economic Reform Program (IMF, 2019). US official political support for the new Ethiopian regime in power since 2018 has been very prominent. This changed in 2020, however, due to a combination of internal factors (power struggles) and external factors, including the perception of the US not being supportive of Ethiopia in the negotiations.

Egypt was also affected by the financial implications of GERD. Egypt participated in parallel negotiations related to the controversial Trump-Kushner New Plan for the Middle East/Abraham Accords soon to be endorsed by Arab countries. The Plan was publicly announced on 28 January 2020 (The Guardian, 2020), which coincided with an intense period in the GERD negotiations when a final agreement was expected to be reached exactly by 28–29 January, according to a Joint Statement of Egypt, Ethiopia, Sudan, the United States, and the World Bank (US Department of Treasury, 2020). Egypt wanted an agreement over the GERD, but also the benefits of Trump's plan called 'Peace to Prosperity. A New Vision for the Palestinian People and the Broader Middle East'. Of the $50 billion in the plan, $9 billion was earmarked for Egypt. Egypt would also benefit from the billions of dollars already received in economic and military assistance from both the US and the Gulf (Mason, 2019). The headline 'Trump to Open Middle East Peace Drive with Economic Incentives' (The New York Times, 2019) sums up the role of financial carrots as a bargaining tool in complex negotiations.

Despite all the ongoing parallel financial negotiations with the three Nile countries, no agreement on the GERD was reached. Rather, the Washington process seemed to dramatically increase levels of distrust towards third parties *in particular, in spite of the financial incentives* proffered. A clear example was a marked rise in anti-American rhetoric among Ethiopian officials and the general public, who accused the US of clearly backing Egypt's interests. As of writing in early 2024, the scenario is one of total bankruptcy (socio-economic, political, and financial) in all three countries – Egypt, Ethiopia, and Sudan. Budget support, investment, and foreign currency are scarcer than

water, and the three countries are 'hostage' to the main investors, namely, the Gulf countries; the three are even competing for the same investment. While the Gulf countries, together with China and Türkiye, have already been major trade partners over the past two decades, the United Arab Emirates, in particular, has more recently also played a discreet role in the GERD negotiation process (Sudan Tribune, 2022). A possible future scenario is that the issue-linkage between the GERD and financial incentives will be stronger in this case than it was during the Washington process. One can only speculate, but a GERD agreement could conceivably be reached as part of a regional geo-economic pax between the two sides of the Red Sea.

### *The Euphrates-Tigris Frontiers: Rivers and Trade*

In the Nile, the balance of power clearly tends to be on the Egyptian side because of its unique geopolitical position and because its economy is by far the most developed economy in the Nile region. However, in the ET region basin, all four riparians are endowed with precious natural resources, but there is no balance of economic power. Iran and Iraq are among the five largest potential gas and oil producers in the world, but since the 1970s, the exploitation and export of these resources have been severely restrained, namely through successive economic and political sanctions. The ET Basin is further situated at the nexus of some of the most important world trade corridors extending from Asia to Europe. Türkiye's position is particularly significant. In hydropolitical terms, Türkiye is also undoubtedly the regional power that benefits most from ET water resources due to its geographical (being upstream), economic (strategy and stability), and military alliances/advantages (Daoudy, 2010), despite Iraq and Iran's large potential economic power.

In the ET region, *historical political grievances and distrust intersect* with issues of identity, ethnicity, religion, and borders, among others. For centuries, multiple civilisations and empires fought along the banks of the Euphrates-Tigris for political and economic expansion and control. Mesopotamia was one of the world's first hydraulic civilisations, whose social and economic prosperity was directly linked to the exploitation of water. Later, the Ottoman Empire's expansion to the Eastern Frontier (16–18th centuries) was marked by the large-scale development of infrastructures all along the banks of the rivers until the Persian Gulf (Husain, 2021).

Türkiye's 20th century 'hydraulic mission' marked the beginning of modern Türkiye's strategy for national economic development, wherein large-scale hydropower and irrigation development – in particular in the Southern Anatolia region – were essential pillars of that strategy (Bilgen, 2019). To the present day, mutual distrust continues to be connected to long-lasting cultural, identity, *and territorial disputes* with direct implications for hydropolitical relations between Türkiye and its neighbours, including a major example of linkages between the development of the huge GAP irrigation project in the Euphrates upstream catchments and high security across borders in Syria and Iraq. Indeed, whether overtly or covertly, cross-border security issues have always been in the background of the diplomatic – including hydropolitical – relations between the three countries.

All in all, despite the piecemeal agreements between Türkiye and Syria, Syria and Iraq, and to an extent Iraq and Iran, hydropolitical relations have been marked by conflicts between the upstream countries' (Türkiye and Iran) right to develop and downstream countries' (Syria and Iraq) concerns over how development upstream curtails their own hydraulic plans and impacts water availability for essential economic sectors such as irrigated agriculture (Daoudy, 2008; 2010). *Distrust is the norm in hydropolitical interactions* among ET riparian countries. There is no multilateral cooperation agreement or even platform for discussion. Recent wars in Syria and Iraq have furthermore weakened their bargaining position vis-à-vis Türkiye in any potential water negotiations.

How *can trade, economic, and financial incentives contribute to overcoming distrust* and simultaneously contribute to transboundary collaboration, such as in the Nile case? In the ET region, it is difficult to envision a multilateral process among the four riparians for several reasons. Because of the outbreak of civil war in Syria in 2011 and severed diplomatic relations with Türkiye, no water-related talks have taken place. Meanwhile, animosity between the political leaders of Iran and Iraq hampers bilateral relations in multiple fields, including management of the contentious Shatt al-Arab waters. In the future, it is likely that transboundary relations in the ET will continue to be more bilateral than multilateral, as in the case of Türkiye–Iraq.

As of the writing of this text in early 2024, there were signs that economic and trade *incentives could conceivably play a role as 'leverage' for transboundary bilateral cooperation* between Türkiye and Iraq. The past decade has observed an increasing economic and political rapprochement between the two countries, with Türkiye becoming a major investment and trade partner of Iraq. Official visits between the two countries are regular and cover a range of bilateral and regional issues. In parallel, hydropolitical relations have apparently improved, judging by the cooperative tone in bilateral diplomatic meetings and speeches. As in the case of the Nile, the presence of financial incentives can arguably contribute to transboundary rapprochement. One of the major areas in which Iraq and Türkiye are trade partners is oil exports and imports, with Türkiye taking geographical advantage of its 'corridor' to import oil via extensive pipelines from northern Iraqi oilfields.

At the same time, Iraq generates revenues from its northern oil fields, which provides it with a certain degree of bargaining power vis-à-vis Türkiye. In regular high-level official meetings, the issues of oil exports, cross-border security issues, as well as water are usually discussed together, and in 2023, there was frenetic diplomacy to address these three top priorities, and in particular, to resume the oil trade, which had been halted in March 2023 (Al-Nidawi, 2023). If oil is the main priority of Türkiye, for Iraq, another key priority in bilateral relations is the water flows in the Euphrates and Tigris: it suffers from severe water scarcity-related problems and considers Türkiye partially to blame.

On the hydropolitical front, there has been some progress in dialogue in recent years. This has mainly been in the realm of technical cooperation, far from the transboundary arrangements that Iraq would like to achieve. In 2019, the two countries agreed on a 'Memorandum of Understanding in the field of Water', which shows *signs that long-lasting distrust was being addressed through dialogue*. Critical voices, however, consider the MoU not to be an example of cooperation but rather one of containing Iraq's water rights and future uses (Save the Tigris, 2019), which *in turn can increase perceptions of distrust*. Nevertheless, official meetings between officials from ministries of water and foreign affairs continue to take place, with expressions of commitment to technical cooperation, namely in public high-level events such as the Baghdad International Water Conferences (yearly since 2021). Türkiye has shown signs of goodwill towards Iraq, namely, by delaying the filling of the new Ilsu Dam in the Tigris upstream and, in 2023, allowing more water releases from the dam (The National News, 2023). The high-level meeting in mid-2023 once again referred to elevating expressions of understanding to more tangible water cooperation – arguably reaching an agreement and establishing a joint committee, at least at a technical level (Al-Nidawi, 2023). However, these do not appear likely to be achieved in the short term. Notwithstanding, the ET case shows that trade and financial incentives, as in the Nile, have played a role in *bringing countries to the negotiation table despite persistent political distrust*. These have covered different priority issues, including water, under the umbrella of bilateral economic cooperation.

## Can Distrust Have a Constructive Role in Transboundary Water Relations?

This chapter has explored *how distrust is a central element of international relations and its dynamics*, for example, by leveraging collective norms and frameworks to 'institutionalise distrust' while promoting interstate economic and political cooperation. As the two cases in this chapter demonstrate, *distrust can also potentially have a constructive role in promoting cooperation* in transboundary water relations.

As in other IR fields, *distrust and trust co-exist in transboundary water relations.* Historically strained relations and the complexities of contemporary political dynamics dictate how riparian countries relate to each other, and how *disputes and conflict might persist because of distrust*. At the same time, this *distrust can play a significant role in bringing the countries together,* whereby some degree of collaboration becomes necessary. The numerous meetings, memoranda, agreements, and even committees established in the Nile and ET basins occurred in the presence of distrust – with *distrust even being a source of leverage to reach some level of technical cooperation*. As in other domains of IR, transboundary relations are influenced by the trajectory of economic relations at bilateral, regional, and global levels. A major argument of this chapter is that expanding incentives in other economic/political fields has the potential to bring countries closer in transboundary water negotiations and arrangements.

### *Take 1: Distrust Has the Potential to be Leveraged in Transboundary Processes, as It Impels Riparians to Meet and Negotiate over Water*

Persistent distrust has characterised political and hydropolitical relations in the Nile and ET basins. This is reflected in water disputes over past agreements, lack of agreements, large-scale projects, water allocations, and failed attempts at cooperation. In all three basins, increasing *water politicisation and securitisation processes have exponentially increased levels of distrust*. However, this same distrust has also led the countries to meet regularly and find potential solutions to hydropolitical dilemmas. For example, at the beginning of the 1990s, Egypt's distrust stemming from acute fears of upstream developments led it to fully engage in the multilateral cooperation process under the Nile Basin Initiative. This was also the case in the GERD negotiations, where levels of distrust amidst the construction of the mega-dam were even higher. More recently, the distrust between Iraq and Türkiye related to the construction and operation of the Ilısu Dam in the Tigris River increased the fear of conflict escalation. This added urgency to bilateral negotiations that necessitated finding a partial 'agreement' over water releases.

### *Take 2: Existing Water Agreements Were Reached and Institutionalised under Conditions of Distrust*

Can distrust have a constructive role in transboundary water agreements? The case of the Nile demonstrates how this can be the case, as the existing water agreements were negotiated and signed under high levels of distrust. The famous 1959 Nile Water Agreement was not negotiated in a political vacuum, but amidst the backdrop of Sudan's independence, and there was significant distrust of Egypt as a former colonial power. As the Nile is a top priority for Egypt, it has strived in *negotiations to institutionalise distrust* between the two main Nile riparians in a way that clearly defines its water allocations and rules out future upstream projects. The 1959 Agreement still guides cooperation between Egypt and Sudan. In so doing, distrust and trust have co-existed, and no major water-related conflicts have arisen.

### *Take 3: Economic and Financial Incentives Can be an Effective Approach to Overcome Distrust and Incentivise Transboundary Water Cooperation*

Can distrust in transboundary water relations be outweighed by economic and financial incentives? Examples from recent diplomatic relations and negotiations in the Nile and ET regions demonstrate the *transactional nature of transboundary cooperation* through the provision of attractive financial packages and/or enhancing bilateral economic ties. In the case of the Nile, during the controversial negotiations in Washington (2019–2020), financial incentives offered by external mediators to Ethiopia, Sudan, and Egypt almost led to an agreement over the GERD. While the agreement was not signed, the process revealed how financial transactions inform Nile hydropolitics – before, now, and in the future.

In the case of the ET, talks on bilateral water cooperation between Türkiye and Iraq have taken place in tandem with growing economic ties – albeit not at the same pace. Investment and trade have grown exponentially in recent years, but in hydropolitical terms, the two countries are still at the stage of discussing the establishment of a possible joint committee, which falls well behind Iraq's ambition to address its multiple water problems. However, whatever the actual level or shape of cooperation, *financial incentives have undoubtedly contributed to improving hydropolitical relations* between Türkiye and Iraq. However, in the absence of more formally legal and institutional transboundary arrangements, distrust is not institutionalised, and, therefore, cooperation remains on a vulnerable footing.

In conclusion, further research is needed on the role of economic and financial incentives and trade-offs in the diplomatic and political relations between riparian countries, especially those experiencing rapid changes in their political economies and economic ties with influential external actors. Transboundary negotiation processes cannot be understood outside the broader context of rapidly shifting geo-economic and geopolitical dynamics. Further research is necessary to show how financial agreements can contribute to addressing distrust by increasing economic interdependence, thus potentially creating an enabling environment for cooperation arrangements over regional water issues.

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# 16

# CREATING AND DISTRIBUTING BENEFITS IN WATER DIPLOMACY

*Ram Aviram, Clive Lipchin, Adina Halevi, and Austin Corona*

**Key takeaways**

- Stakeholders obtain "benefits" in the context of negotiations over shared water resources when agreements allow them to fulfill their currently existing interests.
- In a water negotiation, each stakeholder's interests define the benefits they will pursue, and it is, therefore, critical to recognize the various kinds of benefits water brings and how they can satisfy diverse interests, both tangible and nontangible.
- Participants must overcome a zero-sum approach during water negotiations to identify and share benefits that enable a maximally advantageous outcome for all; to do so, they will need techniques like positive entanglement.
- For successful negotiations, it is important to accurately identify and equitably distribute benefits by understanding each party's interests rather than positions and moving from "rights," "ownership," and fixed quantities to "needs" that can be satisfied in various ways.

## Introduction: The importance of benefits in the negotiation process

In every negotiation over a shared water resource, participants seek to maximize the benefits they will receive. It is crucial to create value within water-related negotiations that exceeds what each party could gain through unilateral action or lack of cooperation. Creating such value involves identifying, creating, distributing, and redistributing benefits from an agreement, whether they are directly or indirectly connected to the shared water resource. This process can not only increase the likelihood of reaching an agreement, but also ensure that shared water resources will be used in a stable, sustainable, and efficient way.

## Understanding benefits

### *Benefits and interests*

Stakeholders obtain benefits in the context of negotiations over shared water resources when the agreements reached allow them to fulfill their currently existing interests. The array of available

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benefits, therefore, reflects the diversity in the stakeholders' interests; interests can be political (international strategic positioning or internal political competition), economic (additional irrigation water or a new source of energy), social (supporting marginalized communities or preserving a perceived sacred water source), environmental (protecting endangered fish species or wetland habitats), or, as in most cases, a combination of all four.

In this sense, a single water resource or piece of water infrastructure can impact different kinds of interests for different stakeholders. For instance, as Ethiopia and Egypt continue diplomatic parrying over the construction of the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile, the two countries' interests reflect a mix of economic and sociopolitical concerns. While Ethiopia's primary interests in building the dam are economic, Egypt's interests go beyond economic development to include more strictly political concerns, chiefly its geostrategic hegemony in the Nile River Basin. Therefore, the main challenge of negotiations over the GERD is to provide Ethiopia with the economic benefits of the GERD (primarily energy production) while also safeguarding Egypt's economic and political benefits (maintenance of Egypt's water-related economic development and its regional political strength).

Another example is the 2009 negotiations between Brazil and Paraguay over power generated by the Itaipu Dam, which is located on the Paraná River between the two countries. As with Egypt and Ethiopia, the interests behind Paraguay's and Brazil's completion of a new pricing agreement for the dam's electricity likewise pushed them to pursue two different kinds of benefits (economic and political) from the same process. The two countries' differing interests are evident in statements made by their leaders and officials: Brazil's President Luiz Inácio Lula da Silva focused on political benefits that Brazil could gain by advancing Paraguay's economic situation, saying "it is not convenient for Brazil to have a poor and weak neighbor," whereas Paraguay's Itaipu Paraguay Director Carlos Mateo focused more narrowly on Paraguay's economic development, saying, "the opening of the power markets is the key for the development of Paraguay" (BBC 2009). As such, while the results of the deal were most obviously economic, each stakeholder received a different kind of benefit, with Paraguay receiving economic benefits and Brazil receiving political ones. These benefits demonstrate how each country brought differing interests to the same negotiation process.

Stakeholders must balance an array of diverse and sometimes competing interests in order to achieve the best outcome in a negotiation. In addition, while this chapter will focus almost exclusively on benefits, stakeholders may have a similarly complex range of concerns when distributing the management of burdens (financial costs, cuts in water use, etc.). Many of the same tools recommended in this chapter for the distribution of benefits also apply to the distribution of burdens resulting from multilateral water management.

### *Direct versus indirect benefits*

In a water negotiation, each stakeholder's interests define the benefits they will pursue, and it is therefore critical to recognize the various kinds of benefits water brings and how they can satisfy diverse interests. In every process of water diplomacy, stakeholders consider benefits that are both directly and indirectly related to a shared water resource.

Direct benefits are those that are directly related to the water itself. Such benefits include increases in water quantity and in products that require water as an input, such as crops and hydroelectricity. Indirect benefits are those that water and/or water negotiations can bring about, but for which water is not a critical element in all cases. Such benefits include social calm, political stability, economic development, and security. It is important to keep in mind that a benefit being

direct or indirect does not mean it is more or less present in a stakeholder's mind. For example, in the aforementioned agreement between Paraguay and Brazil, Brazil saw the indirect benefit of enhancing its regional stability and prosperity as more important than any direct financial benefits it could have received from the Itaipu Dam's power production.

### *Tangible versus intangible benefits*

While not always the case, direct benefits are usually tangible, while indirect benefits are often intangible. While tangible benefits such as increased irrigation or energy production can typically be quantified, intangible benefits include more abstract phenomena, such as boosts in cultural enrichment, geostrategic positioning, and political clout. Evaluating both kinds of benefits allows partners to pursue comprehensive agreements that accommodate sociopolitical interests rather than focusing exclusively on economic ones.

An interesting case in exploring tangible versus intangible benefits is Israel's and Jordan's recently signed memorandum of understanding, which involves direct, indirect, tangible, and intangible benefits. In this prospective deal, Israel would provide Jordan with Israeli desalinated water in exchange for Jordanian solar energy. Looking forward, both countries see direct benefits from this deal. Israel sees a small financial benefit from selling its water, and Jordan sees obvious direct and tangible benefits from receiving Israeli water, notably increased supplies for irrigation and drinking. These benefits are direct and tangible.

At the same time, Israel and Jordan also see several indirect benefits, some of which are tangible and some of which are not. Considering Israel's comparatively limited land area and Jordan's comparatively limited coastline, both countries can conserve their valuable resources by importing, rather than producing, solar energy and desalinated water. Moreover, Jordan can avoid expensive investments in desalination technology by relying on Israel's already existing desalination infrastructure. These are indirect and tangible benefits. Meanwhile, both countries also see intangible and indirect benefits in this deal, which include increased security (water scarcity could mean social unrest in Jordan if not addressed) (Garthwaite 2021), and heightened political reputations for cooperation and climate awareness. Moreover, agreements over water and power can help both countries strengthen their relations without directly addressing the openly controversial political issues that continue to strain their relationship (Tables 16.1 and 16.2).

This example illustrates how direct and indirect benefits, whether tangible or intangible, can arise from the same shared resources and agreements. In many cases, some of the most indirect and intangible benefits may be the most salient to stakeholders, and it's critical to identify and understand them during a negotiation process.

*Table 16.1* Classifying types of benefits: Israel

| *Direct & tangible* | *Indirect & tangible* | *Indirect & intangible* |
|---|---|---|
| Financial compensation for shared water | Conservation of comparatively limited land resources by relying on Jordanian solar fields | Increased stability on the eastern border due to greater water security and heightened political reputation for cooperation and climate awareness |

*Table 16.2* Classifying types of benefits: Jordan

| *Direct & tangible* | *Indirect & tangible* | *Indirect & intangible* |
|---|---|---|
| Increased water for drinking and irrigation | Avoidance of costly investments in desalination and conservation of comparatively limited shoreline through reliance on Israeli desalination | Increased stability due to greater water security and a heightened political reputation for cooperation and climate awareness |

## *The role of technology*

It is worth noting that technology, which constitutes an important kind of tangible benefit in itself, plays a major role in the negotiations process over shared water resources, particularly in creating and distributing benefits. There are a few categories of water-related technologies that are of particular importance.

### *Agro-tech*

Since agriculture is the main consumer of freshwater in the world,[1] technologies that reduce water use in agriculture while increasing (or at least maintaining) productivity are of major importance. Reducing freshwater use may be done by installing sophisticated irrigation systems, adapting crops to marginal water, or increasing the use of treated wastewater. Using these technologies creates the benefits of dramatically reducing stress on freshwater resources while increasing farmers' profits through enlarged yields. Exchanging technological knowledge also creates an opportunity for increased cooperation between riparians.

### *Information technologies*

Information technologies such as big data analytics, artificial intelligence, and remote sensing may also be used for surveying water resources and managing water use in agriculture. All of these technologies can be part of negotiations between parties, particularly when parties seek to quantify or better understand the water resources they share. In this sense, these technologies can be useful in identifying water-related benefits that might have otherwise gone unnoticed.

### *Water treatment and desalination technologies*

Water treatment technologies can be a meaningful element in enlarging the list of the available water sources between stakeholders. Moreover, technologies related to seawater desalination are game changers in the process of creating value (Aviram et al., 2014). Seawater desalination bears significant benefits for international water cooperation. First, seawater has an almost unlimited supply, meaning a reduction in quantity-induced stresses. Second, desalination technologies reduce (climate-related) uncertainties that impact other freshwater sources. Third, the geographic implications of desalination technology can reduce tensions over water resources by reducing asymmetries between upstream and downstream riparians. Lastly, desalination technology has significant legal implications – the producers of desalinated water will own the water they treat, thereby releasing national governments from "ownership" limitations induced by national or popular ownership over water resources.

## The challenges of creating and distributing benefits in the negotiation process

Distributing tangible and intangible benefits involves distinct challenges depending on the nature of the benefit itself. For instance, some benefits bear physical limitations, such as available quantities of water, engineering limitations for electricity generation, or the accessibility of the water resource itself. At the same time, intangible benefits may bear social or political limitations, such as the social significance of traditional irrigation methods or deeply rooted religious practices regarding water uses. Some common kinds of challenges are zero-sum thinking, entanglement, and timing.

### *Zero-sum thinking*

One significant challenge to successful benefit sharing is the prevalence of zero-sum thinking. In a zero-sum approach to negotiations, every gain made by one participant represents a loss for others. This explicit focus on gains and losses most often occurs in disputes over tangible benefits, whose physical and/or quantifiable limitations make their scarcity more easily perceptible. Regarding water quantity, this kind of thinking pushes stakeholders into the view that water itself is the only benefit to be distributed between participants, thereby ignoring the various benefits created by water. Ultimately, losses in water quantity can therefore induce dramatic fears over national survival and lead to the securitization of water issues, pushing riparians into more conflict-prone positions (Daoudy 2010). It is therefore unsurprising that almost 90% of water-related conflicts have occurred in specific connection to water quantity or infrastructure (Wolf et al. 2003).

Returning to the GERD case, if Egypt considers the dam primarily as a threat to its water supply, it might lose the opportunity to consider potential benefits that the project could deliver, including additional power (cheaper electricity), improved economic growth, and enhanced regional stability. An ideal agreement in this situation would provide benefits to all parties, rather than creating win–lose dynamics between them. As such, if participants take a zero-sum approach during water negotiations, they are likely to fail in identifying and sharing benefits that enable maximally advantageous outcomes for all.

### *Entanglement*

Even when there are demonstrable and significant benefits to cooperation, management of water resources is often entangled in existing social, cultural, and political circumstances. In each case, issues far beyond the simple allocation and economic use of water alter the way each participant may view its goals in a negotiation process.

#### *Spiritual and cultural entanglement*

A particularly sensitive form of entanglement comes with water resources that have spiritual value. Worldwide, holy rivers and lakes make spiritual impressions, and communities can build entire cultures and lifestyles centered around wetlands or other aquatic ecosystems. A good example of this is the Ganges River in India, which holds spiritual significance for millions. The purification of its waters has been at the center of multiple conflicts due to the waters' spiritual importance. Additionally, water and water infrastructure can acquire deep cultural importance for groups and countries who see them as symbols of economic development and progress. Any actions that negatively affect a participant's deep cultural or spiritual narratives around water can reduce a participant's willingness toward cooperation.

### *Hostility*

Furthermore, any actions regarding water that require interaction between belligerent or hostile participants can quickly fail if the water-related matter becomes a stand-in for broader issues of contention between the participants. For instance, broad cooperation between the Israeli government and Hamas over water shortages in the Gaza Strip (governed by Hamas) is almost impossible to conceive under current political circumstances. This cooperation is highly unlikely not because there are not mutual "benefits" to be had, but because the two parties view one another as inherently illegitimate entities and, generally speaking, Israelis and Gazans view almost any cooperation between their leaderships as a form of enablement or capitulation toward a violent enemy.

### *Internal misalignment and disagreement*

In less dramatic cases, participants may find that cooperation is suitably advantageous, but that it disadvantages specific internal groups. One participant's competing internal interests may hamper negotiations in a way that other participants have limited ability to address. Internal competition over water resources can make a country's overall water use inefficient and preclude political leaders from seeking cooperation that might weaken or strengthen one internal party over another.

In almost any agreement, each participant takes some losses, and in the case of agreements between entire countries, those losses can mean the destruction of livelihoods or even entire communities. One frequent water-related example of this phenomenon is the dissolution or relocation of communities due to dam construction. For example, in the Mekong River basin, riparian countries have struggled and/or failed to create adequate compensation packages for relocated communities, and in some cases, the loss of those communities, many of whom interact heavily with aquatic ecosystems, has created ecological consequences for the regions in which they once lived (Suhardiman et al. 2014). The perceived injustices done to such communities can create public relations backlash, local political resistance, and ecological consequences if not addressed adequately, and these concerns may impact a participant's approach to water-related negotiations.

## ***Timing***

Another important challenge in sharing benefits is the timing of when those benefits can be delivered. Both psychological and external factors can make the timing of benefit delivery a challenge in negotiations.

As Okhuysen et al. (2003) have argued, participants in a negotiation are more eager to obtain a benefit if it can arrive in the short term. In turn, participants view burdens as being more bearable when they arrive in the long term. In this sense, burdens that must be sustained in the near future and benefits that will not arrive until the long term can both inhibit participants from agreeing on a proposed solution. The filling of a dam is a common case where a downstream riparian faces short-term burdens and long-term benefits. During the filling of a dam, a downstream riparian may have to receive low flows from their upstream neighbor, marking a short-term burden, and any power production or flood mitigation produced by the dam may not be fully accessible for several years, marking a long-term benefit.

Moreover, even if a participant agrees to a benefit that has a long time horizon, no participant can be sure that such a benefit will retain its value in the future. Changes in political power, market

fluctuations, and natural disasters can all radically alter the value of a promised but unrealized benefit. In order to compensate for these uncertainties, participants may look for security measures that protect the future value and stability.

## Accurately identifying and equitably distributing benefits – How to overcome obstacles

### *Reveal interests beyond positions*

As discussed in the "Understanding benefits" section of this chapter, benefits and their agreed-upon distribution derive from each participant's unique interests. In order to identify the largest number of possible suitable outcomes, it is key to understand each participant's interests rather than just their positions. A position is the declared wish of a participant based on their needs and interests. Positions are rigid and limited by nature, while needs and interests can be met in different ways. For example, a participant may express a position by stating, "my share is 65% of the water flow," while in order to express an interest, they would state, "I need to irrigate 100 square kilometers." In the bargaining process, this position may be met fully or partially. However, even if the participant is awarded less than 65% of the water flow, the irrigation interests could still be met in other ways, such as by improving water quality to maximize the effectiveness of irrigation or increasing efficiency in irrigation through technology transfer.

Participants are often concerned that revealing their interests creates weaknesses, making them vulnerable to exploitation. Moreover, some interests are deeply entangled in broader social or political issues, which makes them difficult to isolate from a stated position. Nonetheless, even if an interest is not revealed to other participants, an individual participant's internal emphasis on interests rather than positions can alter their own approach in ways that could make negotiations more fruitful.

Methods for collaboratively identifying each party's interests vary, but they mainly rely on trust-building, good listening, and creating a conversational atmosphere in negotiations. These approaches help participants acknowledge that when managing water issues, two actors can simultaneously experience conflict and cooperation in their relationship (Zeitoun and Mirumachi 2008), allowing them to isolate areas of potential growth from areas of ongoing tension. By expressing and pursuing the fulfillment of one another's interests, actors can continue to maintain their own distinct political positions while also cooperating on water-related issues that bring benefits to both parties. This phenomenon has been observed among Mekong basin states, where even through years of conflict, Thailand and Laos continued to fulfill important aspects of their water management agreements (Sadoff and Grey 2002).

### *Move from "rights," "ownership," and fixed quantities to "needs" that can be satisfied in various ways*

A part of shifting the participants' focus from positions to interests is placing less emphasis on ideas of "ownership," "rights," and "possessive ethos" (a set of guiding principles of beliefs that inform the participant's position). Instead, each party's "needs" should ideally become the defining feature in negotiations over water-related benefits.

The idea of "water rights" may encourage participants to maintain inefficient water management regimes for the sake of individual gain. There is no refuge within international law regarding water rights; as Sadoff and Grey (2002) have argued, international law "provides guidance but

no clear hierarchy for competing claims on shared waters." Therefore, rather than focusing on inventing parameters for exclusive legal claims over water, participants in water negotiations should focus on how they can meet each other's needs in a creative and sensitive way.

### *Collaborate to identify a maximal list of potential benefits*

Once participants have committed to addressing their interests and needs beyond their conceptions of possession or ethos, it is necessary for them to work together to create a list of all the possible benefits that address those needs. Part of this process involves recognizing issue linkages, exchanging potential scenarios of solutions, and coming up with alternatives to already existing proposals.

In order to optimize the exploration and recognition of potential benefits, participants must approach the negotiation process with flexibility in mind. When an initial agreement is proposed, participants should refrain from treating their negotiations as an all-or-nothing affair. Instead, negotiations resulting from a proposed agreement can be used to explore alternatives that might be more suitable than the original proposal.

One example of this approach is to identify different seasonal needs instead of focusing on "overall quantity needs." One successful instance of this approach is Uzbekistan's and Kyrgyzstan's agreement over the operation of the Toktogul reservoir in winter and spring. While Uzbekistan (downstream) needs the irrigating water during the summer, Kyrgyzstan (upstream, owner of the dam) needs to produce hydropower during the winter season. The two parties came to a solution by establishing yearly gas transfers from Uzbekistan to Kyrgyzstan, compensating for reduced Kyrgyz power production in the winter (Teasley and McKinney 2011).

When examining alternative solutions, participants should work together to create theoretical scenarios that they can consider collaboratively without pressure or commitment. Such scenarios can help illuminate previously unrecognized areas of contention or congruence between parties and also allow participants to express their needs more comfortably, knowing that their statements will not directly impact the real negotiated settlement they are pursuing. It is worth mentioning that computer models, such as the one proposed by Teasley and McKinney (2011), can be useful in creating and modifying these theoretical outcomes.

In these exercises, participants should arrive at negotiations only after thorough individual preparation. This preparation should make each participant maximally aware of their own needs and interests, as well as the benefits they are able to acquire. Whether they choose to communicate these interests and benefits to their counterparts is subject to their own particular circumstances (more communication should lead to more available outcomes). Nonetheless, this individual preparation will make each participant more open to diverse arrangements that they or their counterparts may not have considered otherwise.

### *Use available tools to distribute benefits equitably*

The negotiations process should produce agreements that arise from the participants' own needs and interests. Participants who attempt to forcefully impose agreements on their counterparts are likely to fail, and agreements that participants don't naturally and willfully reach are rarely sustainable. In order to ensure that participants willingly agree to any arrangement, it is critical that they see the distribution of benefits as equitable and fair.

There are several commonly accessible tools for ensuring that benefit distribution is perceived as equitable. Recently there have been attempts to use computer models and algorithms to model equitable distribution of benefits, used by practitioners and academics alike. These programs can be modified to fit a wide range of particular situations and geographic locations. Nonetheless, while they are broadly adaptable to different situations, they are particularly useful when distributing benefits through an economic or legal lens. As such, they are best used in combination with the approaches mentioned in the previous section, which are better suited for addressing political and social benefits that computer algorithms cannot easily quantify.

## Conclusions

In conclusion, it is essential to understand each stakeholder's interests on a deep level in order to maximize the available benefits in an agreement over water resources. In identifying these interests, participants in a negotiation should be aware that interests and benefits can take many forms. Understanding the differences between direct, indirect, tangible, and intangible benefits can help illustrate the diversity of possible benefits. Challenges such as zero-sum thinking, entanglement, and timing may hinder a negotiation process, but these issues can be overcome by working in collaboration to understand each participant's needs and the available benefits that come from cooperation. In order to reach this level of cooperation, participants must identify a maximal list of available benefits and find the most efficient and equitable way to distribute them.

## Note

1 The World Bank Group's data portal provides annual estimates of agricultural withdrawals as a percentage of total freshwater withdrawals. You can explore the data here: https://data.worldbank.org/indicator/ER.H2O.FWAG.ZS

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# 17

# THE ROLE OF KNOWLEDGE TRANSMISSION IN WATER DIPLOMACY

*Yumiko Yasuda*

**Key takeaways**

- Effective transboundary water management requires drawing upon different types of knowledge held by diverse actors at different scales, including perspectives from vulnerable groups such as women and youth.
- Knowledge transmission required for transboundary water management occurs at multiple levels, including at multiple governance scales, particularly at local, national, and transboundary levels, and across sectors.
- Both formal (through formal institutionalized processes) and informal (such as capacity building, dialogues, advocacy, and informal meetings) forms of knowledge transmission are important and can shape cooperation over water.
- A wide range of tools and mechanisms that can facilitate knowledge transmission can be useful for water cooperation, including Strategic Environmental Assessment, shared visioning and collaborative modelling, cross-sectoral coordination through Integrated Water Resources Management, adopting a nexus approach or Source to Sea approach, among others.

## Introduction

Managing transboundary water (TBW) is a complex business, not only involving different countries and jurisdictions but also sublevels of those jurisdictions within each country, as well as various sectors and different communities along transboundary water bodies. Often, different types of knowledge, information, and data exist within these different groups. Knowledge and information can be critical in fostering transboundary water cooperation. Information and data exchange is often considered as one of the first steps in fostering cooperation. While many tend to think it is the relatively straightforward initial step, such an exchange can also be politicized, making things challenging for many.

What are the best ways for TBW managers and relevant riparian governments to govern the shared water while taking all the different knowledge into account? What are the mechanisms for knowledge to effectively transmit across different scales and sectors? Knowledge transmission related to transboundary water management can take place at different levels of multi-governance,

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*Table 17.1* Knowledge area

| *Knowledge area* | *Description* |
|---|---|
| Know-how | Knowledge area that supports the ability to produce action, know how to do something |
| Know-why | Knowledge that refers to the understanding of reasons, such as perspectives, assumptions, and paradigms |
| Know-what | Information necessary to make decisions or things that are necessary to take the next action |
| Know-who | Relationships, contacts, networks, and competencies that are necessary to undertake a task |
| Know-where | Knowledge that allows one to navigate through and select the right information required for a task. |
| Know-when | Knowing the frequency and opportune moment for instigating, changing, or ending something. |

Sources: Collison and Parcell (2001) and Delfau (2018).

among different sectors, as well as cross-basins. This chapter aims to provide key tools and approaches to overcome this challenge.

## Types and areas of knowledge

There is a wide range of valuable knowledge for water diplomacy and transboundary water management. It ranges from data, information about specific basin's biophysical and socioeconomic characteristics to management practices, lessons learned, as well as different perspectives and opinions raised by a wide range of stakeholders. Knowledge can be practical (i.e., resulting from on-the-ground interactions), prescriptive (i.e., best practices), or discursive (i.e., a framework for addressing different values) (Mukhtarov and Gerlak 2014; Delfau 2018). In management and decision-making processes, it is also useful to be aware of different areas of knowledge, such as when to apply the knowledge, how, understanding the background to why, as well as who, where, and what knowledge can be applied when (see Table 17.1) (Collison and Parcell 2001; Delfau 2018).

In the management of transboundary water, a combination of these different areas of knowledge is needed by different decision-makers and stakeholders. In addition, it is also important to take note of how knowledge is generated. With the nature of shared resources, knowledge related to water allocation over transboundary water, for instance, is best created through joint monitoring and assessment (UNECE 2021a). This chapter explores different types and areas of knowledge that are useful for transboundary water management, focusing on their pathways and how they are transmitted.

## Knowledge transmission across scales: Multilevel governance

The successful management of transboundary water requires not only an awareness of the multiple levels of governance involved but also an ability to leverage the cascading knowledge pathways that go up, down, and through these various levels. This requires an understanding of the production, refinement, and transmission of knowledge, whether at the local, provincial, national, or even transboundary/intergovernmental scale.

### *Intergovernmental level*

When there is a formal transboundary/intergovernmental organization or institutional structure, such a body would play a key role in knowledge transmission. There are three typical types of formal arrangements. The most common institutional arrangements are river basin organizations (RBOs) or institutions established to manage a specific transboundary water body. Some of these RBOs also play the role of managing transboundary aquifers that are hydrologically connected to surface water through conjunctive management of surface and groundwater. An example of such an arrangement is the Orange-Senqu River, which is hydrologically connected to the Stampriet transboundary aquifer system (STAS). The Orange-Senqu River Commission (ORASECOM) houses the Ground Water Hydrology Committee and is linked to the STAS multicountry cooperation mechanism.

Another type of arrangement is a bilateral commission that oversees transboundary waters shared between two countries more broadly rather than focusing on one specific water body. One such example is the Binational Commission for Integrated Water Resources Management (IWRM) in the Ecuadorian-Peruvian basins, established through an agreement signed between the two countries in 2017 and includes nine transboundary basins shared between the two countries. Another example is the Joint Rivers Commission between India and Bangladesh, which is based on the Statute signed in 1972 and covers 54 transboundary rivers shared between the two countries.

The third type of formal process at the intergovernmental level is regional commissions, where countries agree to jointly work on transboundary water cooperation. An example of such a process is the Southern African Development Community (SADC), which includes 16 member countries sharing 21 transboundary rivers and 14 aquifers (Pietersen et al. 2010). SADC member countries signed the SADC protocol on shared water[1] in 1995 and revised in 2000 (SADC 2000), which aims to foster cooperation for sustainable, coordinated, equitable, and reasonable management of shared watercourses within the region. The protocol also supports the establishment of shared watercourse agreements and basin organizations, such as ORASECOM shared between Botswana, Lesotho, Namibia, and South Africa, as well as Limpopo Watercourse Commission (LIMCOM) shared between Botswana, South Africa, Zimbabwe, and Mozambique (ORASECOM 2022).

### *Cascading knowledge down and up within multilevel governance structure*

Knowledge generated or shared among these intergovernmental processes needs to cascade down through national, provincial, local, and community levels. This cascading down to the national level typically takes place through national focal points to intergovernmental processes. These national focal points are typically national ministries with a mandate to manage transboundary water, such as ministries of water resources, environment, as well as foreign affairs. Subsequent cascading down of knowledge through formal channels depends on each country's formal governance structure. Typically, knowledge will cascade through different subnational governance systems, for example, national to the provincial government, then to the district, commune, and village levels.

### *Informal processes*

Knowledge transmission across multilevels of governance can also take place through informal processes. One such example is a basin dialogue, which often takes place in the form of

multistakeholder dialogues, basin-wide knowledge exchange events, or symposiums. Different actors can foster transboundary basin dialogues, including government, NGOs, international organizations, and academia. Such dialogues have taken place throughout the world at multiple levels. For example, in South Asia, the Brahmaputra dialogue[2] was initiated by nonstate actors, including NGOs and academic institutions in India and Bangladesh. Initially, dialogues took place as exchanges between India and Bangladesh at provincial levels. This was subsequently expanded, engaging stakeholders from all riparian countries (including China and Bhutan) as well as jointly facilitated with government officials who acted in their personal capacity, thus evolving the dialogue from a track 3 process to a track 1.5 (SaciWaters 2014; World Bank Group 2018; Barua 2018). The Indus Basin dialogue, which took place in another major transboundary basin within South Asia, engaged policymakers and opinion-makers representing different riparian countries in the form of the Indus Forum. The dialogue was later turned into the Indus Basin Knowledge Forum, which strengthened the knowledge–policy–action interface (World Bank Group 2022). One of the key features of this type of basin dialogue is in knowledge and personal exchanges throughout the basin, which can often lead to creating communities of practice among basin practitioners. Generally, the more diverse participants are for these dialogues, the more diverse views and opinions can be captured through dialogues, provided that they are well facilitated, allowing different voices to be heard. The role of neutral facilitators and convenors becomes important in these dialogues (Yasuda et al. 2022).

Advocacy by interest groups, NGOs, and other nonstate actors can also serve as an informal way to disseminate and exchange knowledge across different scales. When a controversial issue arises, such as plans for hydropower dam construction, in addition to official information from governments or hydropower companies, civil society groups and academia typically publish their own reports about possible impacts of the dam. These incidents can actually catalyze knowledge transmission across basins and at times lead to exploring new aspects of value related to shared water from various stakeholders (Yasuda 2015). Training events for basin management that take place through various channels are also another way where knowledge transformation occurs.

## Knowledge transmission across sectors

Another key dimension of knowledge transmission for improved management of transboundary water is the cross-sectoral aspect. One of the key concepts that promotes cross-sectoral coordination is the IWRM.

### *Integrated Water Resources Management*

IWRM is a process that "promotes the coordinated development and management of water, land, and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP TAC 2000). By nature, IWRM requires an intersectoral approach to the management of water. At rivers or lake basins and aquifer levels, IWRM would require coordinating management and optimizing equitable use of water, land, and related resources within the limits of basins without compromising the long-term sustainability of ecosystems (GWP and INBO 2009).

For a transboundary river, lake basin, or aquifer, this coordination and optimization needs to span different national jurisdictions and sectors. While cross-sectoral and cross-border coordination is often complicated to manage, it is critical to facilitate the level of knowledge transmission required for the effective management of transboundary water (UNEP 2021).

IWRM has four key dimensions. In a transboundary context, these translate into:

1 Establishment of an enabling environment, such as transboundary water agreements, policies, and plans adopted by countries to ensure cross-sectoral coordination of shared waters;
2 Institutionalization of participatory water governance and management, including the formation of basin institutions and cross-sectoral coordination mechanisms that integrate inclusive stakeholder engagement practices;
3 Development of management instruments such as pollution control, water availability monitoring, data and information sharing;
4 Arrangement of financing agreements that ensure countries pay their share for transboundary water institutions or the securement of finance from various sources to foster cooperation and joint action (UNEP 2021; INBO and GWP 2012).

Knowledge transmission across sectors is a key aspect of IWRM and the sustainable management of transboundary waters more generally. This transmission can take place through formal and informal processes. One such process is inter-sectoral committees and arrangements linked to transboundary water agreements or arrangements.

For instance, the Mekong River Commission[3] (MRC), established by the 1995 Mekong Agreement between Cambodia, Laos, Thailand, and Vietnam, is a primary intergovernmental coordination body among these countries. The MRC consists of the Council of Ministers, the Joint Committee, and the MRC Secretariat. Cross-sectoral knowledge transmission at the intergovernmental level takes place through these formal mechanisms. It is also institutionalized through procedural rules agreed upon and signed among countries. For instance, the Procedure for Data and Information Exchange and Sharing specifies the types of data each country needs to report, including various sectoral information such as natural resources, agriculture, flood management, infrastructure, environment, and socioeconomics (Mekong River Commission 2001). At a basin scale, MRC developed IWRM-based basin development strategies and plans that ensure cross-sectoral linkages and allow national plans to address the long-term sustainable development of the Lower Mekong River Basin. MRC also fosters joint projects on various cross-sectoral topics, including agriculture and irrigation, climate change, fisheries, floods, and droughts (MRC 2022b).

At the national level, each country has a National Mekong Committee (NMC), which consists of all agencies relevant to the Mekong cooperation from each country. The NMC consists of different sectors concerning the Mekong water use (Mekong River Commission 2022a). For instance, Cambodia's NMC consists of 17 national ministries and authorities, including the Ministry of Foreign Affairs, Ministry of Water Resources and Meteorology, Ministry of Mines and Energy, and Ministry of Planning (Cambodia National Mekong Committee 2017). This intersectoral nature of the NMC provides an institutionalized mechanism for knowledge transmission across sectors.

## Knowledge transmission across regions and basins

The effective management of transboundary waters sometimes requires knowledge transmission beyond the boundaries of a single transboundary basin.

Regional institutions can often play a role in catalyzing knowledge exchange across borders. In West Africa, 15 member countries of Economic Community of West African States (ECOWAS) share many transboundary waters and are dependent on each other in terms of water resources.

The Water Resources Coordination Unit of ECOWAS leads dialogues among member countries, facilitating the establishment of the Volta Basin Authority[4] (INBO and GWP 2012).

Regional dialogues are effective ways to transmit knowledge among governments as well as among stakeholders from the same region that may include several shared water bodies. They often catalyze the creation of "communities of practice" among key government officials and nonstate actors, joined together by a set of common interests or concerns. The working relationships that naturally form in these communities can lead to broader collaboration on concrete projects related to transboundary water bodies. For instance, regional dialogue fostered in Southeast Europe has resulted in spin-off basin-level cooperation at five transboundary water bodies (Yasuda et al. 2022). In Central America, the Central America Commission for Sustainable Development and GWP Central America fostered regional dialogues where countries have agreed to develop a regional guideline on transboundary waters (GWP Central America 2022).

Regional training initiatives can also transmit knowledge across basins. For instance, the annual Pan Africa Water Governance and International Water Law training[5] that has taken place since 2015 facilitated learning across different basins. Learning from these training initiatives has resulted in participants influencing concrete policies and processes related to transboundary water, including the drafting of the IGAD Regional Water Resources Protocol in 2017, the development of the Water Convention of the Volta Basin, as well as the establishment of an RBO for Incomati and Maputo River Basin, to name a few (GWP Africa 2020).

Learning across basins can also take place on a global scale. The Water Convention hosted by the UNECE fosters various events and workshops that shape communities of practice of primarily governments and RBO practitioners. The Global Environment Facility's (GEF) International Waters (IW) Learning Exchange and Resource Network (LEARN)[6] program provides another avenue for cross-basin exchanges of knowledge and best practices among GEF IW project managers and partners. GWP's IWRM Toolbox[7] and its online communities allow multiple stakeholders to exchange general knowledge and insights related to IWRM, including transboundary water. Transboundary Water Knowledge Exchange Hub[8] is an online community particularly established for this purpose.

## Stakeholder engagement

Expanding the opportunities for stakeholders to effectively participate in dialogues and decision-making on water issues affecting them is critical to effective water management. Stakeholder engagement is particularly critical in transboundary contexts, where cooperative management is essential to reducing potential conflict over international watercourses by ensuring the sustainable accrual of mutual benefits (Earl and Malzbender eds. 2006). This is because stakeholders can bring a wide range of knowledge and information that may not necessarily be within reach of government actors but are nevertheless critical to the successful long-term management of transboundary waters.

Transboundary basins tend to be larger than domestic basins and have additional complexity in their jurisdictional layers. Both of these factors complicate the assembly of a stakeholder community that represents the entire transboundary basin. One of the solutions is to identify different representatives from different sectors (e.g., agriculture, fishery, and environment), roles (e.g., government, academic, civil society organization, and community), and scales (such as national, provincial, local, and community levels). It's also important to ensure that these different groups have a legitimate way to choose their representatives (INBO and GWP 2012).

River Basin Organizations can play a crucial role in stakeholder engagement. For example, the Nile Basin Initiative[9] (NBI)'s stakeholder engagement strategy categorizes stakeholders into the following groups (Nile Basin Initiative 2018):

- NBI's core governance group (regionally structured to directly guide and supervise the work of NBI's three centers);
- The extended governance group in national ministries;
- The primary stakeholders (external groups whose direct contributions are essential to successful NBI strategy implementation);
- The secondary stakeholders (groups with the potential to shape the constructive implementation environment for NBI's agenda).

Engagement strategies are developed with these different groups and topics in mind.

Also, across the Nile Basin, the Nile Basin Discourse[10] (NBD) is another institutional mechanism working to strengthen civil society participation in the Nile Basin development processes, projects, programs, and policies. The NBD has evolved into a vast network with membership from over 600 civil society organizations throughout the Nile Basin (Nile Basin Discourse 2022).

### *Inclusion of vulnerable groups*

When speaking about stakeholder engagement, one also needs to pay attention to the inclusion of vulnerable groups, including Indigenous communities. Indigenous communities existed long before state boundaries in many parts of the world. Since these communities and their water-related activities commonly span international borders, their livelihoods are directly affected by the use and management of transboundary waters.

#### *Indigenous communities*

Key legal and policy practices support Indigenous people's participation in decision-making. At the global level, the United Nations Declaration on the Rights of Indigenous People lays out key principles to enhance harmonious and cooperative relations between the state and Indigenous peoples (United Nations. 2007). These include the right to participate in decision-making that affects their rights (Article 18) and the obligation for states to consult and cooperate in good faith with the Indigenous people (Article 19). It also includes the right of Indigenous peoples to use and maintain spiritual relationships with their traditionally owned land and resources, including water (Articles 25 and 26), and the state's obligation to establish and implement processes that recognize and adjudicate the rights of Indigenous peoples pertaining to their lands and resources (Article 27).

An example of policy and practice of inclusion of Indigenous groups at the transboundary basin level can be seen at the International Joint Commission[11] (IJC), which was established to manage shared waters between the USA and Canada. The IJC houses the International Watersheds Initiative[12] (IWI), which aims to find solutions to transboundary watersheds through local communities and stakeholders. IWI projects are implemented at the watershed level, where a board is created that consists of representatives from local communities, Indigenous groups, industries, regulators, dam operators, and other stakeholders. It aims to ensure all relevant stakeholders have a seat at the table when discussing solutions. These boards will make recommendations based on

scientific research, joint fact-finding initiatives, and consensus established through collective dialogue. For example, at Rainy River, the IWI initiative worked closely with the Seine River First Nations to undertake studies assessing the adverse impacts of water level changes on livelihoods and food supplies, including wild rice, walleye, and lake sturgeon. These studies fed into decision-making processes regarding the management of the river (International Joint Commission 2015, 2023). This example demonstrates the feasibility and importance of including Indigenous voices in collaborative research and decision-making over transboundary waters.

Modern society can also learn and adopt practices from traditional Indigenous communities' practices for sharing resources. No formal mechanisms exist for such knowledge transmission, but the research community and their knowledge outputs can play a crucial role. For instance, Wolf (2000), through his research on Indigenous approaches to water conflict negotiations, provides five key aspects of Indigenous knowledge that transboundary water managers can utilize.

They include:

1 Allocating time, not water;
2 Prioritizing different demands and sectors;
3 Protecting downstream and minority rights;
4 Pursuing alternative dispute resolution;
5 Adopting a practice of forgiveness (e.g., the *sulha*).

### *Younger generations*

Youth participation in decision-making is another aspect of inclusion not to overlook. This was formally recognized in Agenda 21, a global policy document adopted in 1992.[13] Agenda 21 indicates that governments should establish procedures allowing for consultation and participation of youth in decision-making processes related to the environment (United Nations 1992). After 30 years, several initiatives linked to Agenda 21 remain active. At a global level, there are global youth networks, such as the Youth Parliament for Water and the Water Youth Network, aiming to connect youth to decision-making processes. At transboundary basin levels, there are initiatives to institutionalize youth at specific basin/region scales, such as the Kura-Araks Youth Network[14] and Danube Youth Council.[15] In Asia, the Lancang-Mekong Youth Exchange and Cooperation Center[16] is hosted at Fudan University.

The degree to which these networks provide concrete input into formal decision-making varies depending on their operational model. Nevertheless, these mechanisms can create potential pathways for knowledge transmission from younger generations to basin practitioners and vice versa. There are also activities empowering youth through capacity building and mentorship, such as Water Academy for Youth[17] (WAY), implemented by GWP in various parts of the world. WAY provides opportunities for young professionals to jointly participate in capacity-building programs, create peer-to-peer community networks, and establish relationships with older generations through mentorship.

### *Women*

More structured approaches are prevalent in empowering female participation in decision-making and ensuring gender equity in development. *The action piece on Gender equality and inclusion in*

*water resources management* published by GWP provides four key action areas to ensure gender mainstreaming in various organizations and initiatives. These action areas include (Grant 2017):

1 Institutional leadership and commitment by making gender equality and inclusion a core business goal;
2 Conducting gender and inclusion analysis that drives change;
3 Ensuring meaningful and inclusive participation in decision-making and partnerships;
4 Providing equal access to and control of resources.

These principles underlie several gender mainstreaming strategies utilized at transboundary basin levels. For instance, the Zambezi Watercourse Commission (ZAMCOM) has a gender mainstreaming strategy that includes three dimensions in addressing gender. The first is the structural dimension, where ZAMCOM institutionalizes gender mainstreaming by creating enabling policies and organizational frameworks. The second dimension is the personnel dimension, where ZAMCOM aims to build the capacity of all its organs to mainstream gender effectively. The third one is the output dimension, ensuring gender equity in the establishment and operations of the National Stakeholder Coordination Committees and decentralized basin management structures in the riparian countries, integrating gendered approach in programming, and implementing gender-responsive monitoring and evaluation systems allowing effective tracking of gender responsiveness of policies, processes, projects, and related outputs/outcomes (ZAMCOM 2018).

A similar gender mainstreaming strategy was also developed by ORASECOM (ORASECOM 2019). The prevalence of these strategies in Southern Africa may be influenced by the adoption of the SADC Protocol on Gender Mainstreaming (SADC 2008), which provides a specific mandate to member states to enshrine gender equality and equity in their constitutions as well as to implement an equivalent legislative measure by 2015. This structured approach can enhance knowledge transmission on gender perspectives by ensuring gender equity in institutional structures and input from key stakeholders of shared waters.

More broadly, there are a growing number of initiatives to empower women's participation in water diplomacy and transboundary water management, including the Women in Water Diplomacy network in the MENA region and Women in Water Diplomacy Network beyond the Nile (GWP-MED and Geneva Water Hub 2021; SIWI 2022).

## Additional tools and mechanisms for knowledge transmission

There are a number of tools and mechanisms that allow knowledge transmission across sectors and scales. This section introduces some of them but is not an exhaustive list.

### *Strategic Environmental Assessment (SEA)*

SEA[18] aims to evaluate the environmental impact of programs, policies, or plans as well as their alternatives at an early stage, which is to be taken into consideration in decision-making. It is intended to minimize potential negative impacts and offset any negative impacts that cannot be avoided. At the transboundary level, the Kyiv Protocol on SEA[19] encourages SEA in transboundary contexts (GWP 2022a). One such example of SEA in a transboundary context is from the Mekong River, where the MRC commissioned a SEA of 12 hydropower dams planned for the mainstream of the lower Mekong basin (ICEM 2010). The result of the SEA study was utilized during the debate among member states and stakeholders after Lao PDR notified other MRC member states

of its intention to build the Xayaburi hydropower dam, the first mainstream hydropower dam on the Mekong (Yasuda 2015).

### *Shared vision planning and collaborative modeling*

Shared Vision Planning (SVP) and collaborative modeling (CM)[20] facilitate knowledge transmission among different sectoral stakeholders at multiple levels of governance by focusing on the collective establishment of joint understandings and the collaborative development of a common vision (Figure 17.1). This is in stark contrast to the traditional basin planning process, where models are shaped by technicians and plans are made by key sectors or government agencies.

CM and SVP allows different sectoral stakeholders to jointly build a model that accounts for the parameters recognized by the stakeholders as being important (GWP 2022b). This promotes stakeholders from passive recipients of modeling results to active participants in the modeling process. The negotiation between the USA and Canada over the treaty to manage water levels of the Great Lakes provides a useful example of CM in practice. The bottleneck was uncertainty in resolving different sectoral interests involving two nations, several subnational authorities, tribal governments, and local and city governments. The CM approach was used to bring stakeholders and technical experts together to support the planning process in a more structured manner (GWP 2017).

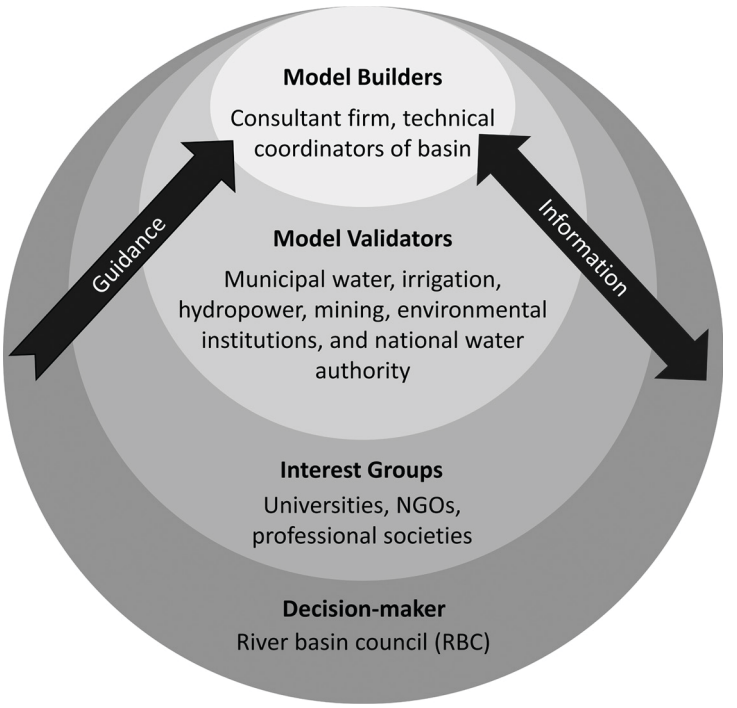



*Figure 17.1* Circles of influence during Shared Vision Planning developed by the Global Water Partnership.

### *Promoting cross-sectoral approaches in basin management*

There are also other approaches and techniques to promote cross-sectoral approaches in transboundary water management.

#### *Nexus approach*

The nexus[21] approach brings intervention benefiting more than one sector, which often aims to bring a win-win solution in the context of limited resources. It enables coherent sectoral and national policies to reduce resource management trade-offs and reconcile multiple uses of resources. By focusing on the intersection, interaction, and mutual dependencies of multiple sectors, the water–food–energy–ecosystem nexus is often seen as an enlarged negotiation space capable of providing more win-win opportunities than a single-sector approach would provide. For instance, efficient use of water for food production can also reduce agricultural pollution. A multipurpose dam can produce energy, supply water for irrigation, and provide flood control. A nexus approach recognizes the importance of intersectoral dependencies and highlights the need for coordination and joint management to ensure sustained mutual benefit. Knowledge transmission among different countries and sectoral stakeholders is critical to a successful nexus approach (UNECE 2021b).

#### *Source-to-sea (S2S) approach*

The S2S[22] approach aims to understand water resources management holistically as a network linking land, water, delta, estuary, coast, nearshore, and ocean ecosystems. When taking an S2S approach, one needs to trace water as it moves throughout the entire water cycle and the entire watershed. In tracing the flow of water, it is critical to understand how natural and anthropogenic processes transform water quantity and quality at each stage and how these transformations impact natural and human systems downstream. The S2S approach recognizes that taking stock of these interactions from a single vantage point is impossible and encourages knowledge transmission and stakeholder engagement across sectors and along the entire watercourse. This knowledge-sharing establishes a more comprehensive vision of how water flows through the watershed, benefiting some and causing harm to others. It identifies areas of concern for equity and justice but also highlights low-hanging opportunities for mutual gain through better water management (Mathews et al. 2019).

## Conclusion

This chapter explored different approaches to knowledge transmission relevant to transboundary water management. At the very least, the management of transboundary waters often requires that national governmental actors play key roles in ensuring that knowledge coordination systems are in place. However, transboundary waters typically cross multiple jurisdictional levels and affect various sectors. Therefore, knowledge coordination must often extend beyond national governments. This chapter has discussed several formal and informal mechanisms for multilevel and multi-sectoral knowledge transmission. It has also highlighted the importance of inclusive stakeholder engagement, including the equitable representation of vulnerable groups. This recommendation comes not only on humanitarian grounds but also because these groups have access to critical knowledge often missing from the larger conversation due to the historical exclusion of their voices. Sustained, inclusive, and collaborative efforts to share knowledge are essential for the successful sustainable management of transboundary waters.

## Disclaimer

The views expressed in this chapter do not necessarily represent the official views of the organizations the author is affiliated with.

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## Notes

1 Read more: www.sadc.int/document/revised-protocol-shared-watercourses-2000-english
2 Read more: https://web.archive.org/web/20230608050840/http://saciwaters.org/brahmaputra-dialogue/
3 Read more: www.mrcmekong.org/.
4 Read more: https://abv.int/en/abvhome/
5 Read more: www.gwp.org/en/GWP-Eastern-Africa/ABOUT-GWPEA/press-room/News/gwpea-hosts-training/
6 Read more: https://iwlearn.net/
7 Explore the IWRM Toolbox at: www.gwp.org/en/learn/iwrm-toolbox/About_IWRM_ToolBox/
8 Explore the Transboundary Water Knowledge Exchange Hub at: https://iwrmactionhub.org/group/42/stream
9 Read more: www.nilebasin.org/
10 Read more: www.nilebasindiscourse.org/
11 Read more: https://ijc.org/en
12 Read more: www.ijc.org/en/iwi-iibh
13 The full text is available at: www.un.org/esa/dsd/agenda21/
14 Read more: https://youthforwater.org/action/the-kura-araks-youth-network-is-launched/
15 Read more: https://danube-region.eu/danube-youth-council/
16 Read more: www.fudan.edu.cn/en/2021/0408/c344a108392/page.htm
17 Read more: www.gwp.org/en/gwp-SAS/WE-ACT/change-and-impact/News-and-Activities/2022/gwp-sas-way/
18 Read more: https://iwrmactionhub.org/learn/iwrm-tools/strategic-environmental-assessment
19 Full title: 2003 Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context.
20 Read more: https://iwrmactionhub.org/learn/iwrm-tools/shared-vision-planning-and-collaborative-modelling
21 Read more: https://iwrmactionhub.org/learn/iwrm-tools/nexus-framework
22 Read more: https://iwrmactionhub.org/learn/iwrm-tools/source-sea-management

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# 18

# DISINFORMATION CHALLENGES IN WATER GOVERNANCE AND DIPLOMACY

*Bhanu Neupane*

**Key Takeaways**

- Disinformation can pose a substantial threat not only to effective water resource management but also to larger environmental challenges.
- Countering disinformation in water requires both demand-side and supply-side approaches.
- On the demand side, empowering people to evaluate information and find reliable sources is critical, while on the supply side, media companies play an important role by enhancing responsible reporting, the use of technologies, and self-regulation to promote content transparency.
- Complementary strategies are needed, and multistakeholder partnerships are vital for building an informed and resilient public capable of making sound judgments concerning water governance and environmental diplomacy.

## Introduction

Water governance refers to the political, social, economic, and administrative systems that influence the use and management of water (SIWI 2021). It comprises governmental and individual decisions and actions that influence the availability and quality of water. The ramifications of poor water governance are increasingly apparent and present a significant threat to humanity. The repercussions consist of water source degradation, water supply depletion, and reduced food production. The degradation of water resources is a widely recognized scientific fact that necessitates the recognition of this reality by both nations and individuals. In this context, sharing correct information regarding water and how it is being managed is extremely important. Understandably, the water governance communication, similar to numerous other public concerns, is rife with disinformation. Such disinformation has the potential to obstruct or even impede urgent efforts to tackle the complexities associated with water resource use.

Information manipulation comprises a wide range of strategies, including the intentional circulation of false information and the utilization of proxy groups to exert more nuanced indirect influences. By controlling the narrative surrounding preexisting challenges, these tactics influence

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the beliefs and perceptions of networks, communities, and individuals. A notable domain in which instances of information manipulation have been documented is water resources management, specifically concerning water pollution, availability, allocation, and drought.

For example, disinformation campaigns that specifically target matters pertaining to water frequently seek to manipulate the perception of these crucial concerns. This may encompass the dissemination of inaccurate data regarding water allocation policies, the exaggeration or minimization of drought causes, or the distortion of the origins and repercussions of water contamination. By promoting doubt, mistrust, and discord among stakeholders—including environmental organizations, government agencies, and local communities—these campaigns undermine efforts to address water-related challenges.

In a similar fashion, regions of water scarcity and climate change have not been impervious to the impact of globally targeted disinformation campaigns. With the increasing need to understand the possible consequences of climate change and the scarcity of natural resources, specifically water, disinformation campaigns have been able to thrive. These campaigns are generally most successful in areas where there is limited understanding among the public regarding current and future environmental issues.

Disinformation campaigns can exploit the information void in settings with limited public comprehension to manipulate perceptions and opinions. These types of campaigns frequently utilize emotive or contentious narratives to capture the public's interest, thereby presenting individuals with the difficulty of differentiating verifiable information from misleading assertions. Consequently, this obstructs the ability to make well-informed decisions and undermines collaborative endeavors aimed at tackling pressing concerns like water scarcity and climate change.

To counter the effects of these disinformation campaigns, it is essential to increase access to dependable, fact-based information, media literacy, and critical thinking. By augmenting public consciousness and knowledge, society can fortify itself against the sway of disinformation and enhance its capacity to participate in well-informed dialogues and judgments concerning urgent environmental dilemmas, such as those pertaining to water resources and climate change.

## Definitions and Interpretations

The Broadband Commission for Sustainable Development is a collaborative initiative between the public and private sectors to promote digital cooperation and develop actionable recommendations for attaining universal connectivity. Their seminal report, *Balancing Act: Countering Digital Disinformation While Respecting Freedom of Expression,* spends nearly three pages discussing the competing definitions of "disinformation" that exist in current use. The definitional challenge occurs in part because of the divergent perspectives on the relationship between "disinformation" and "misinformation." In popular use, the terms are often used interchangeably. However, in more academic circles, the term misinformation is used to describe false information circulated with good or neutral intentions and without the knowledge that the information is false. In these circles, the term "disinformation" is reserved for the intentional and malicious spread of information that is known to be false.

The report discusses the operational challenges in making this distinction. On the one hand, intent is often difficult to discern in practice. On the other hand, intent has very little bearing on the severity of harm that false information can cause. The report concludes that if we want to limit the harm of false information, we must broaden our scope beyond intention and focus on the capacity for harm. The report adopts the term "disinformation" as a "meta-label to cover falsehoods (encompassing misleading messages) within content and which are associated with

potential societal harm (such as negative impacts on human rights, public health and sustainable development)" (Broadband Commission for Sustainable Development et al. 2021, p. 26). For the purposes of the discussion in this chapter, we also adopt this definition. A larger discussion of the dimensions of disinformation is provided in Box 18.1.

An important feature of this definition is that disinformation does not place restrictions on the forms of false information. While "fake news" is perhaps the most widely recognized form of disinformation, the definition's focus on misleading messages acknowledges disinformation's diverse array of genres and formats. This broad view is crucial for comprehending how organized disinformation takes advantage of the synergies between semantics, cognition, and emotions, irrespective of the content's medium or format (Khan 2021).

### *Myths*

This definition of disinformation used in this chapter also encompasses myths. Myths are widely held and often repeated beliefs about the world that are untrue. For example, the "myth of abundance" suggests that humid regions face less severe water-resource challenges than arid regions due to their abundant water resources. This perception is fallacious, as the absence of physical or economic water scarcity does not inherently imply a robust water security system (Praskievicz 2019). Nevertheless, myths are often deeply entrenched. Since preexisting beliefs shape how individuals interpret new information, myths can be reinforced through a lifetime of anecdotes and lived experience and can be hard to counter through appeals to "objective facts."

### *Ambiguities*

Ambiguity is a unique form of uncertainty that arises when a problem has multiple apparently valid and sometimes conflicting ways of being understood. In a managerial context, it points to variations in meaning and interpretation surrounding a specific issue. When ambiguity is present, it becomes unclear what the actual problem is and how to find solutions. It's crucial to pay attention to how these ambiguity-related issues are resolved because it directly impacts the extent to which the perspectives, values, and interests of participants are taken into account when defining a problem and developing its solutions. In the literature, the word "ambiguity" has been employed in two distinct manners. First, to describe the lack of knowledge resulting from insufficient information and, secondly, to characterize the level of confusion that can arise in a group due to the existence of multiple meanings (Dewulf et al. 2005). Ambiguity can also come from non-specificity, and in this form, it has been used strategically in water treaties with mixed success (Fischhendler 2008).

This chapter's primary concern with ambiguity is when it results from false but plausible narratives (i.e., disinformation) competing against true narratives for the public's attention and belief. By muddying the waters, these false narratives severely impact decision-making and collective action by making the correct course of action less clear. While some false narratives may be easier to dismiss than others, the sheer number of competing narratives pushed into the public discourse often has the effect of diminishing the weight of the true narratives and diminishing their power. All narratives may begin to seem equally suspect, and action becomes uncertain.

Ambiguities can arise not only from the sheer number of alternative narratives in the public discourse, but also from competing claims about what is and what isn't disinformation. Those who in good faith attempt to label false narratives as disinformation may quickly find their own messaging branded as disinformation in turn, much as when rival factions label each other's recounting

of events as "fake news." This counter-labeling has a neutralizing effect. Confronted with competing claims, some individuals adopt a course of inaction because they feel uncertain about what to believe. Others may simply choose the narrative that least contradicts their interests or beliefs. Confronting disinformation requires not only showing that a particular narrative is false; it often requires compelling evidence that a competing narrative is indeed true.

**Box 18.1 Disinformation and Its Dimensions**

1 *Content and Messaging:*
   - *False Information:* Disinformation frequently entails the dissemination of inaccurate or deceptive information on water resources management or water systems, which may be based on fabricated data, misleading statistical figures, or distorted storylines.
   - *Misinformation:* Sometimes, information about water resources management is inadvertently disseminated and may include false information that is not intended to cause harm.

2 *Intent and Motivation:*
   - *Malicious Intent:* Water resources information may be disseminated with the explicit purpose of misleading, controlling, or causing damage, possibly for financial, political, or ideological motives.
   - *Accidental Sharing:* Unaware of its inherent falsity, individuals may disseminate information about the water resource system they actually believe to be accurate.

3 *Dissemination Channels:*
   - *Social Media:* Often, perpetrators can use online communities and social networking sites to propagate and amplify disinformation.
   - *Traditional Media:* Sometimes bias may also infiltrate conventional media outlets via unreliable sources or biased reporting.

4 *Targets and Audiences:*
   - *General Public:* Disinformation campaigns often have the capacity to impact public opinion or behavior by targeting the general populace.
   - *Specific Groups:* Disinformation campaigns may be directed at particular interest groups, communities, or demographics. For example, local farmers can be given misleading information regarding water allocation regulations to stir unrest, or general consumers can be given wrong information about quality of water supplied by the municipality to increase sales of bottled water.

### *Disinformation Campaigns*

Within the domain of water governance, disinformation exerts a significant influence on attitudes and behaviors, with far-reaching consequences. Similar to its application within the realm of climate change, disinformation can be utilized to sway public opinion regarding water-related matters. Disinformation campaigns often employ tactics that exaggerate the gravity of water-related issues while downplaying the critical nature of acknowledging these challenges and implementing actions. Scholars have identified the most common categories of disinformation in water governance. Inter alia, these include:

1 Amplifying uncertainties: The dissemination of disinformation could amplify uncertainties concerning the availability, quality, and attribution of water challenges to human activities, thus fostering skepticism regarding the necessity of proactive measures (Klimes 2019).
2 Downplaying the gravity of the issue: Certain disinformation campaigns may contend that the consequences of water-related issues are negligible or, implausibly, advantageous.
3 Mistrust in expert conclusion: Disinformation frequently consists of disparaging the credibility of authorities, speculating on their dependability, or admonishing against the adverse repercussions of implementing water management policies and measures.

### *False Equivalence*

The unintentional propagation of misinformation is a significant issue in water governance, as it is in other scientific fields. The dissemination of disinformation by mainstream media and individual actors has a substantial impact on water governance. Mainstream media organizations, in their endeavor to deliver impartial journalism, frequently assign equivalent significance to contrasting perspectives concerning water-related matters. Unintentionally, this methodology may magnify misinformation, thereby generating an erroneous perception of the extent of agreement among scientists.

## Social Media as the Backbone of Disinformation

Social media platforms have significantly contributed to the dissemination of false information concerning water governance and associated scientific topics. Due to the characteristics of these platforms, echo chambers can easily develop in which users are exposed to content that confirms their preexisting beliefs, thereby amplifying and reinforcing disinformation. Recent studies in this field offer valuable insights regarding the widespread occurrence of such disinformation. As an illustration, a recent investigation explored the domain of online content pertaining to climate change. The study identified a substantial proportion of videos (107 out of 200) that advocated for worldviews that contradicted the prevailing scientific consensus (Allgaier 2019). These recordings either disseminated conspiracy theories concerning climate change or denied the existence of anthropogenic contributions to climate challenges. Conversely, this type of content amasses a substantial number of views, providing additional evidence of the influence that disinformation can have on public dialogue regarding water governance. An MIT study found that human behavior, not bots, is the primary cause of the fact that disinformation spreads on social media quicker than real news. The study emphasizes the difficulties associated with addressing the dissemination of inaccurate information on social media platforms (Langin 2018).

## Fighting Water Disinformation

For effective water governance, it is essential to deal with disinformation to make informed decisions and efficient policies. Identifying credible sources, countering misinformation, and encouraging responsible and evidence-based discourse on the crucial topic of water resource management necessitates a collaborative endeavor.

Significant efforts have been made to formulate effective countermeasures against disinformation. These countermeasures can be classified into two primary approaches: supply-side solutions and demand-side solutions. Each of these approaches tackles disinformation from a unique perspective.

The principal objective of demand-side solutions is to enable users to develop greater discernment as information consumers. These approaches aim at improving the critical thinking abilities of individuals, allowing them to evaluate the authenticity of the information. Demand-side strategies include educational measures and awareness campaigns that prioritize the values of fact-checking, source verification, and media literacy. By encouraging the development of these abilities, individuals will be better able to differentiate between trustworthy and untrustworthy information, thus mitigating the influence of disinformation on their choices.

In contrast, supply-side solutions focus on mitigating the origins of disinformation. These measures focus on those who generate and distribute inaccurate information primarily to check production, suppress dissemination, and lessen potential impacts. Supply-side solutions are composed of a variety of approaches, such as the implementation of legal policies and regulations to discourage the generation and distribution of disinformation, the enhancement of content moderation on digital platforms to impede the proliferation of inaccurate data, and the encouragement of the generation and distribution of authentic, factual content. By addressing the origin of disinformation, supply-side measures seek to restrict its dissemination and influence. Supply-side measures in the domain of water governance seek to suppress disinformation at its origin in order to restrict its dissemination and consequences, thereby guaranteeing that decisions pertaining to water are founded upon precise and reliable information.

Combating disinformation, specifically regarding water governance, necessitates an all-encompassing strategy that integrates remedies from both the supply and demand sides. By equipping individuals with the ability to assess information with a critical mindset and simultaneously instituting strategies to discourage and counter the spread of inaccurate data concerning water affairs, it is possible to establish a more knowledgeable and robust community that is less prone to the detrimental consequences of disinformation concerning water governance. A taxonomy of solutions for disinformation is provided in Figure 18.1.

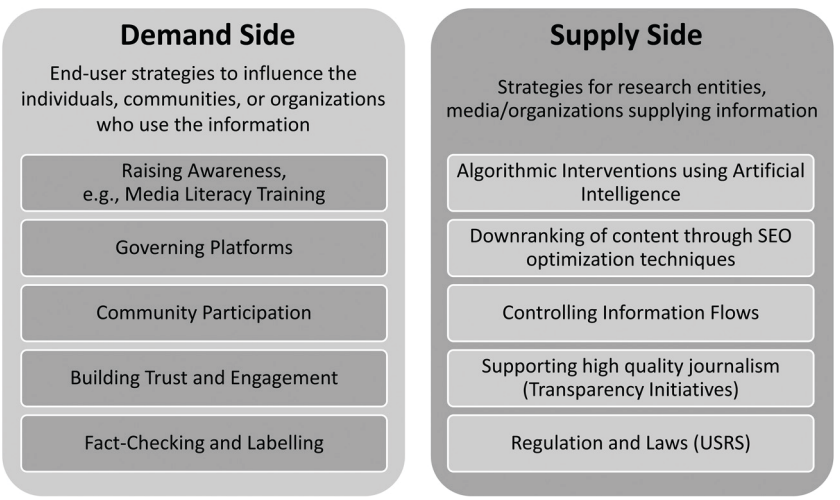



*Figure 18.1* Taxonomy of solutions for disinformation (adapted from Schiffrin 2023).

## Demand Side Solutions

For countering disinformation, *media and information literacy* are critical enablers for individuals to convert them into astute consumers of information. The objective of such training is to heighten users' awareness regarding the possible repercussions that may be linked to disinformation. Enhancement of media and information literacy can empower individuals to engage in critical evaluation of the information related to water where precision is of the utmost importance.

Effective media and information literacy interventions include the following critical components:

- *Critical thinking abilities*: The cultivation of critical thinking abilities is promoted. This process entails scrutinizing the evidence put forth, assessing the credibility and dependability of sources, and scrutinizing the context in which information is presented. These abilities can empower individuals to differentiate between verifiable and misleading information, particularly in the context of water administration, where misinformation can result in significant repercussions.
- *Emphasis on the criticality of the source of information*: Individuals are informed on the need and processes of evaluating the reliability of information sources, differentiating authoritative sources from those that may contain hidden agendas or partial truths. For effective water governance, as decisions can impact the environment and public health, evaluating the credibility of sources becomes critical.
- *Fact-checking techniques*: Individuals are informed on the need to cross-reference sources and validate claims of information to ensure that their understanding of water governance is founded on dependable and verifiable data.
- *Raising awareness of bias*: Individuals are assisted in identifying diverse manifestations of bias and the influence that personal convictions, political associations, or financial concerns may have on the dissemination of information. In the domain of water governance, where stakeholders frequently hold varied viewpoints, it is critical to comprehend bias to make informed decisions.
- *Digital literacy*: As there is a predominance of dissemination by digital means, efforts must place emphasis on the improvement of digital literacy. This encompasses providing instruction on how to effectively navigate digital platforms, distinguish between false information and phony news, and protect one's online privacy with regard to data concerning water governance.
- *Ethical Considerations*: Ethical considerations are also addressed through media and information literacy. The strategy includes the promotion of responsible and ethical engagement with information. This holds specific significance in the realm of water governance as it pertains to the conscientious administration of an essential resource (Cook 2019).

An example of a demand-side initiative is *Crash Course Navigating Digital Information*, which is a series of YouTube videos aiming at helping its viewers to examine information, read laterally to learn more about the authority and perspective of sources, evaluate different sources, and understand how search engines and social media feeds work (Crash Course 2018). Information can also be more directly fact-checked and debunked if it is false. There are several community-led initiatives that aim to flag false information. Climate Feedback[1], for example, is a network of scientists that fact-checks claims about natural resource use in media coverage. For online disinformation, Bot Sentinel, a free platform, tracks what it considers untrustworthy or automated accounts on Twitter, allowing users to check if tweets are being posted by trustworthy sources (Lavelle 2019). Some social media platforms and tech companies also have initiatives to debunk disinformation. YouTube has launched a new feature that fact-checks topics that spur conspiracy

theories. This feature places a scientifically accurate blurb of text from Wikipedia/Encyclopedia Britannica beneath videos (Hirji 2018).

## Supply-Side Solutions

From the supply side, to effectively combat disinformation pertaining to water-related matters, a comprehensive strategy is necessary, which can target two prominent groups responsible for generating and distributing such information: traditional media organizations and social media corporations. These organizations possess significant sway over the formation of public perceptions and attitudes; therefore, it is critical to enact strategies that effectively impede the spread of disinformation.

### *Traditional Media Organizations*

Media organizations, as conventional distributors of news and information, have a significant impact on the formulation of public opinion and comprehension regarding water governance. In order to address the issue of disinformation in this domain, a number of strategies can be implemented:

- It is essential to *incorporate modules on water governance and disinformation into journalism courses*. Journalists and media professionals can gain knowledge from these modules regarding the attributes and perils of disinformation, specifically where they pertain to water management. Journalists have the potential to develop the necessary competencies to evaluate information sources critically, authenticate facts, and differentiate between trustworthy and misleading content.
- *Promoting self-regulation within the media industry* can be an effective countermeasure to the spread of disinformation. Media organizations have the ability to establish and maintain editorial guidelines and codes of ethics that emphasize the critical nature of reporting in terms of accuracy and responsibility. Self-regulation fosters accountability and compels media organizations to promptly correct errors, particularly in content concerning water governance, where significant consequences are at stake.

### *Social Media Organizations*

Social media platforms have become significant conduits through which information, including that pertaining to water, is distributed. In order to counteract disinformation within the digital domain, new technological solutions[2] may be implemented:

- *Artificial intelligence (AI)-Enabled Algorithms and Engines*: Social media companies have the opportunity to benefit from AI to create advanced tools for the moderation of content. It is possible to train AI-enabled engines and algorithms to recognize and mark disinformation, thus preventing its spread. These technologies are of the utmost importance when it comes to detecting and discouraging inaccurate or deceptive information concerning water governance.
- The *surveillance of abrupt increases in website traffic* represents a highly effective approach in the fight against disinformation. Traffic surges that occur unexpectedly on obscure websites frequently serve as an indication of misinformation or clickbait. Social media platforms, including Facebook, have established protocols to verify and assess the accuracy of content that originates

from these sources. By adopting this proactive stance, the dissemination of misinformation concerning water governance is curtailed, thereby promoting public awareness.

- *User Reporting Systems (USRS)* (e.g., WHO 2020) have the potential to enable users of social media platforms to disclose content that they perceive as water governance-related disinformation or falsehood. USRS can contribute an extra level of scrutiny and have the capability to instigate content assessments by administrators of the platform.
- The *implementation of transparency initiatives* is crucial for the improvement of transparency. By disclosing the sources of information and advertisements that appear on their platforms, social media companies can empower users to evaluate the reliability of the content. These initiatives to increase transparency decrease the likelihood of unregulated discussions regarding water governance.

Mainstream media organizations and social media corporations can make a substantial contribution to the mitigation of disinformation concerning water and guarantee that the content they distribute is precise, dependable, and consistent with ethical journalism standards by implementing the aforementioned measures. These efforts are vital in facilitating well-informed decision-making and cultivating conscientious public dialogue within this pivotal sphere (Dwoskin 2019).

### *Other Measures*

There are also measures that respond to disinformation from both types of information producers. Firstly, greater *transparency and disclosure about sources of funding*. Financial transparency about funding for (dis)information about water governance, whether it be from think tanks and research institutes or politicians, can help users to consider whether the information is trustworthy or is produced with self-interested motives in mind (Gaworecki 2023). This may be difficult as weak campaign finance and philanthropy laws make tracing the sources of funds going to promote climate disinformation campaigns difficult. Fortunately, there are independent organizations that now track financial influence, such as the Center for Responsive Politics in the United States.

Secondly, *legal and political regulation strategies* can discourage and punish the dissemination of disinformation. For example, civil society organizations can send letters to politicians warning them about the reputational risks of being fact-checked (Cook et al. 2018). Media platforms can also commit to self-regulatory standards, such as the European Commission's Code of Practice on Disinformation. The Code of Practice includes measures such as removing fake accounts and limiting the visibility of sites that promote disinformation and was signed by Facebook, Google, Twitter, and others (European Commission 2018). At a more fundamental level, given that the primary drivers of change were cues from political leaders, scholars also argue that the political power of the energy industry has to be curtailed by cutting the link between industry and politics (Gaworecki 2023).

Finally, producing true information helps to consistently *communicate facts in an approachable way* in order to build up a resilient reality that citizens should understand before encountering false information (Claesson 2019). In this effort, independent and quality media can be key operatives (European Commission 2018). Community initiatives to produce more true information have also flourished. The Union of Concerned Scientists, for one, has published a chronology of key moments of climate disinformation from the fossil fuel industry and encouraged readers to tweet some of these moments (Union of Concerned Scientists 2023). Fact Avalanche, for another, is an online tool that alerts participants when a false tweet about climate change is released and invites them to respond using proven scientific facts to "bury" disinformation under truth (Lee 2019).

Similarly, SIWI, an organization widely recognized for its substantial contributions to water diplomacy and governance, has initiated action that introduces a novel aspect to the battle against disinformation in the domain of water resources governance (Klimes 2019).

## Conclusions

In a nutshell, disinformation within the realm of water governance is a pressing concern that demands immediate attention. It poses a significant threat to the efficient management of water resources. This chapter has shed light on the various dimensions of disinformation, the methods by which it is spread, and the far-reaching consequences it can have, not only on water governance but also on broader environmental challenges like climate change.

Disinformation not only distorts the understanding of water-related issues but also undermines efforts to address them, often by sowing mistrust and discord among stakeholders. The consequences of disinformation in water governance are dire. From water source degradation to food production reduction, the dissemination of accurate information is crucial to addressing these challenges.

Two primary approaches have been discussed to combat the spread of disinformation: demand-side and supply-side solutions. Demand-side solutions focus on empowering individuals to critically evaluate information, promoting media and information literacy, and enhancing their ability to discern reliable sources from untrustworthy ones. On the supply side, traditional media organizations and social media platforms have roles to play. Media organizations can incorporate training on water governance and disinformation into journalism courses, promote self-regulation, and prioritize responsible reporting. Social media companies can leverage AI-enabled algorithms to identify and flag disinformation, create user reporting systems, and increase transparency in the content they host.

Beyond these strategies, transparency in funding sources, legal and political regulations, and the production of true, quality information are additional measures to combat disinformation effectively. As disinformation continues to be a global challenge, the collaboration of governments, media organizations, tech companies, civil society, and individuals is paramount to establishing a more knowledgeable and resilient community capable of making well-informed decisions regarding water governance and similar environmental issues.

## Notes

1 You can find out more about Climate Feedback at https://climatefeedback.org/.
2 See RAND (2023) for an evolving list of tools to combat disinformation online.

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## SECTION IV

# Tools of Water Diplomacy



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# 19

# BUILDING POLITICAL WILL FOR WATER DIPLOMACY

*Aaron Salzberg and Ram Aviram*

**Key takeaways**

- Building political will is the process of changing the way decision-makers think, feel, and act with the goal of advancing a political agenda.
- Political will is malleable and often ephemeral – it can be, and often is, bent and reshaped in various directions by, and for, various actors.
- Building political will requires a broad understanding of the political, economic, social and hydrological context; an identification of decision-makers, actors, and influencers; and a message that's clear, concise, and tailored to the individual and institution and their own lived experiences.
- Creating political will is key to achieving stakeholders' goals in a negotiations and should be appropriately planned, resourced, monitored, and adapted in real time to changing conditions.

**Caveat lector**

Proceed with humility. Building political will is the process of changing the way decision-makers think, feel, and act with the goal of advancing a political agenda – often *your* own political agenda. At its best, it helps expand the conversation, builds support for new ideas and approaches, and provides incentives for political leaders to act. At its worst, it is ethnocentric, imperialistic, exploitive, and demonstrates a fundamental disregard for the autonomy and sovereignty of others. There are risks. Risks you know; risks you don't know; and, as Don Rumsfeld famously noted, risks you don't know you don't know. Risks that could impact the lives of others – for better or for worse. You may think you understand the situation: you won't. You may believe you know what you're doing: you don't. You may be convinced that your answer is right: it isn't. And you may read the below and think that you are prepared to engage in building political will: you would be mistaken. Be humble, be self-aware, and tread lightly and deliberatively – because the consequences of your actions are likely greater than you know.

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## Introduction

### *What is political will?*

Political will is a term used to describe the level of *commitment among key decision-makers* to a specific problem, policy solution, or process. It's the idea that those with the power to make a change must *want* to make a change before that change can happen.[1] While it informs what goes on within the negotiating room, it exists outside the direct negotiating space and resides with the set of political actors that set the overall policies and goals for a process or negotiation. Successful change often requires that a sufficient mass of decision-makers is committed to a particular policy or process to ensure that actions are taken to advance that policy or process (Post *et al.* 2010). This makes political will a powerful force that can be used by a wide variety of actors to advance their own goals and interests and to shape the outcomes of any process. When considered through the lens of water diplomacy or conflict resolution, collective political will is often synonymous with the willingness of parties (a) to meet, (b) to initiate and/or sustain a process of dialogue or negotiation, (c) to commit to a shared set of actions, and/or (d) that external stakeholders and the broader political environment are supportive of these processes and their potential outcomes. Individual expressions of political will by actors engaged in a process can happen at any point when they demonstrate support for an outcome advanced by a stakeholder seeking to influence the process.

Political will is malleable and often ephemeral – it can be, and often is, bent and reshaped in various directions by, and for, various actors throughout a policymaking, dialogue, or negotiation process. It can exist one moment and be gone the next. It is also predicated on the idea that those with decision-making authority can effectively operationalize their interests within their own political/bureaucratic institutions. Despite its amorphous nature, the sustainability of cooperative arrangements and agreements relies on the durability of political will. Whether driven by internal or external forces, the continued commitment to political agreements and arrangements is critical to their sustainability and full implementation (Zeitoun *et al.* 2011).

Finally, while the science on why and how the actions of societies can be influenced and the methods and approaches to addressing complex social phenomena to promote societal outcomes are growing, the development of political will is often guided by experience, understanding, and intuition – which can, at times, make it seem more of an art than a science. While tools and approaches for building and/or shaping political will exist, the development of political will is dependent on a range of factors that lie at the intersection of national, political, and personal interests. Collectively, these are becoming increasingly complex systems of systems that are strongly influenced by communications – from public and private communications between stakeholders (e.g., communiqués, speeches) to social media and the tools used by social media influencers to shape societal attitudes (e.g., algorithmic filtering, selective exposure, echo chambers, and viral content).[2] Direct cause and effect relationships are difficult to discern and, like any complex social system, are subject to emergent problems. So, in the end, while there are tools and approaches that can be tried, it's more often a process of reading how the system is responding and adapting, in real time, to create a vision of the future that benefits, or is seen as benefiting, those that you are seeking to influence.

### *Building political will: Creating "ripeness"*

The goal of building political will is to encourage action(s) by decision-makers that advance the interests of the stakeholder. In general, decision-makers will initiate dialogue or negotiations when

they think they can improve their own situation through some form of shared arrangement or agreement (Salacuse 2013). If acting rationally, they won't engage if they think such conversations would not advance their interests. Practitioners often describe the "readiness" of parties to negotiate, or the state of the enabling environment for positive negotiations, as "ripeness." It's the idea that there are moments in time when the conditions are right to move a process forward. Try to push the parties together too soon and the lack of willingness or resolve can reinforce animosities, increase tensions, and erode political will for days, months, or years after. Wait too long, and the contextual factors that might have created an "opportunity" conducive to cooperative action may have passed – the "moment" can slip through your fingers. This "ripeness" is needed both before and throughout the process: before – so that you have the proper environment in which to initiate discussions; and during – so that you have the conditions to sustain dialogue and negotiations.[3] Each stakeholder has a role to play in ensuring this "ripeness" is created before the negotiations, during the process, and in the crucial last steps toward an agreement.

Ripeness is not constant or fixed – it can, and often does, change over time. That said, the political will of decision-makers is a prerequisite for achieving ripeness. Knowing when conditions are ripe for dialogue is often not easily determined and is more of an art than a science. Diplomats, or those with extensive practice in conflict resolution, may have a better instinctual sense for seeing through the fog of political posturing and detecting such moments.

In some cases, the parties to a dispute may indicate their political willingness to engage by reaching out directly to each other or to external parties (e.g., the United Nations, the World Bank, another government). The latter could be particularly helpful if the external parties can offer support or incentives that might allow individual parties engaged in the dispute to overcome any internal intransigence – for example, the offer of financial support for a development project by the World Bank may generate broader political support within a government to cooperate with other partners. So too might the offer of a neutral forum for negotiation or the promise of capacity building. At the same time, an outward expression of political will may not be sincere. A party may have no real interest in cooperation but seek to create the perception of political willingness to maintain their reputation as a member of good standing in the international community or ensure continued support from partners. In these cases, parties can demonstrate a commitment to the process while quietly working to undermine the process by establishing roadblocks that prevent any substantive outcomes.

### *Who builds political will*

All stakeholders and participants in the process of negotiations and resolution of any water conflict are working to create political will to advance their interests – often both within their own organization as well as with other stakeholders and decision-makers. Builders of political will include all those that work to mobilize support, generate public interest, and persuade decision-makers to act. This can include the parties themselves, internal and external stakeholders, and external actors with an interest in a specific outcome – both positive and negative. In some cases, their true motives may be clear, others not. Some may work to promote cooperation; others to prevent an agreement, undermine cooperation, and/or foment unrest. Some may be exceptionally well trained as diplomats, intelligence operatives, or social media influencers; others may just be lucky and, without a plan or intention, have a viral moment that reshapes the public narrative and discourse. Some may adhere, or be bound, to some form of ethical standards of conduct that ensure their honesty and good faith; others may be free to mislead, misrepresent, and lie without repercussions.

The parties themselves will be working to shape the internal and external political environment in support of their own interests. If the parties are large bureaucracies or exist within a complicated and perhaps divided political environment, they will be working to build and maintain internal consensus to ensure their decision-makers support their own interests and positions. Externally, they may be working to bring other parties to the negotiating table, to build support among potential allies, or to shape the views of external stakeholders. When the parties are governments or large, well-established, and well-run organizations, their political acumen will likely be high. They will likely be skilled, well-prepared, and motivated. Their responsibility will be first and foremost to the security (physically, economically, socially, politically) of their country/organization. They may see these disputes as existential threats and may be careful not to reveal their true interests or positions ahead of, or even during, formal negotiations. You should assume that they've done their homework, know their counterparts and stakeholders well, and have a strategy for gaining favor, support, or influence by whatever means necessary. The goal of the hydro-diplomat is to understand the roles and interests of all the actors and to use this information to inform the selection of tools and approaches to promote their specific interests.

In addition, non-parties who are directly involved in the dispute resolution process, either as observers, facilitators, mediators, or arbitrators, will seek to strengthen the political commitment of the parties to the dispute resolution process itself (i.e., try to keep the parties at the table[4]) and work to ensure that the process is moving in a direction consistent with their own interests (e.g., their own perceptions of justice). These actors must be especially astute at assessing the ever-shifting political dynamics within the discussion process and the reactions of decision-makers while at the same time walking a fine line between political advocacy and the perception of bias. The perception of bias can quickly erode legitimacy and eliminate meaningful access to key decision-makers. As external actors who may be bearing witness to the actual negotiations, the building of political will is often focused on strengthening and sustaining a commitment to the process and its outcomes rather than promoting a specific result. Ideally, the only "interests" of the non-parties to the dispute inside the process is to ensure a fair and equitable process that yields a positive outcome that is supported by all the parties. Both the parties and those supporting the process face reputational risks for their actions and can, in some cases, face consequences for actions that are perceived to be improper or unfair.[5]

Parties or stakeholders that are outside the direct negotiations will often have specific interests they'd like to advance. These can be process based, for example, an interest in ensuring that the parties resolve the dispute in an equitable and sustainable manner in accordance with generally accepted principles and standards (e.g., transparency, accountability, fairness, stakeholder engagement) or outcome based, for example, that the outcome of the process advances their own specific interests. These interests may align well with one or more of the parties or may be in complete opposition. For example, some stakeholders might benefit from broadening political rifts between the disputing parties to create new political alliances or to weaken one or more of the parties. In some cases, it might be hard to know who is doing what and to link specific actions with specific actors. Some actors may intentionally hide themselves to avoid being held to account for their actions. The increased use of artificial intelligence and the spread of mis and disinformation is rapidly reshaping this landscape and is becoming a growing and potentially destabilizing influence.

One can even build political will externally to any one specific dispute. For example, while a country may not be a party to the UN Convention on the Law of Non-Navigational Uses of International Watercourses, there is broad pressure to adhere to the principles within the Convention. Even informal processes or events can generate political will for change. For example, the United States' release of a National Intelligence Estimate on Global Water Security coupled

with a high-level political event at the 2012 UN General Assembly by U.S. Secretary of State Hillary Clinton and High Representative of the European Union for Foreign Affairs and Security Policy Catherine Ashton catalyzed greater engagement by the traditional diplomatic community in promoting cooperation on shared waters. Not just because these disputes often touched upon issues of sovereignty and security, the traditional domain of diplomacy, but because there was broad recognition that these skills are needed to resolve these kinds of disputes.

Regardless of who the stakeholder is, there is one constant – each will follow their own self-interests. These interests may be broad, such as maintaining peace in a certain region, or narrow, such as encouraging alignment with a specific position or proposal within a negotiation. This could be driven by a direct interest in the issue being contested or by broader political, economic, or security interests. For example, Ethiopia might oppose a specific action within an arrangement or agreement on water between Egypt and Sudan because of its material impact on Ethiopia or it may fear that any agreement might lead to greater cooperation between the two countries on a broader range of economic and/or security issues that could threaten Ethiopia in other ways.

## Building political will

The outcome of building political will is that key decision-makers – those that can affect the direction and outcomes of a process, policy, or program – act in a manner that advances your interests. The process of building political will often begins with a mapping of stakeholder interests and the identification of "levers" that can be used to influence the views and actions of decision-makers. This is the who, what, and how of building political will.

### *Context*

Every dispute takes place within a broader physical, economic, political, and historical context. Some of this you can learn, some you can't, but all of it is important to understanding and appreciating the core interests (what people/governments want) and positions (what people/governments say) of the stakeholders, as well as identifying the potential levers of influence.

Some of this is well understood. You will want to know the current physical, economic, and political facts on the ground and have a sense for how different futures might help or hurt different stakeholders. This could include scenario development and traditional political economy analysis. For example, in the Mekong, you'll want to understand the complex hydrology and ecosystem importance of the Tonle Sap. In the Brahmaputra you'll want to understand the power generating potential of the Tsangpo loop and what that means for meeting the power needs of an expanding China. In the Amu/Syr Darya you want to understand the importance of cotton production to GDP and the power selling arrangements within CASA-1000. You'll want to know what current agreements/arrangements exist between or among stakeholders (on any issues); how each government works; who makes what decisions; and how those decisions are made. You'll want to know opportunities that new relationships may bring (investments, security, trade); vulnerabilities that could be exploited or created; and the level of a party's commitment to adhere to international laws or practices. All this information will inform your development of a plan or strategy, but it also serves a second, equally important, purpose – it will make you a more effective communicator.

As a party seeking to influence others, it's important to know how different stakeholders make decisions, how their beliefs are shaped, and how you can best engage to shape those decisions and beliefs. One part of this is knowing the right things to say; the other is saying things the right way.

Communicating in respectful and culturally appropriate ways that recognize lived experiences and demonstrate that you understand and appreciate their interests and concerns can lay a strong foundation for more open and trusted communications and give you greater opportunities to influence the process. At the same time, framing and delivering ideas within past lived experiences can be extremely compelling – for example, people will often support or oppose an idea based on a similar past experience.

Part of your work to understand the context will be identifying the decision-makers and understanding how they make, and what factors influence, their decisions. With governments, corporations, or other large or bureaucratic institutions/organizations with a clear leadership structure, this is often straight forward – at least on paper. The real workings may be less clear and poor relationships within complex decision-making systems (e.g., different branches of government) can complicate decision-making. Decision-making in less organized actors may be difficult or impossible to determine or subject to radical rapid changes.

### *Interests and levers*

It's fair to assume that all decision-makers will be working to advance their own interests or the interests of the institution or organization they represent. For governments these interests often relate to security and defense, economic, public health and safety, foreign policy, among others.

Demonstrating these benefits can be helpful. Decision-makers will also be looking to maintain the support of their core constituencies both inside and outside of government. This could include, for example, line ministries, parliament, the public, and regional or international political, economic, and security partners. These groups can, therefore, be highly influential in shaping political will. Public reactions through social media and elsewhere can put pressure on decision-makers to act and build support for a set of solutions. Even authoritarian regimes may need public support to maintain their legitimacy and primacy. While critical to many decision-making processes, this has become an increasingly tricky space to navigate. The advent and expansion of social media tools, artificial intelligence, and mis and disinformation provide opportunities for individual actors to disrupt and destabilize a process without fear of repercussions.

Development partners (i.e., governments, international financial institutions, and, in some cases, corporations) can play important roles in supporting and incentivizing negotiations – technically, financially, and politically. Some may have no other interest than supporting the efforts of the parties to come to an agreement. Others may be looking to advance their own economic, national security, or political goals. Some, like the United Nations, may be seeking to advance a set of global norms. Each will be working to align the parties with their own interests and may have a range of tools at their disposal.

When mapping the relationships between different actors and how they may influence each other, it may be useful to borrow a term from international relations – "spheres of influence." In this case, rather than trying to identify areas that states or institutions control, consider how different actors may influence the views of others relevant to the process and begin to map out potential pathways to decision-makers. These actors could include parliamentarians, expert or community groups, known or famous individuals, etc.

### *The leadership role*

What motivates a decision-maker to do something different? One option is that their own circumstances have changed. A change in leadership or new facts on the ground may shift their own

view on how best to maximize their interests. In Uzbekistan, the death of President Islam Karimov in 2016 opened the door to cooperation with Tajikistan on the Rogun dam, which Uzbekistan previously opposed (Muratbekova 2018). In the Nile, Egypt had to readjust its expectations for a negotiated outcome on the Blue Nile as Ethiopia advanced construction of the Grand Ethiopian Renaissance Dam.

Another option is that the decision-maker(s) are swayed by external ideas, incentives, or pressure. The United States shifted its approach to managing transboundary waters with Mexico, originally based on the Harmon Doctrine, in part due to growing international consensus around principles for managing shared water (McCaffrey 1996). The World Bank's funding of the Kariba Dam on the Zambezi incentivized cooperation between seven African countries (World Bank 2016). On multiple occasions, diplomatic pressure from the United States and other development partners brought Egypt, Sudan, and Ethiopia together to discuss a potential arrangement on the Blue Nile. It was protests, public pressure, and even bomb threats that escalated Southeastern Anatolia Project into a diplomatic dispute between Turkey, Syria, and Iraq (Dohrmann and Hatem 2014).

### *Crafting the right message to the right audience at the right time*

In almost all cases, a change in political will is often attributable to having the right message in the right place at the right time. The right place can be a private meeting, at the negotiating table, or publicly using known channels for creating public opinion. The right audience changes as well. It may be with the decision-maker(s) or a key influencer with access to the decision-maker(s) (either directly or through other channels, e.g., the media and elections). The right time is when the decision-maker(s) are receptive to hearing alternative ideas – often when existing approaches to resolving the conflict are not working, that maintaining the status quo is too costly, and/or the prospect of negotiation offers greater potential benefit (Ghosn 2010, Salacuse 2013). The right message is one that demonstrates a better outcome is possible – keeping in mind that these outcomes may be the interests of the country, stakeholder, or individual.

There are no established guidelines for how this is done. The following are intended to guide your own efforts at crafting and delivering the right message.

*Be concise and clear with your messaging.* Use precise language. Even within the same language group, different words may have different meanings to different people, often informed by their own lived experiences. It is essential that people *hear* exactly what you intended to say. Never assume that a given translation has captured the nuance, feeling, precision, or ambiguity you had hoped to communicate. Check with the parties often to ensure that any misunderstandings are rapidly addressed and, if necessary, that common terms are defined and agreed to. Intentionally ambiguous language can be important to creating the space for the joint development and acceptance of ideas. Consider memes where appropriate and especially when engaging through the media. Memes capture public attention and have a tendency to grow on their own. Think "water wars" – a great alliterative phrase that generated arguably disproportionate attention to the future possibility of wars over water, despite strong evidence to the contrary.

*Use data and information.* People are more likely to believe ideas or concepts that are supported by facts, data, or experiences. Consider the lived experiences of your interlocutors and tie examples back to shared experiences. Highly regarded technical experts can be particularly influential. Be transparent about sources, assumptions, and methods and acknowledge uncertainties. Be aware of unconscious or cognitive bias. In those cases, be reflective, ask questions, and seek, develop, and acknowledge multiple perspectives.

*Acknowledge grievances – real or perceived.* Past conflicts, genocide, colonialism, and racism are examples of issues that are often not at the front of water discussions but may underlie stakeholder interests and positions. The authors have been involved in discussion where parties have outrightly claimed that other parties were racist. While these are complex issues that can take a generation to address, left unacknowledged they can erode trust, keep the parties apart, and undermine your legitimacy as an influencer. Building political will may require providing the space and time for parties to be heard and acknowledged on issues not proximal to the water issues at hand.

*Use incentives and be cautious when applying political pressure*. External support can reduce the costs and increase the benefits of cooperation and provide a level playing field for negotiations, increasing the likelihood of a positive outcome for a weaker party. Sanctions, demanding adherence to colonial agreements or other international norms, inciting a political transition, for example, can end a process and hurt the very parties you're seeking to help. Don't threaten unless you mean to follow through and no other alternatives exist.

*Know yourself.* Be self-aware and continuously assess whether what you're saying is being heard the way you intended. Monitor yourself from their perspective, in real time, and then adapt to shape how and what you say to ensure that they hear and see you the way you intended. Communicate in respectful and culturally appropriate ways that recognize lived experiences. Know that you may not be the right messenger. People respond to expert authorities, cultural and religious leaders, or others that may generally share their beliefs. Step outside yourself and objectively assess who can best deliver a message with the greatest likelihood of influencing the outcome.

*Be prepared to counter unknown actors.* Have a positive agenda for responding to and countering mis and disinformation, those you know and those you don't.

## Generating a "cadence of cooperative events"

Perhaps nothing reinforces political will more than demonstrable success. This is often what we mean by "low hanging fruit" or "early wins." Demonstrating, or even creating the perception, that cooperative action can occur, ideally with outcomes that benefit each of the parties, can be critical to building and maintaining political will. It reinforces the idea that the parties can work together and that cooperation can yield greater benefits than conflict. This is particularly important in cases where there are strong animosities or no past history of cooperative behavior. It begins to break down social/cultural barriers to cooperation and provides a space for building an esprit de corps around a shared mission. It can also be critical to building and sustaining internal political will – that is, if a decision-maker can show that their approach is delivering progress, it can reinforce internal support for their continued engagement.

These don't need to be grand events. In fact, single grand events may be seen as a fluke, a one-time occurrence, and not a reflection of a broader change in a working relationship. Rather a sustained drumbeat of positive events over time – a "cadence of cooperative events" – can gradually shift the zeitgeist away from conflict and failure toward cooperation and success. Monthly meetings without public acrimony; joint data collection/analysis activities; small projects; joint trips/study tours; shared public appearances and statements; memoranda of understanding; etc. can pave the way toward more permanent institutional reforms.

Any diplomatic process needs to be fed and nurtured. These are Sisyphean tasks. Often, the key is to push that impossible rock up a few inches, lock in success, and then push again. Publicly recognizing successes is how incremental progress is sustained. Never pass up an opportunity to

celebrate, to cut a ribbon, and to tell a good story. It should always come from the parties themselves and not from external parties or those within the process. The parties should capitalize on all opportunities to be credited with success, while others should carry the blame for failures. Building the reputation of decision-makers is an important step in sustaining political will. Maintaining a constant rhythm of success can, over time, vest the parties in the process and erode long-standing barriers to cooperation.

## Last words

In general, the goal of building political will is to influence the actions of decision-makers and create an environment conducive to the outcomes you want. This is the real "art" of water diplomacy – it's knowing when, how, and what to say that will shift the thinking of others.

It's often a war of words, ideas, and approaches where the outcomes could impact the lives of millions and the fate of countries. Approach it with the gravity it deserves.

## Notes

1 Each party must genuinely want to reach an agreement, to be willing to make the necessary concessions to get it. Unless each side has confidence that the other is willing to carry through on its promises, agreements will be difficult to reach (Fisher *et al.* 2011).
2 See, for example, Forest (2021).
3 For more on the issue of ripeness and its complexity, see Zartman (2000).
4 *Observer* – an outside party who is not actively engaged in the discussions but whose presence may improve the discourse and accountability among the parties. *Facilitator* – an outside party that provides at the request of the parties support to the process. This could be technical or legal capacity building, providing data or analysis, and/or financial support. *Mediator* – an actor formally requested by the parties to establish and manage the dispute resolution process. *Arbitrator* – an actor designated by the parties to assess the facts and adjudicate the dispute.
5 In October 2020, while the United States was working to facilitate discussions between Egypt, Ethiopia, and Sudan over the Grand Ethiopian Renaissance Dam, President Trump, upset about Ethiopia's recalcitrance in the discussions, publicly remarked that Egypt "would blow up the dam." He likely believed that such comments would motivate Ethiopia to reach an agreement. In fact, the opposite happened and Ethiopia walked away from the discussions (Getachew and Tih 2020).

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# 20

# JOINT FACT-FINDING TO TACKLE DIFFICULT WATER CHALLENGES

*Todd Schenk, Ben Roston, Kristin Rowles, Megan Rippy, Thomas Birkland, and Stanley Grant*

**Key takeaways**

- Scientific and technical information is invaluable to decision-makers and other stakeholders involved in water diplomacy, but cannot solve issues alone and is often politicized.
- Joint fact-finding approaches bring stakeholders together to collectively identify their information needs, frame research agendas to address those needs, identify and work with scientific and technical experts, and collaboratively interpret the data collected.
- Joint fact-finding helps participants to answer technical questions in ways that engender shared ownership of the data, foster shared learning, facilitate buy-in and collaborative decision-making, and enhance sophisticated understanding of social-ecological systems to improve decision-making in practice. However, it is not a panacea.
- This chapter examines the application of joint fact-finding in efforts to work across organizational and jurisdictional boundaries to tackle inland freshwater salinization in the Occoquan Reservoir in Northern Virginia, providing an important opportunity to test these approaches.

## Introduction

Like most problems faced by communities at all scales, decision-makers and other stakeholders engaged in efforts to address water availability and quality challenges frequently seek scientific and technical information that they hope will provide clarity and help them resolve disputes. Unfortunately, scientific and technical information on its own is rarely sufficient. Supposedly objective science quickly becomes politicized, with parties marshaling the "facts" that best support their respective positions. Persistent uncertainties and dynamic conditions make the pursuit of a single best answer unrealistic. Furthermore, trust in science often wavers, especially when parties are not receiving the answers they want.

Joint fact-finding (JFF) efforts engage the suite of stakeholders working to address water diplomacy and other challenges in collaborative processes to collectively identify what scientific and technical information could help them to move forward with their decision-making, devise research questions and accompanying agendas to collect and make sense of research data, partner

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with experts that all stakeholders believe can advance those research agendas, and ultimately develop shared understanding of the systems they are focused on. JFF does not promise generalizable solutions to the complex situations it is employed within but can help parties to make wiser decisions as they seek to balance competing interests and priorities while attending to biophysical dynamics in complex socio-ecological systems (SES).

This chapter illustrates the use of JFF in practice by presenting a case in which it is being employed in Northern Virginia (United States) to address the challenge of inland freshwater salinization in the Occoquan Reservoir. This watershed provides drinking water to over one million people and is experiencing increasing salinity over time. A large and complex effort, funded by the National Science Foundation, is engaging a range of stakeholders and a project team comprised of biophysical and social scientists. This is an iterative effort that engages stakeholders to identify research needs, conduct research, and share findings with stakeholders, making sense of findings together, and repeating these cycles to contribute to ongoing learning and shared understanding. The case offers an exciting opportunity to systematically apply JFF and make sense of the lessons learned.

Participants' feedback suggests that they find the JFF dimensions of the project to be helpful in answering their technical questions in ways that foster shared learning. Furthermore, the collaborative nature of the research enterprise is facilitating consensus among all stakeholders, allowing the group to collectively wrestle with the freshwater salinization issue. This suggests that JFF can enhance understanding of SES (Ostrom 2009) and subsequently advance self-organization to sustainably manage resources. However, project experiences underscore that JFF is never a panacea; the project team must tread carefully as it works with other stakeholders to foster consensus around what data is important and arrive at the implications of findings on practice. Furthermore, JFF is often best thought of as an iterative process, necessitating flexibility. Furthermore, the shared learning JFF is meant to foster is contingent on good conversation and thus robust process design. JFF is hard and requires ongoing relationship management but can help parties to find ways forward when scientific and technical information is contentious but ultimately critical to decision-making.

## The need for joint fact-finding

We live in a time in which scientific and technical information is decreasingly trusted by decision-makers and the wider public (Pew Research Center 2022). The possibility for meaningfully objective science has long been questioned on various fronts (see Reiss and Sprenger 2020). The patina of objectivity is further eroded when scientific efforts and results are used by parties to generate and selectively highlight *scientific facts* that support their interests and priorities, leading to competing sets of information marshaled by parties at odds with each other (Slob and Staman 2012).

One can legitimately question why we *should* defer to scientific and technical information even if we do not question its credibility when juggling competing interests and priorities. Any given dataset may lead us to a certain conclusion, but the data were not necessarily generated for that purpose and are typically not attentive to other considerations. The resolution of virtually any public policy debate, including those around water, requires the synthesis of and attentiveness to *social facts* and *scientific facts* (Islam and Susskind 2022).

Parties' concerns are also often on very different time scales, and they discount the future at different rates. Further complicating matters, while the nature of the scientific method has always made definitive answers impossible, uncertainty has become more pronounced as we seek to tackle issues at wider systems scales and across disciplinary domains. It can be challenging to translate scientific and technical data into information that is useful for decision-making at the best of times, and we live in complicated times with low trust in virtually all institutions, from elected

officials to scientists (Pew Research Center 2022). Decision-makers are increasingly confronted by what Adler (2017, 30) calls "Science Intensive, Politically Snarky Disputes." Unfortunately, these disputes often devolve into protracted legal battles with grossly delayed, zero-sum, and inherently unstable outcomes.

Even when groups do seek to cooperatively tackle difficult policy and planning problems, they can find themselves wrestling with each other over how to use scientific and technical information. Adler (2017, 32–34) identifies six challenges that complicate efforts at the "science-policy-citizen" interface: Communications issues, given that scientists, decision-makers, and other stakeholders typically speak different languages; the conflation of science and policy questions; differences in how disciplines make sense of the world, and poor communications across them; adjudicating the relevance and salience of information in a world with information overload; differences in risk perception and realities; and the persistence of the belief among some scientists that they can and do act neutrally and thus are best equipped to objectively tackle science-intensive problems. These challenges underscore the complexities of addressing issues that involve both social and scientific facts.

Despite the myriad challenges complicating interactions at the science-policy-citizen interface, many decision-makers and other stakeholders ultimately still seek to make evidence-based decisions (Davies 2012). Rather than rejecting scientific and technical information wholesale, they seek information that is: *salient* (i.e., relevant) to their particular context and decision-making; *credible* insofar as it meets context-independent scientific standards; and *legitimate* insofar as the process through which it is generated and interpreted is seen to be fair, accounting for multiple values, interests, circumstances, and perspectives (Cash et al. 2002). Effective interactions at the science-policy interface require much of all involved, including scientific and technical experts (Knaggård et al. 2019). They also require new institutional arrangements and processes designed for productive, more collaborative boundary work (Quick and Feldman 2014). JFF offers such a framework for collaboration among decision-makers, other key rights holders and stakeholders, and scientific and technical experts.

## Introducing joint fact-finding

JFF brings scientific and technical experts, decision-makers, and other key rights holders and stakeholders together to engage in shared learning as they seek to address public policy and planning challenges. The goal is to generate a shared set of information that all parties, despite their diverging interests and priorities, find *salient*, *credible*, and *legitimate*. Groups engaged in JFF typically (Matsuura and Schenk 2017a):

- Collectively identify what scientific and technical information would help them to advance their understanding, often in the service of their decision-making;
- Translate those needs into research questions and accompanying research agendas;
- Engage relevant experts that all see as trustworthy and able to implement the research agenda; and
- Jointly receive and process the results, and collectively consider the implications on the policy and planning challenges they are tackling.

Figure 20.1 provides an archetypal model of how JFF efforts can be implemented, derived from both an empirical examination of many cases and theoretical conception of best practice. Real-world applications diverge from this model, but it nonetheless offers a reasonable representation.

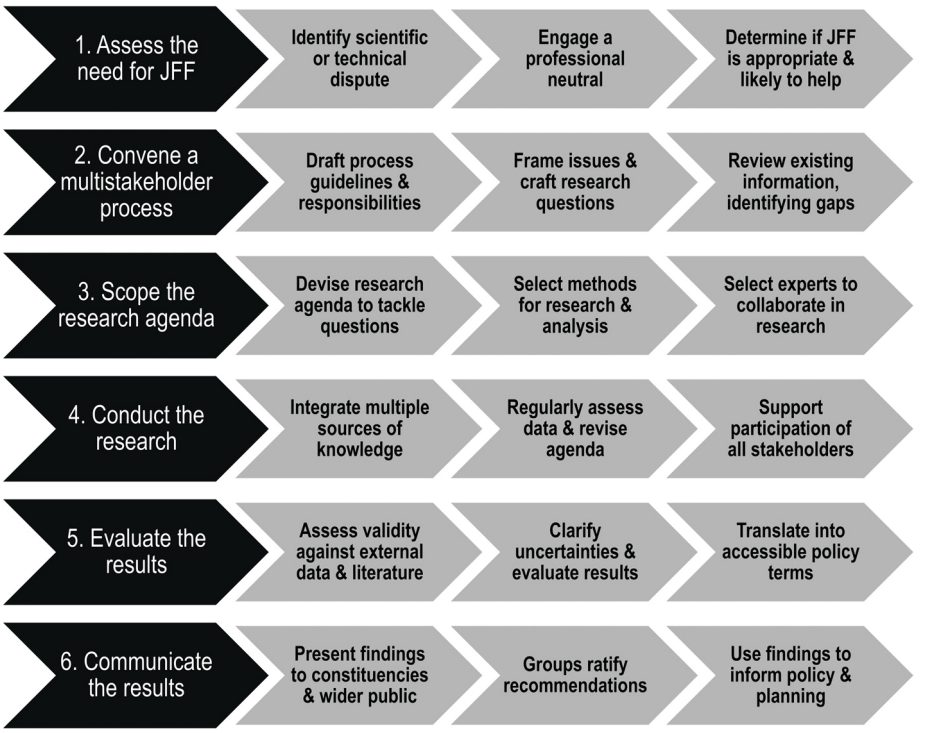



*Figure 20.1* Steps in the joint fact-finding process.
Source: Matsuura and Schenk (2017a, 5).

JFF is not always necessary or appropriate. Any agency or other organization considering convening an effort should consider: (1) Are there information gaps that a process might be able to address? (2) Is the agency or organization willing to truly support and engage with other stakeholders through the process? (3) Are key rights holders and stakeholders able and willing to engage? (4) Can the convening agency or organization invest the necessary time and other resources? While the conventional alternative is typically less productive processes characterized by adversarial science (i.e., parties marshalling competing knowledge claims), there are other ways to broker shared understanding. Some might be characterized as "JFF lite," with decision-makers and other parties agreeing to a relatively narrow fact-finding endeavor with one or a small number of experts they all trust engaged to provide a specific set of data. Professional neutrals can help to assess the viability and appropriateness of potential JFF efforts, including by testing the waters with potential stakeholders (Susskind et al. 2017).

When a convening agency or other organization gives a JFF effort the green light, the next step is convening a multi-stakeholder group with representation from the key constituencies. Drawing from proven practices in other models of collaborative governance, including the consensus-building approach, JFF efforts typically involve the formal engagement of stakeholder group representatives, rather than relying on other models of representative selection such as random or self-selection (Susskind et al. 2017). Ideally, careful attention is paid to identifying relatively small groups of representatives that are seen as legitimate by the constituencies they represent (e.g., agencies, environmental groups, fisheries industry, tribal nations). Parties often choose their

own representatives, in partnership with conveners and facilitators. Representative selection is straightforward in some cases and challenging in others; sometimes facilitators organize stakeholder group meetings to facilitate selection. First tasks for the group once convened include clarifying objectives and research questions and drafting initial work plans and ground rules.

Once the groundwork is laid, the next step is to translate the group's objectives and research questions into a research agenda. This scoping process is typically done in concert with scientific and technical experts, whether or not they are part of the stakeholder group (Susskind et al. 2017). Stakeholders may have more or less interest in working with experts to identify methods for research and analysis but should be clear around their expectations, including how resulting information will be presented. Facilitators often play a central translational role here and at various other points in the process. External factors—such as existing regulations—can bound the scoping process.

Conducting research is at the heart of most JFF efforts, insofar as it is necessary to help members of the group improve their collective understanding of the issues. There is variability in how closely other stakeholders work with scientific and technical experts as research is conducted. In some cases, the researchers simply do the research on their own and then bring it back to the group. In other cases, stakeholders engage directly in the research, sometimes approximating methods of "community science." Many take a middle-way in which scientists regularly interact with stakeholders—especially as they complete data gathering, generate preliminary findings, and start to draw conclusions—but conduct the research itself independently (Susskind et al. 2017). Striking an appropriate balance between researchers' independence and stakeholder engagement can be tricky. However, the chances that the findings will be widely accepted as salient, credible, and legitimate are significantly improved when the stakeholders have been kept abreast and had input on the research process.

It is of utmost importance to clarify that Western science does not have a monopoly on scientific and technical knowledge. Indigenous and local knowledge provide essential understanding and thus also need to be appropriately interwoven into JFF efforts. There is no shortage of examples of times in which ostensible experts erred while local knowledge-holders had more accurate and nuanced understandings of the systems of which they are a part (Berkes 2018). However, this does not mean that Indigenous and local knowledge are always appropriately integrated into JFF or wider decision-making, nor that it is easy to do so given different epistemologies and the risks posed to knowledge-holders through engagement (Thompson et al. 2020). Integration requires intentional decisions on the part of conveners and facilitators to integrate a wider spectrum of voices and their invaluable knowledge.

In the evaluation stage, stakeholders, decision-makers, and scientific and technical experts assess the implications of their findings (Susskind et al. 2017). Matters to be discussed include the degree of confidence in those findings, presence and nature of remaining uncertainties, and significance of any assumptions made. Participants may want to engage in formal peer review or validation of findings against other relevant literatures. If not done earlier in the process, findings should be translated into language that is accessible to the wider membership of each stakeholder group. As with all good science communication, this involves understanding the various audiences, including their interests and priorities vis-à-vis the information being presented.

As the findings are finalized, the group should pivot to translating the scientific and technical information into policy recommendations. Stakeholders should be involved in taking the findings and recommendations back to their constituencies and nurturing salience, credibility, and legitimacy among those wider communities. Ideally, the findings will then be used to reframe positions and move groups toward consensus on how to tackle the issues at hand. Depending on the nature of the JFF effort, the findings may be directly injected into an ongoing decision-making process or added to the more general body of knowledge informing discussions around an issue.

As noted previously, JFF in practice can diverge significantly from this model. One notable and common variation from the model outlined here is that many processes in practice are embedded within larger multi-stakeholder collaborative governance (e.g., consensus building) efforts, complementing those initiatives by helping groups to increase their shared understanding or address specific technical questions (Innes and Booher 2018; Susskind et al. 2020). Standalone efforts are typically less oriented toward devising specific policy outcomes and more toward building shared understanding for wider usage, while JFF is typically embedded within wider governance processes to help narrow factual disputes as they tackle specific policy or planning challenges (Adler 2017).

Another common variation across the range of JFF efforts is when and how scientific and technical experts are engaged. In some cases, they are core participants sitting alongside other stakeholders at every stage. In other cases, they are brought in by the group during the research phase (step 4 in Figure 20.1) to answer very specific research questions. In many cases, they are engaged for much of the process but not as full stakeholders—for example, engaging in the scoping, research, and interpretation but not broader deliberations around the implications. The more intensive their involvement, the more is asked of scientific and technical experts to become genuine and effective collaborators (Andrews 2002). Regardless of when and how experts are engaged, their selection is an important consideration. Decision-makers and other stakeholders should agree on the selection of experts or their legitimacy may be compromised.

Deliberation and conversation are central to the JFF process. Effective JFF involves heterogeneous groups engaged in conversation as a form of experiential learning, within which they construct meaning by embracing differences and creating conversational spaces to foster individual and collective learning (Baker et al. 2005). The five dialectics that Baker et al. (2005) introduce as a theoretical foundation for conversational learning—apprehension and comprehension, reflection and action, epistemological discourse and ontological recourse, individuality and relationality, and status and solidarity—are helpful as we consider how conversation is attended to within JFF processes.

JFF adopts many established techniques from the wider world of collaborative governance to, among other things, foster conversational learning. A key technique drawn from best practice in the consensus building approach is the use of professional facilitation; facilitators bring in essential process design expertise, and shepherd groups through what can be complex enterprises, involving numerous scientific and technical experts and no shortage of hurdles along the way (Karl et al. 2007).

Participation in JFF efforts is typically quite intensive in nature, requiring serious time investments at and away from the table. Many processes are complemented by wider public participation interventions, such as public meetings and the dissemination of summary briefs, but the core group is expected to heavily invest their time and effort in the deliberative process (Matsuura and Schenk 2017b). The investment is worthwhile when groups derive concrete policy outcomes, informed by their JFF, that are broadly seen to be more "fair, efficient, stable and wise" by participants and their constituencies (Susskind and Cruikshank 1987, 21). However, serious attention must be paid to ameliorating resource discrepancies among stakeholder groups that could impede their full participation. Processes typically go better when the time commitments are clear up front, and adequate resources are provided. Experts must also be adequately compensated for their time if they are going to show up and not only do the technical work but also the multi-stakeholder engagement.

The core principle of JFF is the engagement of multiple stakeholders in all or at least many steps in the fact-finding process. While the ideal model presented above outlines a particular approach to JFF, in practice it may be interwoven with many other existing approaches to governance at

the science-policy interface, including but not limited to collaborative adaptive management, systems modeling, scenario planning, environmental impact assessment, risk assessment, benefit–cost analysis, and life cycle analysis (Susskind et al. 2017). These approaches are often already either mandated for decision-making or familiar to and preferred by decision-makers and other stakeholders; JFF practices can be integrated, advancing shared learning and more collaborative decision-making.

## Examples of JFF advancing water diplomacy

JFF is not new, with scholarship documenting efforts and contributing to our evolving understanding of best practice going back more than 35 years (Andrews 2002; Ehrmann and Stinson 1999; Karl et al. 2007; Matsuura and Schenk 2017b; McCreary, forthcoming; Ozawa and Susskind 1985). JFF has been employed in a wide variety of contexts, including in efforts that can be characterized as water diplomacy. A few of the many examples are introduced below.

In the 1980s, the New York Bight—which is comprised of the Hudson and Raritan River estuaries and associated bays along the New York and New Jersey coastlines—had a problem: Contaminants, including polychlorinated biphenyls (PCBs), were harming human health and the marine ecosystem. In response, the New York Academy of Sciences convened a multi-stakeholder group of agency staff and fisheries, port, environmental, wastewater utility, and manufacturing representatives to collectively learn about the sources, fates, and effects of PCBs and seek consensus around how to tackle the problem (McCreary, forthcoming). The group met ten times over the course of ten months, engaging with scientists to inform their deliberations. The final product was a "single text" document that all parties accepted, which conveyed both a shared understanding of the facts (e.g., "PCBs are the focus of longstanding attention for a variety of reasons including findings reported in peer-reviewed literature showing their persistence in the environment and biota, carcinogenicity in animals, and health effects in humans") and provided concrete recommendations to address the problem (e.g., "Improve procedures for secure interim storage and destruction of PCBs contained in electrical equipment in the New York Bight region") (McCreary, forthcoming, 2–3). This is one of the earliest examples of JFF, and it was influential on the practice with lessons learned still resonating today. Among these lessons is the persistent challenge of maintaining the credibility and legitimacy of findings post-deliberations when parties come to see the outcomes as threatening to their interests, even when they fully bought into the process that generated them. Despite this challenge, another lesson learned is that such efforts can have significant influence on policies and planning over the longer term, as was clearly the case here (see McCreary, forthcoming).

Coastal zone management is an area ripe for JFF. Stakeholders often have very different interests and priorities, the stakes can be very high, and relevant scientific and technical information can be rife with uncertainties and complex in nature. Integrated approaches that bring stakeholders together to seek consensus through, among other things, shared learning can foster stable, well-informed, and implementable agreements (McCreary et al. 2001). Likewise, JFF can be instrumental to marine protected area planning. In the successful case of north central California's marine protected area network planning, a core principle was the provision of "clear science guidelines and effective decision support to ensure access to the best readily available scientific information, local knowledge, and spatial data by stakeholders, scientists, and decision-makers in a joint fact-finding approach" (Gleason et al. 2010). One particularly notable dimension of this case is that the JFF explicitly integrated scientific analysis with local context and knowledge. The process explicitly engaged local stakeholders not merely as recipients of information, but to share their knowledge, filling critical data gaps and providing invaluable nuance and context.

The state of California's CALFED Bay-Delta Program coordinates an extensive suite of activities conducted by federal, state, and local actors intended to address the interrelated water issues in the Sacramento-San Joaquin River Delta. CALFED's work is inherently multi-stakeholder, involving various agencies and numerous other stakeholders, and scientifically and technically complex, given the vast infrastructure involved and serious ecological, social, and economic implications of decisions made. CALFED established a network of task groups to improve coordination and facilitate timely decision-making. Given the need for consistent, shared information generally accepted as salient, credible, and legitimate, CALFED has a Data Assessment Team comprised of staff from various agencies and other stakeholders to analyze biological, hydrological, operational, and other data and make recommendations to the CALFED Operations Group. CALFED's multi-stakeholder scaffolding has sped up decision-making and reduced conflict (Innes and Booher 2018; McCreary et al. 2001). One innovative program that grew out of the CALFED effort—the Environmental Water Account (EWA)—is using JFF to effectively manage "water banking" so that different stakeholders can get the water they need when they need it and bank it when they do not. Here, JFF improves collaboration and ultimately efficiency (Innes and Booher 2018). The rapid decision-making and water trading core to the EWA's success rely upon the timely information on water conditions, fishery health, and other variables that their JFF process provides. An independent review of the EWA program concluded that, in addition to the hydrological and ecological benefits, the program has generated significant social learning and capacity building among those involved and fostered critical and creative thinking (Innes and Booher 2018; McCreary et al. 2001).

A very sophisticated JFF process was established to tackle the question of what kind of water intake should be used for a proposed desalination plant in Huntington Beach, California (McCreary and Cowart 2017). The project proponent, Poseidon Water, and regulatory agency, the California Coastal Commission, hired the firm CONCUR to design and facilitate the process, which engaged an Independent Scientific and Technical Advisory Panel made up of geo-hydrologists, construction technologists, economists, biologists, and other experts, all approved by both the Commission and Poseidon. The group engaged in extensive modeling and other research, deliberated intensively, and ultimately generated two reports unanimously supported by all members of the expert advisory panel. Various mechanisms for broader public engagement complemented the advisory panel's work. While consensus was reached among the advisory group, this case also illustrates some of the challenges associated with JFF in practice, including: Reliance on data from certain stakeholders, given resource and time constraints, which can be beneficial but also threaten legitimacy if others see it as biased; the tendency of parties to 'system jump' and attempt to bring new issues into the conversation, especially when they see opportunities to advance their interests by doing so; parties failing to commit to particular steps post-process; and the fact that higher-level policy changes can eclipse or diminish the influence of such efforts (McCreary and Cowart 2017). On the latter point, the plant has still not broken ground over six years later due to higher-level regulatory changes.

Broadly defined, JFF occurs under a variety of names and employs various techniques. Collaborative adaptive management—which emphasizes ongoing and iterative learning among multi-stakeholder groups seeking to advance conservation and resource management in the face of persistent uncertainty, systemic complexity and interconnectedness, and dynamic conditions—may be considered a form of JFF (Scarlett 2013). This makes the Glen Canyon Dam Adaptive Management Program (AMP) another JFF example, insofar as it involves a complex network of decision-makers, other key rights holders and stakeholders (including state and federal agencies, tribes, water users, power producers, recreational interests, and environmentalists), and scientific advisors. The AMP's main Adaptive Management Work Group identifies information

gaps and uncertainties as they deliberate on potential management options for the dam. The associated Technical Work Group translates those gaps into research questions. The Grand Canyon Monitoring and Research Center, which is operated by the U.S. Geological Survey, is charged with conducting research. Independent review panels validate research products. Despite the major investment, the results have been mixed. While significant learning has occurred, the group has rarely arrived at or heeded recommendations on how to respond, and their lack of impact on decision-making underscores the need for clear objectives and procedures for fostering consensus and the importance of legitimacy on the part of experts in the eyes of stakeholders (Susskind et al. 2012). The current drought and resulting low water conditions in Lake Powell (the dam's impoundment) no doubt greatly complicate the work of the AMP but also underscore the importance of scientifically grounded and broadly supported management decisions.

While these various examples illustrate the promise and benefits of JFF, they also underscore the challenges. The practice of JFF can still be further honed, but perhaps more importantly JFF processes are ultimately limited by the wider institutional environments within which they are created and their outcomes translated. JFF cannot provide all *the answers* to complex socio-ecological and socio-technical problems but holds promise in informing wiser conversations as groups seek ways forward, including around challenging water issues. Of course, attention must also be paid to the nature of the conversations within JFF groups. Groups must grapple with dialectics like status and solidarity; the inordinate elevation of scientific and technical experts can inhibit new perspectives while excessive solidarity can downplay important contributions (Baker et al. 2005).

## Tackling freshwater salinization in the Occoquan Watershed: A case study of joint fact-finding to advance water diplomacy

Collaborative governance is employed to advance water diplomacy for a variety of reasons, including when responsibility for managing water challenges is shared or ambiguous. It is particularly appropriate when decisions are likely to be contentious. JFF can be a valuable complement to collaborative efforts to tackle water challenges when groups identify gaps and seek information that they feel can contribute to their shared learning and conversations, provided that they collectively view that information to be salient, credible, and legitimate (Cash et al. 2002).

The management of freshwater salinization is such a challenge, ripe for collaborative governance and JFF insofar as numerous sources contribute to salinization; significant uncertainty exists around the nature of the problem and how it could best be tackled; responsibility to address this emerging threat is often unclear and existing regulatory frameworks inadequate; myriad actors could potentially take actions to address the challenge; and the majority of those actors are concerned about the implications of possible management decisions.

This section of the chapter illustrates the application of JFF within a broader multi-stakeholder effort to advance shared understanding and potentially collaborative governance to address the inland (i.e., not coastal) freshwater salinization challenge. This section discusses the *Common Pool Resource Theory as a Scalable Framework for Catalyzing Stakeholder-Driven Solutions to the Freshwater Salinization Syndrome* project, funded by the National Science Foundation under the Growing Convergence Research program (award #2021015). The project is facilitating shared learning and exploring the potential for shared governance to tackle freshwater salinization in the Occoquan Reservoir, which is a drinking water supply for up to one million people in Northern Virginia, United States. The stakes are particularly high in this rapidly growing region because the Occoquan is home to the first large-scale indirect potable reuse system in the United States, which was established in the 1970s. Furthermore, the implications

of rising salinity could be profound and have significant environmental and human impacts, including, potentially, the need to desalinate 'fresh' water at a cost of up to one to two billion US dollars (Bhide et al. 2021).

### *The freshwater salinization challenge*

Unfortunately, inland freshwater salinization is a significant and growing issue globally; water bodies around the world are seeing increases in total dissolved solids, base cations and anions (sodium, chloride, magnesium, calcium, potassium), and alkalinity (Kaushal et al. 2018; Kaushal et al. 2023). In the case of the Occoquan, average sodium ion concentrations at the dam near Fairfax Water's Intake have almost tripled since the 1980s; they now frequently exceed the health advisory levels for individuals on low-salt diets (20 mg/L) set by the Environmental Protection Agency (EPA) and occasionally also exceed the EPA's lower taste threshold for sodium (30 mg/L) (Bhide et al. 2021).

The effects of freshwater salinization can include: declines in food production; human health impacts, especially for those on low sodium diets; adverse taste; accelerated leaching of heavy metals such as lead in water infrastructure; infrastructure corrosion, including of concrete; the mobilization of heavy metals and nutrients into surface water; and declines in benthic invertebrates (Grant et al. 2022). However, as noted previously, addressing freshwater salinization also has impacts, including the costs and environmental impacts associated with installing desalinization capacity into our drinking water supplies, the economic impacts of discharge restrictions on economically important local industries, and potential safety impacts associated with changes to deicer use and transportation norms during winter weather. The costs on either side are part of what make navigating freshwater salinization challenging and JFF practices particularly valuable.

Increasing salt concentrations can be attributed to various sources, including deicer use on roads, parking lots, and driveways; water softener use; water and wastewater treatment; industrial discharges; agricultural activities; human excretion; household product use (e.g., laundry detergents and the application of fertilizer to lawns); concrete weathering; and geologic materials weathering, which is greatly accelerated by human activities (Grant et al. 2022; Kaushal et al. 2023). The relative weight of each of these sources varies significantly by situation, depending on local activities and conditions. Different sources are also more or less dominant over time and exhibit seasonal variability. In the case of the Occoquan Reservoir, sodium ion concentration in highly treated wastewater entering the reservoir derives on an annual average, from drinking water treatment (3.9%), wastewater treatment (4.2%), a permitted microfabrication facility (13.8%), and human excretion (14.1%); the remaining 64% comes from a variety of other sources (Bhide et al. 2021), including possibly household detergents (unpublished data).

With the exception of chloride and total dissolved solids, current federal water quality regulations in the United States do not regulate salt pollution. State-level regulations in the Commonwealth of Virginia, in which the Occoquan water and sewershed are located, also do not address salt. Furthermore, there appears to be little appetite at this time to further regulate salt, at least in Virginia, although some have called for regulations to address freshwater salinization (Hintz et al. 2022; Schuler et al. 2019). In addition to political constraints, a significant barrier to regulation is that freshwater salinization does not fall cleanly under the jurisdiction of any single agency or even domain; it is concurrently an environmental, public health, and public infrastructure issue. These challenges do not mean that regulation is a bad idea or impossibility, but rather that management—whether by regulation or other means—is complex.

### *Stakeholder-driven solutions to address freshwater salinization*

The *Common Pool Resource Theory as a Scalable Framework for Catalyzing Stakeholder-Driven Solutions to the Freshwater Salinization Syndrome* project is engaging key stakeholders associated with the Occoquan Watershed and sewershed to explore the potential for bottom-up (i.e., stakeholder rather than regulation-driven) solutions to tackle this challenge. Such solutions will not necessarily supplant regulation, but they could allow for more immediate and coordinated responses in this complex domain in which multiple actors have leverage and are responsible for different pieces of the puzzle.

This project is rooted in Elinor Ostrom's (1990) common pool resource theory, which asserts that institutional arrangements can evolve to allow for collective and coordinated action among actors even in the absence of top-down coercion from regulators to do so. An underlying assumption is that freshwater salinization can be framed as a common pool resource problem, with the assimilative capacity of freshwater systems as the limited resource. Assimilative capacity can be treated as a common pool resource because it is available to virtually everyone associated with the system, from salt applicators to homeowners to wastewater treatment operators, and it is virtually impossible to prevent access to the resource. Furthermore, more salt load from any one actor to the system reduces the assimilative capacity available to others (Grant et al. 2022). What differentiates this project from most previous work employing Ostrom's framework is that we are exploring the *potential* for a collective governance regime to emerge to address this relatively nascent problem; most prior work involves empirically analyzing existing arrangements managing common pool resources. We assert that Ostrom's (2009) related SES framework can serve as a diagnostic tool for identifying context-specific barriers and opportunities for bottom-up collective management of this freshwater salinization problem.

To test the application of Ostrom's SES framework as a diagnostic tool, and with the hope of advancing collective action to address freshwater salinization in the Occoquan, the project created a multi-stakeholder group with almost 50 members called the Executive Committee for the Occoquan System (ECOS). Members come from various organizations, including utilities, state agencies, municipalities, and nongovernmental entities. ECOS meets roughly quarterly, with information exchange between meetings in various forms, including white papers, workshops, interviews and mental modeling exercises, and informal conversations (one-on-one and in small groups). ECOS meetings are interactive in nature, with significant time devoted to small group discussions and other means of participant engagement. The project team regularly shares research data and other findings with ECOS, within the existing context of ongoing management efforts and with opportunities for group deliberation.

Given how central scientific and technical information is to both understanding the nature of the problem and exploring ways to tackle freshwater salinization, research products are often core to the work of ECOS. In order to enhance the saliency, credibility, and legitimacy of those research products and maximize responsiveness to stakeholders' needs, the project has explicitly embraced a JFF approach. Vis-à-vis Ostrom's (2009) SES framework, the working hypothesis is that JFF will help the group to enhance their collective understanding of various 'second-level variables', including *predictability of system dynamics* (RS7) and *knowledge of the SES* (U7).

### *Joint fact-finding to advance saliency, credibility, and legitimacy*

One challenge when tackling an issue like freshwater salinization is that often a disconnect exists between the information needs of decision-makers and other stakeholders and what scientists and

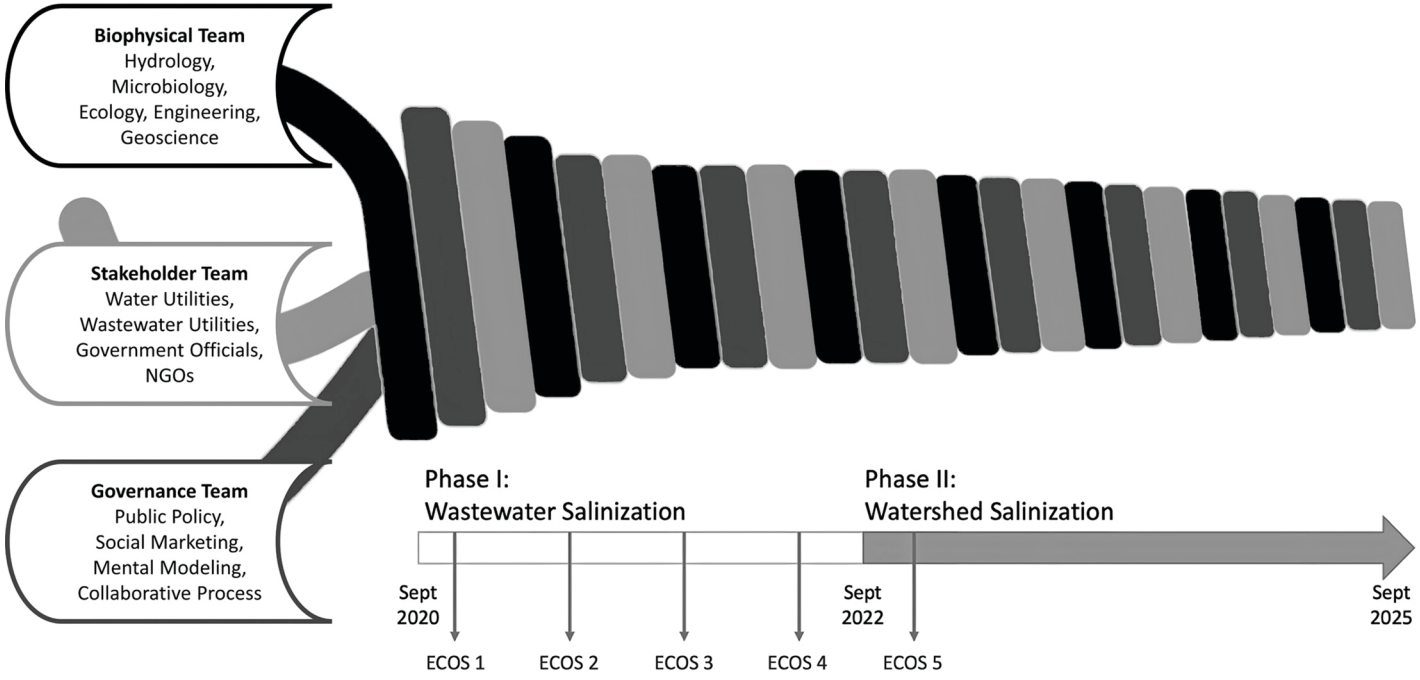



*Figure 20.2* Convergence through the Executive Committee for the Occoquan System (ECOS).

engineers are producing. Researchers and policymakers have very different incentives, influences, connections with advocates, accountabilities, knowledge span and depth, tolerance for uncertainty, conceptions of what constitutes "valid" data, means of receiving information, timeframes for action, and concern with dissemination (Brownson et al. 2006). Bridging the science-policy interface requires different modes of interactivity that move far beyond the traditional "loading dock" model of experts creating information and putting it out in the world with little or no attention to how it might be understood or used. As outlined earlier in this chapter, JFF offers a way forward by bringing scientific and technical experts together with decision-makers and other stakeholders to collaboratively establish research needs, define research agendas, sometimes even conduct research together, and collectively assess findings. The *Freshwater Salinization Syndrome* project embodies the JFF approach by intertwining the biophysical research agenda, social science research agenda, and stakeholder representatives (see Figure 20.2).

This interactivity is achieved through regular ECOS meetings between the research and stakeholder teams and episodic engagement between meetings. As noted previously, information exchange is a core component of these meetings and other interactions. Stakeholders played a major role in shaping the research agenda from initial project conception; over 100 people participated in a *Salt Management Workshop* in January of 2020 and provided their perspectives on the freshwater salinization issue and how it might be tackled. Their insights played an important role in shaping the project proposal that was ultimately submitted to the National Science Foundation and funded.

A variety of tools have been used to engage stakeholders in reciprocal dialogue over the course of this project. A key example is the use of *fuzzy cognitive maps t*o explore stakeholders' and team members' mental models of freshwater salinization, including causes and consequences of salinization, potential mitigating actions, and the information needed to better understand the system and prioritize these actions (Rippy et al. 2024). Information needs identified during one-on-one cognitive mapping interviews were grouped based on how frequently they were mentioned and the project team's opinions on how they fit with project plans and scope (i.e., currently addressing, already planned for later in the project, not planned but possible, and out-of-scope for the project). ECOS members were given the opportunity to confirm whether the researchers' assessments were correct, further explain what these information needs mean in practice, and deliberate over how they might be tackled (see Figure 20.3).

This process yielded genuine alterations to the project at both the micro and macro levels. For example, two of the topics listed under not planned but possible—data on willingness to change behavior and case studies of salt management across watersheds—received strong stakeholder support and ultimately became priorities for the project team. The former prompted the development and administration of a home product survey geared toward evaluating product use preferences and willingness to change behavior in response to information about environmental impacts. The latter resulted in a comparative assessment of sodium ion concentrations in the Occoquan Reservoir near Fairfax Water's intake relative to sodium ion concentrations statewide, to help contextualize the "current state" of local freshwater salinization relative to other watersheds within the state. This kind of iterative scoping of the research agenda may be applied in other contexts, although it does require significant flexibility on the part of the research team.

Another important way that JFF has been employed to enhance the saliency, credibility, and legitimacy of the research products is through the review of research findings by ECOS (see Figure 20.4). Research findings are typically vetted with ECOS members before papers are finalized. This provides opportunities for stakeholders to provide feedback, deliberate on the implications of research findings for practice, and contribute to research products; several publications to date feature ECOS stakeholders as coauthors. Once published, stakeholders have additional opportunities

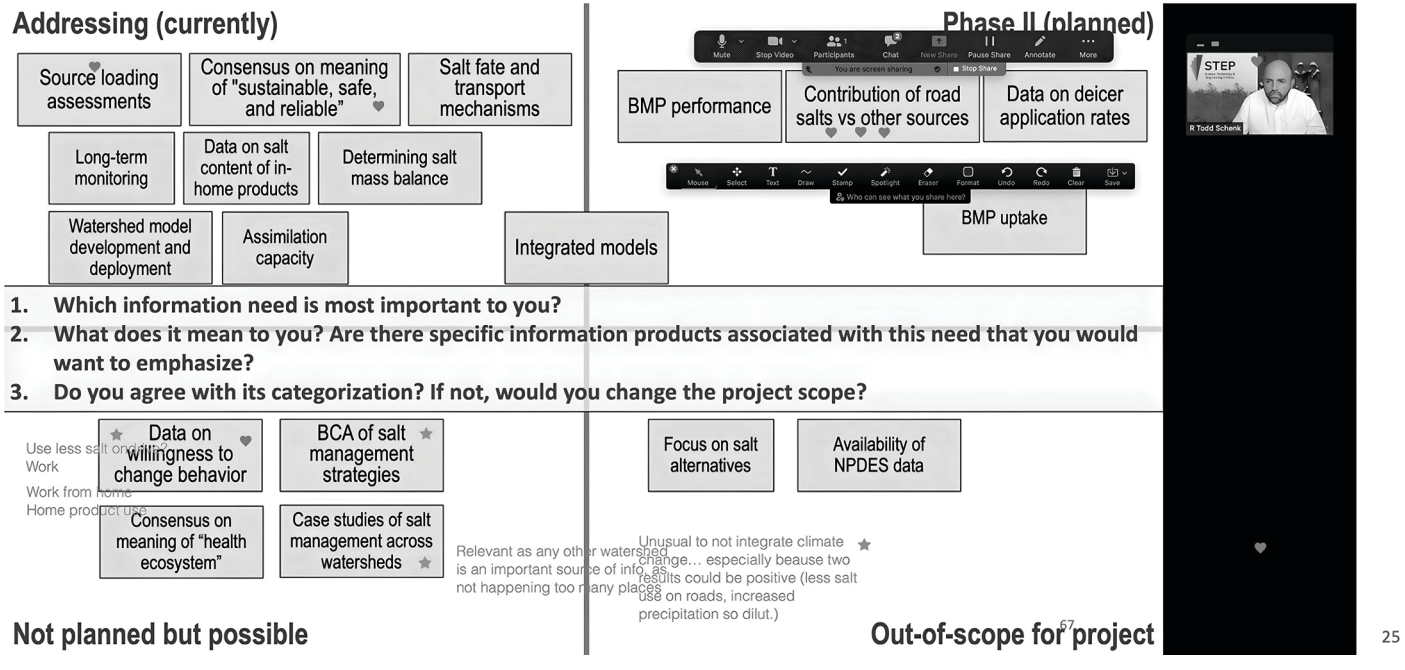



*Figure 20.3* Engaging stakeholders (ECOS) in vetting research plans.

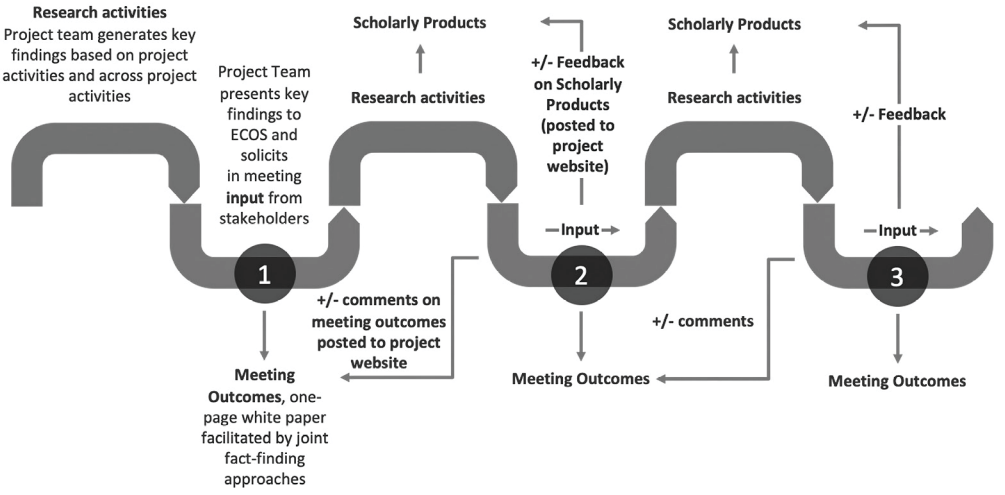



*Figure 20.4* Iteration, ongoing engagement, and the vetting of research products.

to provide feedback; this process has had real implications, including an "author correction" to one of the team's major research products (Bhide et al. 2021).

### *Stakeholder feedback on joint fact-finding efforts*

A goal of this project is to identify and test new ways to assess the efficacy of JFF efforts. Both qualitative and quantitative feedback has been collected from ECOS members. Future work will expand upon both our assessment methodologies and approaches for their validation.

A primary source of quantitative feedback has been through surveys that explicitly ask participants for their assessment of the saliency, credibility, and legitimacy of various research products and approaches (see Figure 20.5). Cash et al.'s (2002) three criteria can serve as useful metrics for stakeholder evaluation, as they comprehensively yet concisely get at how useful and trustworthy respondents find the data in question. Higher ratings would suggest that the products generated and approaches conducted were more suitable in the eyes of respondents. The responses in Figure 20.5 suggest that different products and approaches are seen to be more or less salient, credible, or legitimate. As can be seen, participants were asked directly about JFF as an approach; they rated it quite highly, on average, suggesting that JFF is a worthwhile approach in the eyes of most participants.

ECOS members have also been asked about their experiences with and opinions on the project's JFF approach in qualitative interviews. Here, too, the feedback has been largely positive. "I think this whole process has a lot of saliency," opined one participant. Another reflected that their "viewpoints changed after a number of these workshops to where I'm more ready to embrace this and some of these concepts going forward than I would have been originally." This suggests that the approach is yielding genuine shifts in participants' perspectives and positions as a result of their shared learning. Participants also value the collaborative nature of the process. "One thing that's going through my mind is just recognizing the variety of stakeholders that are engaged […] and all the activities that are going on. And I think just the level of interest and engagement, I think really speaks to the need and the value of this effort in particular because I think it's rare to bring

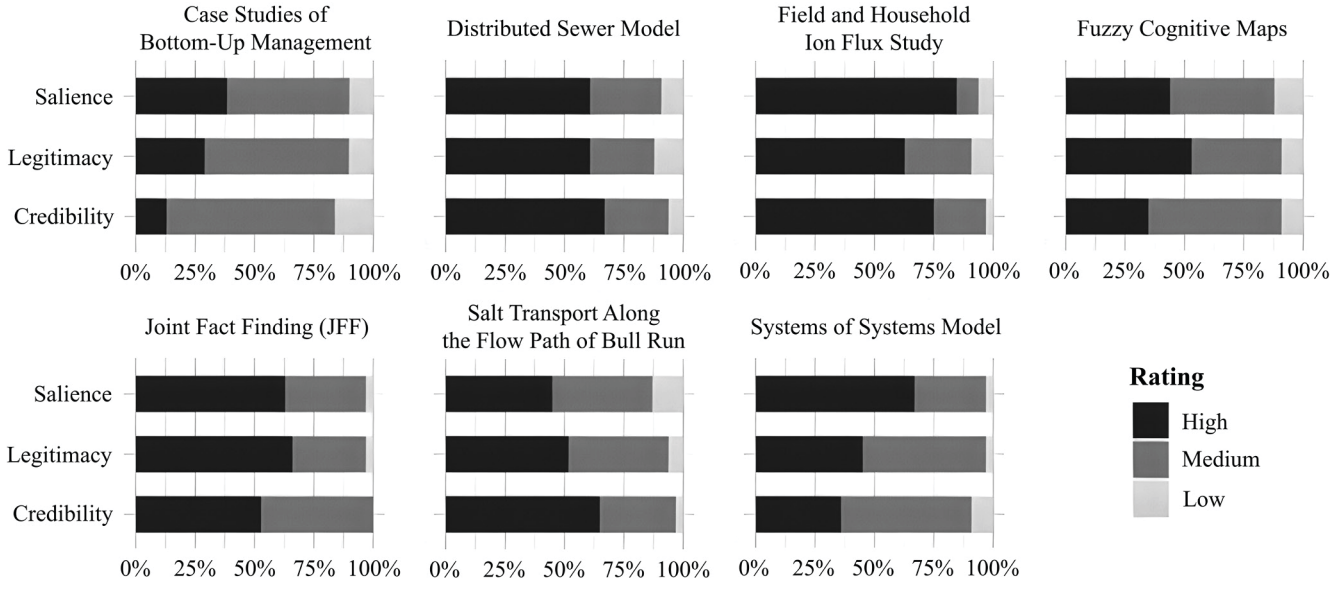



*Figure 20.5* ECOS members' evaluations of various research products and approaches.

together such a range of stakeholders and actually see actions occurring," opined another ECOS member.

Assessment has also exposed areas in which stakeholders feel that saliency, credibility, and/or legitimacy may be lacking. For example, one participant suggested that a weakness of the cognitive mapping could be due to the dearth of "front line" people in the room and thus the absence of their voices, stating that "*we haven't really had a lot of the people who are out on the front line, the operators who are actually putting the salt down on the roads*." It would seem that the respondent has internalized the JFF approach insofar as they appreciate the need for broad stakeholder engagement to arrive at a truly comprehensive and shared understanding.

Finally, the results indicate that not everyone feels comfortable with JFF-related activities, like fuzzy cognitive mapping. This discomfort, by some, is reflected in Figure 20.5 and participant feedback. Some feel that these activities can corrupt or distract from what they are seeking: objective science. "*I still struggle with the fuzzy cognitive maps; I think that the science of aggregating the data is good but I still struggle because it is opinion based*," opined one participant. The possibility of arriving at objective and sufficient "facts," and thus value of embracing different perspectives in a complex domain like freshwater salinization is a matter of opinion. However, overall, ECOS members are embracing the value of engaging in shared learning through JFF and are finding that these approaches lend legitimacy to their deliberations. In the words of one: "*The process the team has done, and going through and revising them [the FCMs] and getting more input and going through and revising them again, I think the legitimacy is the best you can possibly do.*"

## Conclusion

This chapter has discussed JFF, which is an approach to resolving tensions at the science-policy interface by prioritizing shared learning and the broad involvement of decision-makers, key rights holders, and other stakeholders in the research process. The goal of JFF efforts is to generate information that is widely viewed to be salient, credible, and legitimate by all involved. JFF can contribute to water diplomacy initiatives insofar as they often feature disagreements around "the facts." Reducing factual disagreements alone will rarely resolve water disputes as they are rooted in much more than information deficits, including different interests, priorities, and values. Nonetheless, a shared understanding of the dynamics of the systems in question can help parties engaged in water diplomacy to reach consensus around more creative, efficient, and wise outcomes.

The *Common Pool Resource Theory as a Scalable Framework for Catalyzing Stakeholder-Driven Solutions to the Freshwater Salinization Syndrome* project is engaging in JFF to better understand and ultimately tackle this significant challenge collaboratively with a suite of stakeholders. It is also providing opportunities to more systematically assess the use of JFF in practice. Early findings suggest that the JFF approach is fostering shared learning among project collaborators (i.e., the ECOS stakeholder group); enhancing the saliency, credibility, and legitimacy of research products generated; and seen to be valuable by stakeholders. In addition to evincing the general value of JFF, lessons learned that are transferrable to other contexts include: the potential to use JFF as a means to enhance understanding of SES (Ostrom 2009), and subsequently advance self-organization to sustainably manage resources; that JFF is often best thought of as an iterative process, necessitating flexibility; and that the shared learning JFF is meant to foster is contingent on good conversation and thus robust process design. This and other projects will continue to hone our understanding of best practice as groups work to address water diplomacy and other challenges that are scientifically and technically complex in nature.

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# 21

# MODELING TO SUPPORT WATER MANAGEMENT NEGOTIATIONS

*Kevin G. Wheeler*

**Key takeaways**

- Models can be powerful tools to bring stakeholders together to build a mutual understanding of shared water resources and explore possible solutions.
- The utility of a model is seldom in its ability to deliver a precise value but rather in whether it provides an improved understanding of a system that would not have existed in its absence.
- An effective hydro-policy model used to support a negotiation process must be sufficiently accurate, transparent, and flexible to be a trusted source of knowledge and facilitate creative solutions.
- Expert design and participatory modeling are both effective ways to develop models but require information transparency and dedication from water managers to support the model development process.

## What can systems thinking and models contribute to water diplomacy?

Addressing a water conflict typically requires parties to reach some degree of shared understanding of the nature and extent of the problem. If a finite set of interrelated elements of a problem can be identified, those elements are within an interconnected system. A system is essentially a mental or physical concept of what we believe the world is like. A system has a boundary and an environment with which it interacts through elements that have properties and behaviors. In the context of a river system, elements may include physical river reaches, lakes, reservoirs, cities, agricultural users, environmental needs, etc. and policies that govern the management of these elements. The boundary is often assumed to coincide with watershed borders; however, the extent of a river system is frequently larger when one considers water diverted to or imported from outside of the watershed, aquifers that interact with the surface water, institutions that govern water management within political borders that do not align with watersheds, and trade with economies and societies that depend on the food and energy produced from the river. With today's highly interconnected world, defining the river system for a negotiation is nontrivial.

A model is an abstract representation of a system that makes the assumed system boundaries explicit, and seeks to clarify the system structure (Avendano-Uribe *et al.*, 2022). Models are not


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static, but an evolving process marked by increasing confidence or decreasing uncertainty of how a system works (Elms, 2020). Models are particularly helpful to understand complex nonlinear interactions among elements. Our intuition may provide a sense of how elements interact in simple systems (e.g., more rainfall results in higher river flows and faster filling reservoirs), but a model is often necessary to understand the magnitude of those interactions (e.g., how fast will reservoirs fill given more rainfall, higher evaporation, seepage losses, and downstream demands, and how should water be released prior to a rainfall event). Critically, models help us understand which factors and relationships are significant or comparatively inconsequential – particularly in complex systems. Models are inherently imperfect and contain subjective representations, assumptions, uncertainties, and limitations.

The utility of a model is seldom in its ability to deliver a precise value, but whether an improved understanding can be gleaned about a system that would not have existed in its absence.

Models can serve a wide variety of purposes with respect to water management. Scientific research models can describe physical process that happen in nature or societies, such as determining the impact of a rainfall event or the impact of a drought on food availability. Such models are frequently developed as fact-finding tools to increase understanding. Such models can be continuously refined with new knowledge and their complexity expanded accordingly. A high degree of expertise is usually required to develop and use such a model.

A second type of model helps decision-makers plan and manage a resource or respond with some action, such as how to operate a river during a flood or mitigate potential food shortages during a drought. Such action-oriented models are often called decision support systems (DSSs) and emphasize operational decisions that affect a river system or those that depend on it. These models may use simplifications of physical process compared to scientific research models but still aim to capture the most important elements to evaluate an objective and help make a decision. Like scientific models, DSSs are typically used by technical experts.

A third type of model focuses on increasing understanding of a system among a wider audience that may or may not have a technical background or decision-making authority. The elements and their interdependent relationships are structured within model to encourage users to explore the tradeoffs associated with various decisions. Albeit often using simplified dynamics, such stakeholder engagement tools can be an effective way to build trust among conflicting parties.

The distinction between these three types of models can be found when looking at extensively studied and managed river systems. For example, Colorado River researchers have developed large-scale hydrology models to assess the sustainability of the river system under various climate regimes (Barnett and Pierce, 2008, Rajagopalan *et al.*, 2009) as well as models to evaluate the implications of physical changes and management decisions on aquatic habitat (Pitlick and Van Steeter, 1998, Dibble *et al.*, 2021, Bruckerhoff *et al.*, 2022). While the results of these research-oriented models may be considered by decision-makers, Colorado River water managers, primarily the US Bureau of Reclamation and state water agencies, rely on DSSs such as the Colorado River Simulation System (CRSS) to develop policies for managing reservoirs (Fulp *et al.*, 1999) and the Colorado River Mid-term Modelling System (CRMMS) to develop 24-month operation plans (Baker *et al.*, 2022). However, few of these research models or DSS tools are easily wielded by stakeholder groups in the Colorado River Basin. As a result, academics and nongovernmental organizations develop simplified modeling platforms to encourage dialogue (Rosenberg, 2022) and the Bureau of Reclamation developed a web-tool to allow non-technical stakeholders to engage with their DSS tools through a simplified interface (U.S. Bureau of Reclamation, 2023).

## What is a water management model?

Models that simulate the management of water are often a critical component of planning, development, and operation of infrastructure that allocates water. A water management model is typically a network representation of how various water supplies are used to meet various demands. These models are subtly different than watershed models, which typically calculate the amount of runoff generated from rainfall, considering variations in climate, soils, vegetation, etc. The outputs of watershed models can be used as inputs to water management models, which then simulate physical properties and management decisions – for example, how much water exists at various locations around the basin, how flows combine and change over time, how water is stored and released from lakes and reservoirs, and how much water is lost to evaporation or exchanged with the groundwater. The model representation must also capture how water is used by different interests and stakeholders such as consumptive uses (e.g., agricultural, municipal, and industrial purposes) or nonconsumptive uses (e.g., recreational uses and hydropower generation). Furthermore, knowledge of how water sustains the environment is a critical element, particularly to understand when thresholds are reached that negatively impact habitats.

A water management model must capture the logic by which a river is controlled. This logic can be informed by many sources, including international treaties, domestic laws that govern water allocation among users, safety concerns such as flood or drought management planning, dam operational guidelines established by engineering designs, or specific needs such as hydropower generation or environmental requirements. In river systems that contain reservoir storage used to achieve multiple objectives, many of these complex decisions are manifested in the logical decisions of how dams are controlled, making them critical parts of the river system.

An extraordinary amount of detail and complexity can exist on both the supply and demand sides of water provision, as well as the system operations. Therefore, modelers must consciously decide what degree of complexity is necessary to be represented to help solve the problem being addressed.

### *Representing water supplies*

Several methods have been developed to determine how much water is available in a river. Most methods begin with data collected by gages along different reaches of the river. Raw data is collected periodically and typically range from every minute, once per hour, or once per day, depending on flow variability. Watershed models may also be developed to convert rainfall data into river flow data, using river gages to calibrate these models. Data is aggregated to average flows over a period of time with a time step appropriate for modeling and decision analysis. For example, long-range planning may require average monthly or annual flows, while studies that concern habitat conditions may require daily or hourly time steps.

Time series data from a network of gages or watershed models across a river basin is assembled to reveal a topological representation of the river network. Data from all gaging locations must cover a similar time range to provide an accurate depiction of how water moved through the river. Data is subjected to a 'naturalizing' process that removes the effects of historical diversions and management. The product is a naturalized dataset that forms a collective understanding of the past.

The network of naturalized historical data is then used to develop projections of future water flows. This is done through various approaches such as simply assuming the flows in the past will represent the future with new demands and management practices or projecting future

flows in a way that does not presume stationarity (Milly *et al.*, 2008). The latter often uses projections of future climate conditions from global or regional circulation models to drive watershed models, which are then used as inputs to water management models. The assumed flows are key assumptions that represent plausible future hydrologic conditions. To perform risk-based analyses, multiple versions of the future conditions are produced to drive multiple model simulations.

### *Representing water demands*

Establishing historical water use and identifying future demands are important to develop and effectively use a water management model. The amount of water historically used is often unknown and controversial. Diversions are infrequently measured and recorded, and flows returning to a river are even more difficult to quantify. When diversion gages do exist, a time series can be developed much like a stream gage. When this does not exist, diversions can be estimated through knowledge of irrigated areas and cropping patterns, often invoking crop models. Legal diversion allocations are also useful in determining water demands. If detailed hydrologic studies do not exist, return flows are estimated using rules-of-thumb based on the type of use and the proximity of use to the river.

Determining how much water was used in the past can be a challenging but surmountable task. In a transboundary or water dispute context, many stakeholders treat such information as 'securitized' and may be reluctant to share data. However, if parties are genuinely interested in system-wide planning, then exchanging information of the past is required to create an accurate depiction. Future demands can be even more contentious but can be managed by testing multiple future scenarios. Parties often overestimate their future demands to safeguard their potential needs, so the modeler must remain attuned to realistic vs. exaggerated demands. Regardless, examining a system under different future needs is one of the primary justifications for using a model.

### *Representing reservoir operations*

One of the most crucial elements of a water resource model is the simulation of reservoir operations. Some models contain algorithms to simulate operations using simple objectives and control variables, such as meeting target elevations. However, when reservoirs operate for multiple purposes, a model must reflect when and how each objective is met, particularly when competing objectives suggest contradictory operations. Operational purposes such as making releases for hydropower requirements, meeting downstream demands, reaching certain pool elevations to manage floods, storing sufficient water to prepare for drought, meeting environmental needs, etc. are objectives that dam operators need to balance. These objectives reflect why infrastructure projects are financed and their prioritization can often be gleaned from interviews of dam operators, inspections of dam designs, and comprehensive analyses of legal and operational criteria. A water management model should accurately capture this prioritization.

## What is required for a water management model to be useful in a transboundary negotiation?

Models can be helpful to reach a positive outcome in a negotiation or they can be a limiting factor that inhibits parties from reaching an agreement. The selection and design of a model are critical

for a positive outcome, in addition to how it is used during the negotiation. Wheeler *et al.* (2016) introduce the notion of a *hydro-policy* model as one that is useful for negotiations and exhibits three critical characteristics: accuracy, flexibility, and transparency:

- *Accuracy* means that a model contains enough detail to represent the major physical and operational aspects that substantially affect how water allocations are made. Models are simplifications of reality and therefore not all aspects of a system can or need to be included, but if models are to be used in a negotiation context, parties must agree that the most significant elements have been appropriately incorporated. If aspects of a system are excluded from a model, this should be made explicit.
- *Flexibility* means that a model has the capability to be customized to reflect proposed policies that the parties or a facilitator wish to examine. The course and outcome of a negotiation are rarely known from the outset; therefore, a model must have the ability to be adapted and reconfigured throughout a negotiation to meet evolving needs. An initial model configuration may be proposed, but subsequent iterations likely require new configurations as ideas emerge. Negotiations require a great deal of creativity, and the capability of the model must not present a limitation.
- *Transparency* means that the model logic can be understood and trusted by people from the conflicting parties. Modeling typically requires technical expertise and is often driven by individuals with strong computer backgrounds. For many people, computer code is not understandable; therefore, distrust can easily develop between technical and nontechnical participants. The onus is on the model developers to explain how the model works to the stakeholders that will rely on the outputs. The nontechnical parties are also advised to seek technical support to understand and interpret the models.

A *hydro-policy* model tries to strike a balance between the three types of models described earlier, that is, a scientific fact-finding model, a decision-support model, and a stakeholder engagement model, with the goal of having the characteristics of accuracy, flexibility, and transparency (Wheeler, Robinson, and Bark, 2018). The concept of a *hydro-policy* model is one particular example of a knowledge system that seeks to manage the boundary between knowledge and action in ways that enhance the salience, credibility, and legitimacy of the information it produces (Cash *et al.*, 2003). Using this framing from the growing field of sustainability science, a model must not only be deemed scientifically credible to be used in a transboundary negotiation, but it also must be able to provide relevant information to those involved in the negotiation and the parties must trust that the model is objective and has not been tainted by biased assumptions. This framework draws from the notion of models acting as *boundary objects* between knowledge generation and knowledge users (Falconi and Palmer, 2017), which has been extended to transboundary contexts where knowledge gaps and physical boundaries must concurrently be bridged.

### *Model development*

The process by which a model is developed is likely to be heavily scrutinized in a negotiation context and therefore must be done with great care and consideration. Two general approaches are illustrated here: expert design and participatory modeling.

### *Expert-designed modeling*

A model may be constructed by an expert individual or institution that has been provided access to sufficient information. The credibility of the developer is particularly important in this case. If a new model is built for a negotiation and future management, the developer may be selected or approved by all parties. Unfettered access to hydrological gage information and historical use data must be allowed to help construct a complete picture of the past and future mass balance of a river system. Raw and refined data is also likely to be needed to determine the accuracy of data collected.

Granting access to data does not, however, mean that the developer would be able to build a model in isolation. It is likely that model developers will need to continuously interact with local water managers and stakeholders throughout the process to ask questions and request additional information. The initial objective of the model developer will be to construct a well-calibrated model that accurately represents how the river system has worked historically, which will then allow the model to be adapted to simulate proposed future alternatives.

River managers may already have developed models for decision-making. In this case, the parties will need to decide whether the existing model is appropriate for the purpose of the negotiation, and whether it incorporates biases for or against any one party. This can be particularly challenging if the proposed model has been developed by one of the parties, and thus the level of model expertise favors that party. It is incumbent on the party that developed the model to convince the other parties that it is an appropriate tool to use and devoid of such biases. Extensive model training opportunities are likely required to build trust, with the opportunity to scrutinize the assumptions and to offer improvements. Such a learning process may take a significant amount of time – that is, months or years. This time can also be an opportunity to build confidence among parties; without taking this time, negotiations could stumble over distrust of the model outputs. At some point during the process, however, all parties would need to declare there is sufficient trust in a model to move forward with it as a credible source of knowledge.

### *Participatory modeling*

The entire process of developing a water management model can also be conducted with a primary objective of building trust among parties. Participatory modeling is a process by which stakeholders become directly involved in the model design and take some degree of responsibility from the initial stages to the final product (van den Belt, 2004). Participatory modeling is seen as an evolution from structured public participation processes that began in the 1920s and became common following the establishment of environmental laws during the 1960s and 1970s.

The process of participatory modeling is not formulaic. A common starting point is distilling multiple system representations held by stakeholders into one common representation of the system (Avendano-Uribe *et al.*, 2022). The emphasis must be on understanding what the values and concerns are of the parties, and how those may be reflected in a model (Islam and Susskind, 2012). A focus on equal and respectful participation among parties is instilled early and maintained throughout the development and exploration process. Process acceptance is generally more important than the numerical methods used to calculate the model outputs.

The development of a participatory model requires a considerable number of workshops to be held. Typical steps include, but are certainly not limited to: (1) discussion of the objectives of building the model, (2) identify the background, strengths, and weaknesses of participants and

provide basic training on modeling software and platforms, (3) listen attentively to stakeholders' conceptualization of the system, (4) understand the problem or challenge to be addressed from multiple perspectives, (5) identify key elements to be included in a modeling framework, (6) acquire data that characterizes the supplies and demands of available water, (7) identify reservoir operations and water allocation methods or rules, (8) jointly assemble the elements of the model in a transparent, parsimonious, and logical fashion with information acquired from codevelopers, (9) jointly test the modeled representation using simulation techniques with the objective of obtaining a realistic output, and (10) examine the implications of perturbations to the model inputs or logical structure.

The above participatory process is simplified and yet may still take years to achieve. Participatory modeling within a transboundary context presents challenges that might not occur in a domestic water dispute. Convening workshop participants may be challenged by travel restrictions across international borders. Language and cultural barriers may inhibit direct communication. Political tensions may limit the ability of participants to share information. It is also important to recognize that only a limited number of participants from outside government agencies may be allowed to participate in international collaborative modeling, leaving a potentially false presumption that those in attendance represent the interests of those not in attendance. Despite these challenges, participatory modeling often provides value, particularly in the scoping phase of dispute resolution (van den Belt, 2004).

Langsdale *et al.* (2013) provide a set of best practices for participatory (collaborative) modeling:

1 Collaborative modeling is appropriate for complex, conflict-laden, decision-making processes where stakeholders are willing to work together.
2 All stakeholder representatives participate early and often to ensure that all their relevant interests are included.
3 Both the model and the process remain accessible and transparent to all participants.
4 Collaborative modeling builds trust and respect among parties.
5 The model supports the decision process by easily accommodating new information and quickly simulating alternatives.
6 The model addresses questions that are important to decision-makers and stakeholders.
7 Parties share interests and clarify the facts before negotiating alternatives.
8 Collaborative modeling requires both modeling and facilitation skills.

A participatory modeling exercise may not capture all of the complexities of a system, but the utility of the outcome is determined by the quality of the discussions more than the specific outcome and ultimate quality of the model itself (Avendano-Uribe *et al.*, 2022). An evaluation of the participatory model effectiveness can be ascertained through careful documentation of the discussions, interviews, and questionnaires provided to the participants. An indication of effectiveness is whether attitudes have changed throughout the process and to what extent the parties have exhibited an increased sense of empathy (van den Belt, 2004).

### *Model management*

How a model is managed and maintained over time is often overlooked during a negotiation process. If a model is deemed useful or influential, it is likely to be used beyond a negotiation and into the implementation phase of an agreement. Technological advances may require that software and hardware systems are updated regularly to keep a model functional. In addition, models may

evolve over time with the latest information incorporated into them such as additional hydrologic data with successive years of new data collection, refined parameters with improved scientific knowledge, or improved logic of how the system is managed. Furthermore, models are imperfect, and errors (called bugs) are often identified and need to be addressed. This dynamic nature of models typically requires that an official model version is maintained by a designated authority. This entity has the responsibility to keep the model up to date and utilize adequate version control, so a development archive is available. Critically, a model manager must be committed to allow all parties to have unfettered access to avoid perceptions that it has been inappropriately modified or mishandled by the manager. Joint funding and participation in model maintenance and management are both ways to encourage equitable model access.

## How are models used during a negotiation?

The use of models in actual negotiations is not prescribed. A model may be a product of a fact-finding stage to understand the status of water resources and the outputs are referenced only during the initial discussions. However, if a model is seen as a credible, salient, and legitimate tool to identify management alternatives, it is likely to be used repeatedly with various formulations as the parties converge on a solution. Subcommittees of modeling experts with participants from the various parties can be established with a remit to examine proposed solutions using the available modeling tools. Furthermore, models may be used to identify viable solutions that are not readily obvious to the negotiators. Therefore, modelers might be called upon to evaluate ideas proposed, or to provide new proposals to be considered in the negotiations.

A complex water management system may contain many elements (e.g., various dams and reservoirs) that can be managed in many ways to meet competing objectives, so the number of potential solutions can be large. Finding an acceptable outcome can be seen as a process of identifying a viable solution in a multidimensional decision space. To make the problem tractable, a finite set of decision variables is identified with a finite set of evaluation objectives. The sets of decision variables and objectives may change over the course of a negotiation, as well as the logic by which the result is determined. How a model solves mathematically is an important consideration that has practical implications in a negotiation context.

### *Optimization modeling*

Mathematical approaches derived from the field of Operations Research are used to identify *prescriptive* solutions in complex multidimensional decision spaces. These traditional optimization techniques seek to identify a best solution. This may be useful for preliminary planning phases to identify what might be possible in an idealized world, but this requires distilling competing objectives to comparative values, such as economic costs. Such value simplifications may be disputed among parties. Optimization algorithms frequently provide solutions that are opaque as to why particular results are produced, raising more questions than answers. A strong resistance to *prescriptive* engineering solutions can emerge if model outputs conflict with the legal and political realities that dominate reservoir management decisions and constrain negotiations between adversarial parties. In such a case, the credibility of the model can be questioned or considered too detached from reality. Due to the difficulty in translating ideal solutions to real-world operations, classic optimization solutions are rarely used in negotiation contexts.

### *Simulation modeling*

Simulation modeling is a more useful approach for negotiations that does not seek a best solution, but instead tries to provide a *descriptive* outcome that would result from a set of inputs. These inputs not only include water supplies and demands, but also the assumptions or rules describing how reservoirs are operated to meet these requirements. Simulation modeling can be seen as testing *what-if* scenarios, which helps to open the discussion space within a negotiation. Multipurpose reservoirs are typically operated using a hierarchy of management requirements (e.g., flood control rules, hydropower demands, downstream release requirements, drought management plans) with certain objectives having a priority in certain circumstances. Management practices are translated into logical rules and can include variables that can be adjusted throughout a negotiation process, or entirely new management rules can be designed and evaluated.

### *Simulation-based optimization*

Advances in computing during recent decades have allowed models to be used more extensively to search for preferred solutions to complex problems. Evolutionary algorithms allow simulation models to be executed iteratively by continuously selecting new sets of decision variables while seeking improvements to a set of objectives. The product is a set of multidimensional Pareto fronts that reveal which combinations of variables result in 'non-dominated' outputs – that is, results for which one objective cannot be improved without compromising others. This approach allows complex simulation models that have realistic rules to be optimized, thus allowing iterations between reconfiguring rules and optimizing parameters.

### *The human factor*

Engineers often overlook the value of the process of finding a solution. It is unlikely that any model will deliver an answer to a complex negotiation over water resources. There is a crucial element of creativity in problem-solving that is difficult, if not impossible, to replicate with a computer algorithm. Furthermore, extensive research has shown that stakeholders' willingness to accept an outcome of a model is closely linked to their involvement in its formulation. If a model is used during a negotiation, back-and-forth discussions between policymakers, stakeholders, and modelers are required. A possible formulation for an agreement may be proposed and tested under a variety of possible future hydrologic scenarios, and using a variety of possible parameters, but if and when an impasse is reached, new ideas are required and the model must be reformulated to evaluate those ideas (Wheeler, Hall, *et al.*, 2018). The process of generating ideas is valuable; therefore, it should not be excluded by over-automating a modeling process.

## Conclusion

Reaching a negotiated agreement over shared water resources often requires a mutual understanding of its availability and limitations, which can be facilitated using a numerical modeling representation of that resource. Many types of models exist, but a model that is to be used in a negotiation context must be considered useful by all parties. A *hydro-policy* model is one that seeks a balance between a scientific fact-finding tool, a DSS, and a stakeholder engagement tool. The product is one that provides a sufficiently accurate depiction of the river system, is flexible enough to evolve

during a negotiation, and is transparent so parties can examine it thoroughly to build trust in its results. An inadequate model can present a barrier to the creative thinking, but a well-designed modeling process can encourage new ways of thinking.

A model is unlikely to provide a single correct answer, but it can often be used to provide insight to the system dynamics that would not exist in its absence. If a model is developed and used effectively in a negotiation, the insights it provides may be useful for parties to converge on a mutually acceptable outcome.

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# 22

# MUTUAL GAINS NEGOTIATION IN WATER DIPLOMACY

*Lawrence Susskind*

**Key Takeaways**

- Use stakeholder assessment procedures (with the help of a neutral) to ensure appropriate representation of stakeholder interests in the work of the agencies engaging in water diplomacy.
- Look for early opportunities to engage affected groups in value-creating exercises before final decisions are made. This will encourage issue linkages and increase opportunities for meaningful trades. Incorporate joint fact-finding into all negotiations.
- Seek consensus (total unanimity is not essential) and rely on professional neutral facilitators for help as needed.
- Try to formulate self-enforcing agreements that make it easier to get compliance. Add ongoing monitoring and dispute resolution elements to all agreements.

## Background

Water diplomacy emphasizes the process by which public officials (elected or appointed), and other relevant stakeholders (not just diplomats) decide how shared waters will be used (Islam and Susskind 2012). Usually, multiple parties are involved, some directly and some indirectly. Consultations leading to decisions can be formal or informal, and be undertaken quickly, or extended over long periods (i.e., decades). The shared waters that we discuss here (e.g., rivers, lakes, wetlands, coastal areas, etc.) may cross national or subnational boundaries and vary in scale from transnational to regional to local. The water uses under discussion can vary from conservation, diversion, agriculture, ecosystem preservation, energy production, industrial activity, sanitary services or waste management, or urban drinking water. The deliberations can be cooperative or highly conflictual and lead to treaties that are either open-ended or time restricted. Short-term or long-term decisions about who gets what, at what scale, and at what cost, as well as who has decision-making authority, fall under the broad umbrella of water diplomacy.

All water diplomacy involves negotiation; that is, efforts by one or more parties to convince others to do "what they want, when they want, the way they want" (Susskind 2014). There are no formal rules about who will be involved in which negotiations over shared waters, although "best practices" presume that all stakeholders (direct or indirect water users or those

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who represent them) ought to be consulted, if not involved directly, and those with constitutional or statutory decision-making authority have the final say (Islam and Susskind 2012). Some stakeholders in water diplomacy are formally represented by government officials while others may be informally represented by ad hoc organizations of various kinds (Susskind 2013). The political power of the parties may vary dramatically and change before, during, and after each round of negotiation. The relative political clout of the parties "away from the table" may not always determine what the outcome of a specific water diplomacy effort is; that is, power in negotiations over the access, allocation, and use of shared waters is dynamic, reflecting changing coalitions, new scientific or technical findings, and the desire of the parties to preserve peaceful relations (Fisher 1983).

The outcomes of water diplomacy efforts are often dependent on several kinds of information that are dynamic, including (1) field-based data describing the nature of the shared waters, existing rules governing usage, and the status of the socio-ecological systems involved; (2) probabilistic forecasts of likely changes in supply and demand; and (3) models of how the relevant natural, societal, and political systems and their interactions are working and what has been learned about them. In most places, this information is not readily available to all parties involved, and often the information is fragmented and uncertain. Given the variability, uncertainty, and ambiguity of the information, most conversations about access, use, and allocation of water are likely to be highly contested (Islam and Susskind 2012; Matsuura and Schenk 2016).

Negotiation over the use of shared waters is sometimes linked to other issues that are important to some of the parties involved, but not necessarily related directly to water allocation. While linkage can be the key to formulating an agreement, it can also lead to an impasse when unrelated linkages are given high priority by some of the parties. Concerns about compliance and enforcement can also shape the likelihood of reaching an agreement. My objective in this chapter is to sketch an approach to multiparty negotiation in water diplomacy with a focus on using the mutual gains approach (MGA) to negotiations developed in other disciplines and domains (Raiffa 1982; Fisher, Ury and Patton 1981; Susskind, Larmer and McKearnan 1999).

## The Mutual Gains Approach to Negotiation

I advocate the MGA to negotiation in most situations regarding the access, allocation, and use of shared waters. This is because MGA is best suited to situations in which many parties need to address multiple issues, and there is substantial uncertainty surrounding the systems involved. The alternative approaches range from purely cooperative (in which the parties merely defer to each other) to purely competitive, in which any gain to one is a loss to the others, and the parties seek only to "win." In a purely cooperative situation, the parties may value reaching or maintaining an agreement above everything else. For example, in addition to sharing water, if the parties depend on each other for military security or guarantees of trade in goods and services, they may well be inclined to move quickly to a diplomatic agreement regarding shared waters. At the other end of the continuum, there are likely to be difficult competitive exchanges typical of what is known as "hard bargaining." This may involve threats of various kinds or even armed conflict.

Whether agreement is reached in water diplomacy is partly a function of the way the parties perceive each other's power, that is, the extent to which each side believes the other has the ability to impose substantial harm or costs on them. Most negotiations fall somewhere in the middle: between completely cooperative and purely competitive exchanges. MGA assumes that parties need not trade away their interests for the sake of a quick agreement, no matter how ready

they are to defer to their negotiating partners. At the same time, MGA encourages the exploration of options so that there are ways that the weaker party can negotiate successfully with the stronger party.

MGA assumes that all negotiations need not be viewed in zero-sum terms, regardless of the power asymmetry that exists between parties (Raiffa 1982; Fisher et al. 1981). MGA offers a way to balance the pursuit of one's own interests while making an effort to meet the most important interests of "the other side" at the same time. Indeed, the balance of the two – meeting one's own interests while meeting the interests of the other side – is often the key to reaching voluntary and nearly self-enforcing agreements. The MGA sequences value-creating efforts followed by value-distributing moves in a process that attempts to serve the interests of competing parties. MGA emphasizes the need for the parties to do all they can to meet the most important interests of all the relevant stakeholders.

## What Does the Mutual Gains Approach to Negotiation Entail?

The MGA to negotiation applies particularly well when many stakeholders are trying to reach an agreement on a complex set of issues. It requires careful preparation by the parties as well as skilled communication and attention to maintaining long-term relationships. The four phases of the mutual gains process are shown in Figure 22.1.

### *Step One: Preparation*

In the preparation phase, the following attributes and features of MGA need to be considered:

1 A central feature of the MGA is *a focus on interests, not positions* (Fisher et al. 1981). A position is the stance each party takes on an issue without much discussion, for example, "We must control at least 50% of the water in the river during the dry season." An interest highlights the need that underlies that position, for example, "We need as much water as possible, especially during the dry season to minimize saltwater intrusion."

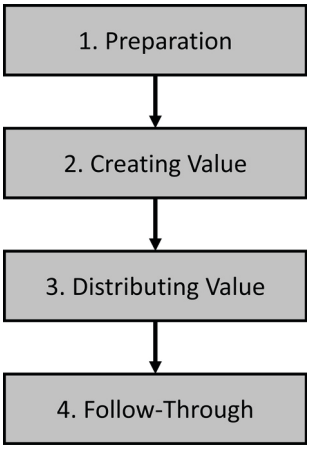



*Figure 22.1* The four phases of the mutual gains process.

2 To prepare for a negotiation, parties need to begin by *clarifying their interests*. This may require a discussion with others in their organization, including a review of the organization's short-term and long-term interests, as well as possible internal and external disagreements. This should be completed prior to meeting with external negotiating partners so that the participants can explain their interests to their negotiating partners with one voice and make credible commitments in the name of their organization.
3 In addition to describing the kinds of things that are important to them (in rank order), parties should be clear about (but not reveal) their range of acceptable outcomes. These are likely to extend from their *aspirations* – the best possible outcome that would satisfy their interests – to their *minimum acceptable outcome* – the least they would be willing to accept in terms of meeting their basic interests. For example, if the parties are negotiating to implement new water allocation rules, each side should be clear (to themselves) about both the ideal arrangement that would allow them to meet their interests, as well as the minimum conditions that would have to be met to make the proposed allocation rules better for them than what they would be left with if there were no agreement.
4 To figure out their minimum or basic requirements, each party must determine their *BATNA* (Best Alternative to a Negotiated Agreement). Each party's BATNA describes what they are most likely to end up with if no agreement is reached. A party's BATNA may form the basis for calculating its bottom line. Beyond merely assessing the BATNA, there are a number of steps that can be taken to take the MGA to the next level – and make a good alternative even better, including (a) a thorough comparison of multiple options rather than focusing on a single issue (quantity of water as a fixed resource vs quantity of over a year or multiple years); (b) As BATNA will usually involve uncertainty, try to estimate probabilistic BATNA for multiple options, and (c) examine the other party's BATNA as carefully and objectively as you scrutinize your own by thinking about what they will do without a deal can provide valuable insight.

### *Step Two: Creating Value*

The MGA challenges and encourages parties to create as much value as possible before deciding how to distribute it. Creating value means inventing trades or packages that are advantageous to all sides – expanding the range of mutually beneficial outcomes.

To create value, parties must first identify the things they value differently. In other words, start by trying to list interests that are in conflict, not those they all have in common. Once that full list is clear, then the parties can explore possible trades. With trades that exploit differences, both sides can exceed their BATNAs, although not necessarily by the same amount.

1 The MGA is different from the conventional win-lose approach to negotiation in several ways. The conventional approach suggests taking an extreme position at the outset (so as not to look weak), withholding information about one's real interests, making the other parties uncomfortable (sometimes with overstated threats), and offering as few concessions as possible. By avoiding trades altogether, the conventional wisdom locks the parties into a zero-sum situation where gains for one can only come at the expense of losses to another.
2 To find out what the opportunities are for mutual gain, it won't help if each side continues to restate its positions. Instead, the parties need to engage in "what if?" explorations. Fisher et al. (1981) call this "inventing without committing."
3 It is important to remember that the cultural sensitivities of various negotiating partners might cause them to use or prefer negotiating styles that are unfamiliar or even offensive to others

at the table. This means that one side's effort to explore possible options prior to making any commitments could be misunderstood or misconstrued as unwillingness to be forthright. The best way to avoid this is to agree on "ground rules" before addressing the substantive issues on the agenda (Susskind and Cruikshank 2006).

4 Parties engaged in water diplomacy need to understand what their counterparts are trying to achieve and why. They are more likely to find this out by asking direct questions and listening carefully, than by restating their own positions and hoping for a revealing reaction. If the parties can collaborate, regardless of their differences, they can make the proverbial "pie" larger. The key is to generate new packages or options that bring all sides closer to achieving their aspirations.
5 Even if one side is clearly relying on the conventional wisdom about how to negotiate (not MGA), the other side is still better off using the MGA. All conversations aimed at communicating and understanding the other side's interests can generate answers that lead to value creation that is likely to benefit both sides.
6 There are situations in which two negotiators are having a hard time talking to each other because of their combative history, a lack of trust, and their lack of preparation. It might make sense for these parties to seek the help of an intermediary (i.e., professional facilitation or mediation). Likewise, if there are interpersonal conflicts among staff members of two organizations, a neutral party can serve as a go-between, helping to improve communication.

### *Step Three: Distributing Value*

No matter how much value the parties create, there will still be hard choices that have to be made when it comes time to reach an agreement. So, assuming all parties' aspirations cannot be fully met, but there is a large enough Zone of Possible Agreement (ZOPA) for each party to exceed its BATNA, the parties will have to engage in value distribution (Susskind 2014).

1 Distributing value is the process of choosing among the options or packages developed during the value-creating stage. When the negotiations are almost over, most parties will have to justify to their "back table" why the proposed agreement should be approved (Susskind 2014). Some negotiation experts think of this as having to "write the victory speech" their negotiation counterpart can present to their back table. This is especially necessary when continuing relationships are going to be key to implementation. No negotiator wants to bring a draft agreement back to their organization and admit, "I was pressured into going along with this. It's not good for us." Instead, they want to be able to say, "Given the circumstances, this is a good agreement. It guarantees that our highest priority concerns are met. Everyone involved thought it was fair and set a good precedent."
2 The parties need to find some "objective" metrics or criteria that allow them to justify the package they have constructed. In this context, "objective" doesn't mean "correct," but rather, acceptable to both sides to show the reasonableness of the agreement they have reached. The key is for each negotiator to offer their counterpart a way to justify to their back table why it makes sense to accept the proposed agreement.
3 If they cannot agree on a criterion for "dividing the pie," they might bring their competing proposals to someone (or some institution) they both trust and ask for their assessment on how to move forward.
4 Finally, sometimes parties find themselves in a situation where one side can realize additional gain by violating the terms of a negotiated agreement, as long as the other side continues to

honor it. The prospects for compliance or enforcement can turn out to be an important consideration as a final deal is negotiated. Ideally, the parties will be able to create a "nearly self-enforcing agreement," or an instrument (like a contract) that will ensure that all promises made will be fulfilled because the costs of violating the agreement have been pre-negotiated.

### *Step Four: Implementation and Follow-up*

The same logic that drives parties to create nearly self-enforcing agreements leads to voluntary implementation. First and foremost, if everyone involved in a negotiation did their best to reach an agreement that met many (if not all) of everyone's interests then the parties are likely to make good on their promises.

1 If each negotiator represents a constituency, they need to be sure that the final agreement works for all segments of their group or organization. Each side probably needs to follow whatever internal procedures their agency or organization is obliged to use to canvass its members about the agreement before it is formally signed.
2 If an agreement is intended to produce tangible changes in the system (e.g., increasing the supply of clean water available at certain times and locations to various parties), the parties should have been clear when they signed the agreement about how implementation would be monitored. The agreement needs to specify what metrics will be used by the parties or an independent monitor to document efforts and outcomes on all sides.
3 Each agreement should include an amendment or modification procedure that makes it possible to alter the agreement considering changing circumstances. The parties should agree ahead of time on how one side can initiate a discussion of possible modifications of the agreement, and exactly how the follow-up negotiations will unfold.
4 Finally, the parties need to use the process of finalizing the agreement and possibly reviewing periodic progress to reconfirm ongoing relationships or deal with changing circumstances.

## Examples of Collaborative Decision-Making in Water Diplomacy

Islam and Susskind (2012) presented a range of case studies and hypothetical negotiating situations that mirror the difficulties facing almost all efforts at shared management of water (at community, subnational, and international scales). Five of these case studies, described very briefly below, show that the MGA described in this chapter offers possible solutions to the persistent negotiation challenges that arise in practice: How should negotiations involving a great many parties be managed, and by whom so that the process is efficient? What can be done to ensure access to crucial technical or scientific information in an understandable form when the parties have very different capabilities? How can zero-sum resource allocation disputes be transformed into value-creating opportunities through which the most important interests of all parties can be met? What can be done to ensure fairness when some disadvantaged stakeholders have been treated poorly in the past? The following case studies chosen from Islam and Susskind (2012) demonstrate how the MGA approach to multiparty water negotiation offers answers to some of the questions posed above.

The Zimbabwean experience described by B.N. Tapela (*Stakeholder Participation in the Transboundary Management of the Pungwe River Basin, 2006*) indicates that a stakeholder assessment by a neutral party should have been used at the outset to justify the selection of participants (i.e., stakeholder groups) and to involve them in framing the negotiation agenda and

ground rules. The absence of a mediator in the Pungwe River Basin case shows how difficult it is to produce a credible stakeholder assessment and manage the interactions among many stakeholders and decision-makers in a credible way without the involvement of a professional neutral.

B. Werick in a Lake Ontario, Canada, case study (*Changing the Rules for Regulating Lake Ontario Levels, 2007*) shows the importance of joint fact-finding in water diplomacy. Involvement of stakeholders in data gathering, modeling and the assessment of policy, program, and design options is key to the legitimacy of the findings and recommendations that are produced. Stakeholder interaction with experts needs to be carefully designed and managed by a neutral. All parties also need to have a hand in selecting experts to assist in ensuring transparency. This does not happen in most negotiations over the management of shared waters.

B. Fuller in an Everglades (Florida) Mediation case (*Trading Zones: Cooperating for Water Resource and Ecosystem Management When Stakeholders Have Apparently Irreconcilable Differences, 2006*) describes three successful value-creating moves – bringing in additional stakeholders, broadening the scope of the discussion, and reframing the problem – that led to the success of this negotiation. The MGA approach ensures that the parties spend at least some time working collaboratively to generate trades that provide mutual advantage. This does not happen in many water diplomacy negotiations that are framed as zero-sum interactions in which the powerful inevitably dominate the powerless.

G. Radosevich's case study of the Mekong River Basin Agreement (*Mekong River Basin Agreement and Commission, 2011*) shows that an independent mediator can assist parties fighting about the management of shared water resources, even when each is a sovereign entity. The success of the mediator in the Mekong River Basin case is attributed to the role that a neutral organization (UNDP) played. It had successfully mediated a previous agreement in the same context.

S. Pollard, D. du Toit, and H. Biggs, in their case study of the river systems in the Kruger National Park (*River Management under Transformation: The Emergence of Strategic Adaptive Management of River Systems in the Kruger National Park, 2011*), show that internal consensus-building was the key to successful use of the MGA approach. That is, when parties are themselves complex (with multiple stakeholders involved on each "side"), internal negotiations must be coupled with (or completed prior to) external negotiation. The adaptive management approach generated by the parties in the Kruger National Park case was developed through internal collaboration and joint fact-finding among park researchers, field staff, and managers (i.e., the full set of internal park stakeholders). The MGA recognizes that internal conflict within parties needs to be addressed before external negotiations can be completed effectively.

There are multiple volumes devoted to presenting case studies that show how and why the MGA approach can produce "good" results. One of the most impressive ones is provided by Verdini (2017). He describes the details of several years of negotiations between the United States and Mexico over the water sharing in the Colorado River. This official bilateral negotiation was supplemented by negotiations among subnational and scientific entities. While all the elements of the MGA were not employed, internal negotiation, joint fact-finding, a commitment to value creation were effectively used in this case.

## What Are the Obstacles to Using MGA in Water Diplomacy?

The notion of MGA is not very common in the world of water negotiations. There appears to be unawareness that there is an alternative to the power politics and win-lose negotiation strategy that typify water governance. There is very limited involvement of nongovernmental stakeholders, either in drafting or finalizing the terms of agreements regarding the use and management of

shared waters. The parties produce on their own whatever technical or scientific input they feel they need, but they rarely engage in joint fact-finding. Participants in these exchanges come with explicit mandates generated by their government back tables and rarely engage in collaborative brainstorming. They seldom try to invent a value-creating consensus (as opposed to a minimally acceptable political agreement) as their goal. And they usually do not employ the services of trained neutrals (i.e., facilitators or mediators). Most water diplomacy negotiations follow hard bargaining rather than a joint problem-solving format like MGA to negotiation.

Water professionals and decision-makers seldom take advantage of learning about MGA or how to apply it to water governance or diplomacy. So, while there are currently hundreds of operating agreements governing the use of shared waters all over the world, many are outdated or ignored in practice (Wolf 1998). While these still serve as governing documents, the processes by which they were generated and the ongoing relationships among the parties appear to be flawed. For example, many contain no mandatory timetable for monitoring and renewal. While some have dispute resolution provisions, they are poorly constructed and hardly ever used, even when disputes emerge (Wolf 1998).

Many governmental entities with water management and governance responsibilities have signaled their support for a set of principles outlined in Integrated Water Resource Management (IWRM). IWRM argues for a more substantial role for women in water management; balancing ecological sustainability, economic efficiency, and social equity; integrating domestic, agricultural, industrial, and environmental needs in water catchment management; and encouraging participatory processes that include all groups of water users (UNEP 2009). These are all laudable objectives. Unfortunately, IWRM does not spell out how multiparty negotiations aimed at achieving more holistic, efficient, equitable, and participatory decision-making in water governance are supposed to happen. IWRM practitioners expect elected officials to do the decision-making, but they have no commitment to bringing all the stakeholders together in a pre-agreed way to recommend (and try to reach agreement on) tradeoffs as part of governance of shared waters.

The Water Diplomacy Framework (WDF) is much more explicit about the kind of negotiations that ought to happen and embraces the key elements of MGA (Islam and Susskind 2018). WDF speaks explicitly to the expanded role of stakeholders (both governmental and nongovernmental) who are usually asked to defer to technical experts. It also highlights the need for professional neutrals to assist in consensus building and distinguishes between collaborative efforts to draft governance and management proposals and final decisions (made by those with formal legal authority).

Some environmental justice advocates and some coalitions of nongovernmental actors – with a clear stake in water governance – often fail to see why they should take part in collaborative efforts to draft water governance agreements if NGOs and unofficial stakeholders do not have final decision-making authority. They don't understand that elected officials would be in breach of their formal authority if they delegated away final decision-making authority to unelected and ad hoc groups and individuals. This is one source of resistance to MGA from both the activist and conventional sides of the political spectrum.

MGA requires extended preparation time that can stretch over many months as many stakeholders engage in joint fact-finding and collaborative problem-solving. And there is a cost to supporting such collaborative efforts. For many public officials who prize efficiency above all, losing time and money to MGA-style water governance and management collaboration is not something they are likely to support. Some officials may also argue that there is no point involving a broad swath of stakeholders in joint fact-finding or collaborative decision-making because they won't be able to "handle" the technical complexity involved.

## How Can These Obstacles Be Overcome?

Reflecting on and learning from the success of MGA in other domains, it appears that the conflicts and difficulties surrounding the formulation and implementation of agreements regarding the governance of shared waters can be overcome by adopting an MGA to negotiation. Fairer, more efficient, more stable, more adaptable, and wiser results can be achieved rather quickly. It appears that governmental and nongovernmental actors can, with only a modicum of training and a bit of mediation assistance, shift to a more collaborative and value-creating approach to allocating and managing the shared waters for which they are responsible. The obstacles listed above can be sidestepped by the officials involved, provided they are motivated to "try" a new approach like MGA without committing to make any permanent changes in the statutes that govern their operation.

If an "experiment" of trying to work with MGA doesn't produce the desired results, they can always return to "their old way" of doing things. If it does produce results that all parties prefer, they can then decide how best to modify their existing operating rules, guidelines, and procedures by passing a new law, adopting a new regulatory framework, or signing a new treaty. It is possible to suspend the "rules of the game" temporarily, while an unofficial process of consultation and examination of the pros and cons of new options (which does not include making final decisions) is explored. One may think of this as "adding a consensus-building step," rather than changing formal decision-making rules (Susskind and Cruikshank 2006). If the participants reach a consensus, they can hand it off to the officials with the authority to make decisions.

It would increase the chances of using MGA successfully if all the parties likely to be involved in a temporary collaborative effort participated in a half-day training session provided by a skilled facilitator and/or instructor. Well-structured training of this sort is usually built on hypothetical scenarios offering hands-on opportunities to explore value-creating possibilities without any formal commitments.

One of the strongest arguments for switching to MGA is that enforcement of any agreements reached is likely to be easier and, therefore, less expensive. All stakeholders, including the decision-makers with the final authority, are likely to benefit in using MGA rather than win-lose or top-down, expert-dominated decision-making since it will reduce the costs of enforcement and enhance public perceptions of government effectiveness.

## Concluding Remarks

This chapter compared traditional win-lose negotiation and the MGA to negotiation. Building on many years of theory and practice of using MGA, we have discussed how MGA can be used as an effective tool for water diplomacy. A traditional win-lose negotiation usually highlights competitive orientation, fixed positions, limited information sharing, short-term focus, and win-lose type outcomes. In contrast, the MGA emphasizes collaborative orientation, interests (not positions), open information sharing via joint fact-finding, long-term focus, and mutually agreed-upon criteria-based outcomes.

If it is true that an MGA approach to diplomacy produces "better" outcomes for all the stakeholders and institutions involved, why would some parties oppose it? If MGA generates better long-term working relationships since no one is forced to settle for an agreement that doesn't address their most important interests, why would there be opposition? If MGA almost always produces higher rates of voluntary compliance, and thus, lowers costs, why are top-level decision-makers involved in water negotiations not adopting MGA as a preferred approach?

First, the MGA is not very common in the world of water negotiations. There appears to be a lack of awareness that there is an alternative to the power politics and win-lose negotiation

strategy that typify water governance and water diplomacy. Second, the MGA requires extended preparation time because it requires many stakeholders to engage in joint fact-finding and collaborative problem-solving. And there is a cost to supporting such collaborative efforts. For many public officials who prize efficiency above all, losing time and money to MGA-style water governance and management collaboration is not something they are accustomed to. Third, the MGA suggests that parties involved in water diplomacy efforts need to be flexible and adapt to changing circumstances. This uncertainty and the lack of a "permanent solution" makes many decision-makers reluctant to adopt MGA to water negotiation.

Water diplomacy at every scale involves a wide range of negotiations (both formal and informal) prior to decision-making by those in authority. Collaborative consultations when shared waters are involved can help to ensure agreements that are perceived as fairer, more efficient, more stable, more adaptable, and wiser in the eyes of all the parties. If decision-makers take a slightly longer-range point of view and seek to manage water resources in more sustainable ways, it is highly likely that they will discover that MGA enables them to make water governance and water diplomacy work more effectively to resolve many conflicting water issues.

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# 23

# WATER MARKETS

## Tools for Management and Diplomacy

*Rhett B. Larson*

### Key Takeaways

- Water is a part of all markets, as water is a part of all goods and services.
- The purpose of water markets is to value water appropriately, encourage its conservation and sustainable use, and mitigate or resolve water conflicts.
- Water markets often fail because of water management's high transaction costs, cost externalization, risks related to the tragedy of the commons, information and power asymmetries, and because of the political and sociocultural values of water not captured by a market.
- Water markets are tools, a means to an end of equitable and sustainable water management.

### Introduction

Water defies boundaries. It flows over, sinks under, erodes through, and flies above every line drawn around it. Water has much in common with gold, uranium, or oil – a valuable, saleable commodity. It also has much in common with music, faith, and sovereignty. We do not throw gold at each other in the wintertime, we do not squirt each other with oil in the summertime, and we do not use uranium in our religious ceremonies. Any attempt to classify water as a pure commodity is doomed. But so are attempts to insulate water from market forces. Water is embedded in all goods and services in some way, and designating water as "priceless" may risk devaluing water. This chapter explores water markets as a tool in water resource management and diplomacy and evaluates the risks, challenges, and potential for that tool.

### Defining Water Markets

Water markets are resource management tools involving the allocation of private, transferable interests in water resources (Casado-Pérez 2015, 168). The allocation of these interests does not require an absolute private property right. Many jurisdictions recognize the public trust doctrine in water resources (Blumm & Guthrie 2011, 760). Under the public trust doctrine, the state holds water in trust with a fiduciary obligation to manage it for the benefit of all citizens (Sax 1970, 474). Governments holding those trust resources allocate usufructuary rights to private parties,

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or rights to make use of a certain amount of the public trust resource subject to certain conditions (Larson 2015a, 962). This approach is comparable to hunting licenses. The state is the trustee of wildlife and allocates licenses to hunt a certain number of certain animals during certain times. Usufructuary water rights are similar, except that within a water market, those licenses are transferable, in whole or in part.

Jurisdictions' approaches to the public trust doctrine vary widely across a spectrum. Some lie on one extreme, with the state controlling all water resources with no recognition of private rights to water. Others lie at the opposite end of that spectrum, with strongly protected property interests held by private parties and the state's role in water rights transactions being not much different than its role in any other private transaction.

Markets play some role in water resource management, regardless of where a jurisdiction lies along this public trust spectrum. Water is embedded in all goods and services. Thus, the buying and selling of anything involves trade in water, even if only in this embedded or virtual water (Allan 2012, 107). Agriculture accounts for nearly 70% of global human water consumption, and energy for much of the remaining 30% (Boretti & Rosa 2019, 4). Factor in the use of water in mining processes and timber, and human consumption in domestic, commercial, and industrial operations, and it stands to reason that every market is a water market to some extent. While such a definition of water markets properly emphasizes waters' central role in all human endeavors, and waters' movement through trade, it is too broad to serve well for evaluating the efficacy of markets as a tool for water diplomacy.

One of the principal ways in which water is bought and sold is through public water utilities. As natural monopolies, the rates charged by these utilities are generally regulated by agencies subject to political oversight (Rossi & Ricks 2018, 712). These utilities can be both publicly or privately owned and operated, or function in some form of public–private partnership (Guo & Ho 2018, 630). While rate-setting for these water enterprises represents attempts to approximate prices that an efficient market would produce, these rates often fail to reflect the value of water (Eckstein 2006, 972). Rather, these rates reflect a market in costs and services associated with water treatment and distribution (Hardberger 2014, 936). The regulation of water utilities may have some relevance to water diplomacy in guiding how water is valued and to provide examples of how public and private sectors can partner in water provision. It may also be relevant in the context of drinking water systems sharing some water source or infrastructure at a localized level along an international border, like exists between certain communities along the US/Canadian border (Larson 2016, 760).

Some jurisdictions have markets in credits related to water conservation. For example, in Arizona in the United States, parties holding water rights can extinguish those rights in exchange for extinguishment credits, which are saleable. In parts of Arizona, developers cannot sell subdivided lands without demonstrating that the land will be developed consistent with water management goals. Part of demonstrating such consistency may include acquiring extinguishment credits (Hodson & Becker 2007, 393). Additionally, those seeking to demonstrate consistency with management goals may acquire recharge credits, obtained through state-approved artificial groundwater recharge facilities (Larson & Payne 2017, 498). The market in such conservation-based credits has expanded beyond the state level to function across the Colorado River Basin. The Arizona Water Banking Authority serves as a source of credits and debits through banking groundwater recharge on behalf of its neighboring states (Hodson & Becker 2007, 392). States sharing the Colorado River have also developed a debit and credit system for water temporarily stored based on conservation measures, called "Intentionally Created Surplus" (Buschatzke & Klobas 2018, 35). While these markets in conservation credits have demonstrated promise, including in the

context of interjurisdictional water management relevant to water diplomacy, they are not markets in water, but rather markets of credits representing conservation efforts.

Some jurisdictions have used market-based policies to improve water quality. In an approach comparable to that of carbon cap-and-trade schemes aimed at mitigating climate change, these governments set a cap on certain contaminants, like phosphorus and nitrogen from agricultural runoff or wastewater discharges (Shabman & Stephenson 2007, 1077). Efforts to remediate contamination or limit discharges generate credits, which can then be sold to parties seeking permits or pursuing projects requiring mitigation of water contamination (Rutherford & Cox, 2009, 12). These water quality credit regimes share many of the same risks and benefits as comparable approaches in climate change. These measures are markets in investments in improved water quality, not markets of water itself.

Research on water markets tends to split between the examinations of urban markets (like public utility water sales), which are often concerned with access and affordability, and rural markets, which are often more concerned with efficiency and conservation (O'Donnell & Garrick 2018, 2). Research on water markets is also often split between informal markets and formal markets. Informal markets may refer to household-level water sharing and water sales by extra-legal water vendors (Wutich 2019, 3). In the rural context, formal water markets are typically those involving permanent conveyance of water entitlements and significant regulatory controls. Informal markets may refer to agreements between irrigators involving a temporary lease of a portion of a water rights, with little or no administrative oversight (Bjornlund 2004, 1). In the context of water diplomacy, water markets generally refer to exchanges or sales of rights to raw water, typically in both the formal and informal sense within the rural context. Thus, the water markets explored in this chapter involve the permanent or temporary conveyance of all or part of legally protected rights to raw water, generally in quantities large enough to be relevant to basin-level management.

## The Aims of Water Markets

These water markets, involving permanent or temporary transfers of all or part of water rights, may have several policy objectives. But the market itself cannot be the objective. Markets, like democracy, are means to an end, not ends themselves (Gollier 2004, 1374). Markets have many potential policy aims, including achieving appropriate valuation of goods and services, the efficient allocation of resources, the mitigation of water disputes, and the avoidance of the tragedy of the commons.

One aim of water markets is to properly value water. States could reject markets, and instead determine water's intrinsic value or else state that water is priceless and defies any commodification (Dietz & Vollebergh 1999, 341). However, states may struggle to define water's intrinsic value without reliance on the sort of data on human behavior provided by markets, and a political determination risks both over- and undervaluation of water. Determining that water is priceless risks undervaluing water as well, particularly if such a policy results in low cost recovery necessary for maintenance of infrastructure and compensating qualified water professionals. Additionally, if water is priceless, resulting policies may mean that people do not internalize the costs of their water consumption and thus lack incentives for conservation. Furthermore, anti-commodification arguments regarding water must confront the reality that water likely must, eventually, be commodified in some way, as it is embedded in virtually all goods and services (Larson 2015b, 26). The argument that water markets are an effective means for valuing water rely on four claims: (1) markets provide low-cost signals of the value of various water uses; (2) markets provide dynamic information as water demand, supply, and knowledge change; (3) markets encourage investment in water

conservation, storage, augmentation, and data; and (4) markets do not require broad consensus among competing users but allow for a diversity of water interests to coexist (Morriss 2006, 974).

In addition to achieve an appropriate valuation of water, water markets as policy tools aim to more efficiently allocate water resources. Water markets allow for flexibility in water allocations, with trades made to higher value or more necessary uses in times of shortage, or reallocation of surplus water achieved through investments in efficiency in irrigation, power generation, or manufacturing processes (Howe, Schurmeier, & Shaw 1986, 442).

Another rationale for using markets in water policy is to avoid the tragedy of the commons. Water, generally a rivalrous and non-excludable resource, is a commons and thus susceptible to rational overexploitation. The theory behind this prediction is that water users internalize all of the benefits of their consumption, but when the resource is depleted, much of overall cost of scarcity is externalized to others sharing the resource. One prescribed remedy to this tragedy of the commons is to assign private property rights in the resource, so that costs of unsustainable consumption will be internalized (Libecap 2008, 131).

Of particular relevance to water diplomacy, water markets have been used to avoid, mitigate, or resolve water disputes. In the state of Texas in the United States, groundwater has traditionally been a right appurtenant to land and subject to a pure rule of capture (Bray 2014, 1309). This laissez-faire approach to regulation resulted in massive overdraft in the Edwards Aquifer, a groundwater resource underlying much of central and western Texas. Declining water tables resulted in widespread water rights disputes. In 1993, Texas established the Edwards Aquifer Authority, which included a market for transferring permitted groundwater withdrawals. The market in the Edwards Aquifer aimed to promote conservation and drive water rights to higher value uses and has achieved some success in mitigating disputes with a reasonably high degree of participation (Kaiser & Phillips 1998, 423).

The various aims of water markets – valuation, efficiency, conservation, and conflict avoidance or resolution – are understandable policy goals and have led to adoption of variations of water markets in many countries and between countries. The United States relies on water markets in individual states. The eastern states have a riparian rights regime with water rights appurtenant to land ownership. Thus, water transactions are tied to real estate markets. The western states rely on prior appropriation regimes, which is a first-in-time, first-in-right approach to allocating property rights in water. The value of the individual water rights is tied to their relative priority, with the earliest uses have the highest value. The connection between historic priority in the United States is a particularly stark example of one challenge with implementing water markets in much of the world, which is the recognition of the rights of Indigenous peoples (Larson & Payne 2017, 470).

Spain relies on water markets, including allocating rights to water through administrative permits rather than appurtenant property rights. The water rights are limited to specified uses, like those in the United States, but governed by basin commissions rather than by subnational jurisdictions with broader powers, like states in the United States (Casado-Pérez 2015, 185). Australia has relied on markets as a water policy tool, shifting from riparian rights regimes and land-based rights, to a US-style prior appropriation regime, to a basin-level permitting regime like Spain, but with permits based on a percentage of available supplies. Australia has been lauded for its water markets but has faced challenges associated with drought, lack of independent oversight, and shifting political agendas (Holley & Sinclair 2018, 6). Some jurisdictions, like the United States, discourage water conservation with regimes in which water users forfeit water rights for nonuse over a certain period. Chile has private water rights, but has not adopted the doctrine of forfeiture like the United States, allowing for trades of rights to unused water.

South Africa also relies on water markets and private water rights, which are not appurtenant to land and not subject to the doctrine of forfeiture. Many other nations implement some version of water markets, including India, Brazil, Indonesia, Vietnam, Mexico, Honduras, and Japan (Endo, Kakinuma, Yoshikawa, & Kanae 2018, 4).

## Why Water Markets Fail

Each of these jurisdictions implements markets as a water management tool with certain policy aims in mind. The policy aims of water markets include appropriate valuation of water, more efficient allocation of water resources, mitigation of water disputes, and avoidance of the tragedy of the commons. However, each of these aims have corresponding risks and costs.

States justify markets as policy tools to achieve appropriate valuation of water. One of the most prominent advocates of markets as policy tools, Adam Smith, articulated the limits of markets in the context of water in his seminal work, *The Wealth of Nations*. Smith compares a diamond, which has a very high exchange value but very limited use value, with water, which has a very high use value but a limited exchange value (Smith 1776, 28). This water-diamond paradox illustrates the limits of markets in adequately capturing the value of water. Why do markets value diamonds more than water, despite the difference in use value? Scarcity is one possible explanation. However, this explanation seems insufficient when the value of water often remains low even in arid regions. Inexpensive water in arid regions can result from political forces in rate-setting agencies, large water subsidies arising from lobbying efforts, or an indifference to the long-term sustainability implications of the overexploitation of nonrenewable water sources, like groundwater (Sisk 2011, 82). Other factors may explain the water-diamond paradox and the limits of markets in achieving appropriate valuation of water, including the role of politics in manipulating water prices, the cultural and political meaning of water, and the status of water as a public good and human right (Larson 2015b, 30). Even where markets improve effective valuation of water, markets may divert water uses to higher economic value uses, and away from other uses necessary for human health or cultural flourishing (Bjornlund & McKay, 2002, 784).

Water frequently has deep cultural meaning, and is often a symbol of sovereignty, making pure economic valuation difficult (Eckstein 2006, 968). Additionally, water may defy market valuation because it is arguably a public good, meaning it cannot be easily divided among consumers in a manner that excludes others, and the state cannot effectively exclude the public from accessing it (Dellapenna 2008, 413). Also, markets may fail to properly value water because it is arguably a human right, and thus the state owes provision of a certain quantity and quality of water in a way equally accessible to all citizens (Larson 2015b, 30).

Despite the potential for markets to efficiently allocate resources, the aim of an efficient water market faces the same obstacles as efficiency in any market. Power and information asymmetries between parties in water rights exchanges often limit efficient outcomes (Arnold 2004, 37). Efficient water markets assume rational economic actors, which is frequently not the case. Pure rationality rarely exists in any market, perhaps even less so in the context of water, which carries so much aesthetic, ecological, cultural, and political meaning. Water markets fail to achieve efficiency due to host of high transaction costs, including legal requirements associated with approval water transfers and changes in water use, the sheer number of water right holders and water users in a basin impacted by water transactions, and the litigation costs involved in clarifying water rights and resolving disputes (Garrick, Whitten, & Coggan 2013, 197). Water right holders are as susceptible to bounded rationality as any other market participant, including limits on efficient

outcomes due to the endowment effect (water right holders irrationally over-valuing their own water rights) (Kahneman, Knetsch, & Thaler 1991, 200).

States have also promoted markets as a means of avoiding externalities and unsustainable practices described as the tragedy of the commons. While private property rights in water may have the potential to limit externalities imposed by overconsumption, this is not the sole, or even necessarily best, policy approach. Many local, traditional approaches to water management, not based on property rights and markets, have managed to avoid the tragedy of the commons in water allocation (Ostrom, Stern, & Dietz 2003, 10). In fact, over-allocation of private property rights can create market inefficiencies by driving up transaction costs with too many parties with whom to negotiate and too many stakeholders with which to communicate, in a challenge referred to as the tragedy of the anti-commons (Bretsen & Hill 2009, 728). When private rights to water are allocated in varying amounts, with varying priorities, in distinct legal systems depending on whether the water is surface water or groundwater, with so many parties, the transaction costs associated with water markets are so high that markets cannot achieve an acceptable level of efficiency. Transaction costs that are particularly relevant in the context of water diplomacy include cultural and linguistic differences, number of stakeholders and geographic scope of the basin, the political salience of water, and heterogeneous legal regimes and traditions between jurisdictions sharing transboundary waters (Casado-Pérez 2015, 162).

Water markets have also aimed to mitigate or avoid water disputes, as illustrated by the case of the Edwards Aquifer conflict in Texas. However, the Edwards Aquifer Authority lacks general appropriations from the state legislature and has no taxing or bonding authority, so it must rely on user pumping fees. This means that the Edwards Aquifer Authority may lack resources to provide effective regulatory oversight and enforcement of the market. Without effective oversight and enforcement, water conflict has persisted in the Edwards Aquifer region (Kaiser & Phillips 1998, 426). Experts have made proposals for similar market-based approaches to resolving conflict, including in particularly complex transboundary disputes like those in the Jordan River Basin. However, those proposals face the same challenge of ensuring that some entity has authority to monitor, regulate, resolve disputes, and enforce violations necessary to achieve an efficient market (Slaibi & Silverbrand 2008, 659).

Even if policymakers avoid all of these obstacles and limitations, and achieve a well-regulated, efficient, and equitable water market, such a market may have serious third-party adverse impacts. For example, the famous case of the transfer of water from the Owens Valley to Los Angeles is often criticized as the paradigmatic example of the limitations of water markets. The story of shady water deals, fraud, and the destruction of a virtual agricultural Eden in the service of a voracious and corrupt group of big city politicians and developers inspired the movie "Chinatown." Yet despite this popular longstanding conception of "water theft," the farmers who sold their land and water rights in the Owens Valley received a reasonable return in the transaction, at least in terms of the value of the land and water for agriculture. The sale and transfer of water from the Owens Valley to Los Angeles placed the water in a higher value use, spurred the development of a major urban center, at the market cost of impacting a marginal agricultural area. The market served reasonably well in terms of promoting higher value water uses, generating wealth, spurring innovation, and compensating the farmers. The market failed, however, to protect the community surrounding those farmers. The third-party impacts are the real tragedy of the Owens Valley – the schools, shops and supporting industries that withered as the farms went dry (Libecap 2005, 2072). Thus, even an ostensibly well-functioning market generating seemingly beneficial outcomes can fail to value how water nurtures and protects vulnerable communities.

## Conclusion

The failures of markets as water management tools are not reasons to abandon the tool entirely. Instead, policymakers should recognize how and when that tool might be most successfully deployed, with an appreciation of the tool's limitations. The potential for markets to serve as effective water management tools depends on the implementation of particular reforms. First, groundwater and surface water should be managed conjunctively, and groundwater should not be an open access, unregulated resource (Larson & Payne 2017, 485). The trading area of water rights should be large, with a diverse group of water users, and well-developed network of market facilitators. Regulators should have effective oversight and enforcement authority, and help protect against third party effects as well as cultural and environmental harms (Bjornlund & McKay 2002, 774). Equitable, efficient, and effective water markets require the steady flow of accurate information. Markets must allow transfers across space and between different kinds of water users. Law should clearly assign water rights and provide clear procedures and conditions for transfers, without punishing the nonuse of water entitlements (Bjornlund & McKay 2002, 785). These reforms increase the potential positive impacts of water markets, in the context of water diplomacy. However, the diversity of different water rights regimes between nations, the cultural and political meaning of water and its representation of sovereignty, and its status as a strategic resource relevant to national security make the role of water markets in mitigating transboundary conflicts even more complicated than in more localized disputes.

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# 24
# GAME THEORY
## Insights for water diplomacy

*Marc F. Müller, Michèle C. Müller-Itten, and Kaveh Madani*

**Key takeaways**

- Game theory can capture some of the key dynamics of many water diplomacy applications by codifying the relationship between the objectives, decision variables and constraints.
- Non-cooperative game theory helps understand how each party's decisions can affect the other party's constraints and their ability to meet their objectives.
- These dependencies help identify barriers to collaboration and design mechanisms to overcome them.
- Cooperative game theory can then help with sharing these benefits in a fair and stable way.

### A game of shared rivers

Game theory is the mathematical study of paradoxical situations, where decisions optimized by individual rational agents interact to produce outcomes that neither agent might find optimal.

Suppose that a river serves as a border between two states – Wakanda and Nikanda – in a highly variable climate (Figure 24.1). To hedge against that variability, the countries have pooled resources to build a dam on the border to regulate the river flow and allow everybody to make the best use of the available water. Now, the dam only works effectively if sediments are regularly dredged. This comes at a substantial maintenance cost, which the two countries have agreed to share. However, when push comes to shove, and maintenance costs are due, one of the countries might renege and count on the fact that the other country relies too heavily on the dam to let it fall into disrepair. Faced with the possibility of losing the benefits of the dam, the other country will step in and cover maintenance costs for the reneging state. Of course, both countries can anticipate this reasoning and try to preempt it by themselves refusing to pay maintenance costs. This leads to a situation where a critical shared infrastructure is not maintained, although it would be in the best interest of all involved parties to maintain it – this is a classical free-rider problem. Importantly, none of the implicated parties need to be of bad faith for these dynamics to occur. The simple *possibility* that one state would renege on its commitment will drive a wedge between the parties and introduce incentives to strike before being stricken.

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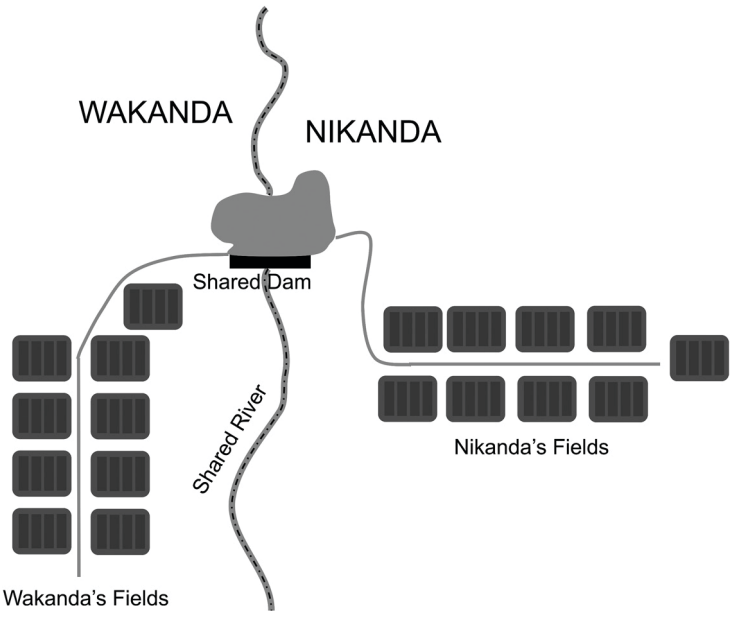



*Figure 24.1* Layout of the illustrative example. Wakanda and Nikanda are two countries separated by a river. The two countries jointly own an irrigation dam and must decide whether to pay for its maintenance.

If the dam is vital enough, everyone will suffer too much from its demise for the infrastructure to be left unmaintained. Maintenance costs *will* be paid for – the salient question is *by whom*. This situation is akin to a game of chicken, where two drivers heading towards each other on a narrow bridge must decide whether to swerve (or "chicken out"). Nobody wants to be the chicken, but if no driver chickens out, they both die. Of course, the optimal situation (from a welfare perspective) is if both drivers swerve, but then nobody wins the game. The best course of action for drivers who do not want to die but *do* want to win the game is to send strong signals to the other driver that they will not – or cannot – swerve, for instance, by tying their hands and blocking their steering wheel. The driver able to send the most convincing signal will then convince the opponent to swerve for fear of dying. In our infrastructure example, these dynamics might cause both countries to posture – potentially quite aggressively – to convince the other country that they will not be the one chickening out and ending up paying for the maintenance. This situation, where parties that are otherwise inclined to cooperate find themselves not only unable to cooperate but vying to intimidate each other, led Thomas Hobbes to famously lament in "The Leviathan" that life is destined to be "solitary, poor, nasty, brutish and short" (Hobbes 1651).

Such failures to credibly commit to cooperative arrangements have been used to explain why reasonable parties can find themselves fighting a war that no one wanted in the first place (Fearon 1995; Roche et al. 2020). Water has been argued to play a potentially important role in that process, as committing to peace is particularly challenging if the future is uncertain due to large, unpredictable variations in water availability. Short of full-blown armed conflicts, the dynamics of the above example are also ubiquitous in water diplomacy, where the mere suspicion (whether justified or not) that any party might desist from a cooperative arrangement can prevent well-intended

parties from realizing the potential benefits of cooperation. Game theory provides a helpful framework to make sense of this paradox and, more broadly, build institutional mechanisms to avert it and prove Hobbes' gloomy prediction wrong.

This chapter introduces game theory to practitioners of water diplomacy by providing a brief overview of its broad concepts. As such, we do not seek to provide an exhaustive review of the increasing body of research applying game theory to water resources. We refer the interested reader to Madani (2010) and Dinar and Hogarth (2015) for comprehensive reviews of both non-cooperative and cooperative water games, including transboundary water conflicts. Examples of recent applications in water diplomacy include Müller et al. (2017) and Penny et al. (2021) for non-cooperative game theory applied to transboundary groundwater; Akbari et al. (2021), Aljefri et al. (2019) and Bahrini et al. (2021) for non-cooperative game theory applied to transboundary rivers; and Teasley and McKinney (2011) for cooperative game theory. We also refrain from introducing the rigorous mathematical formalism necessary to use game theory in a research or modeling setting. Instead, we focus on providing key intuition that is accessible to readers with limited mathematical background. We refer the interested reader to Gibbons (1992) and Fudenberg and Tirole (1991) and Peleg and Südholter (2007) for a complete mathematical treatment.

Our dam maintenance example discussed so far is based on a real-world water conflict between the Islamic Republic of Iran and Afghanistan under Taliban rule before the United States Invasion of 2001 (see Madani 2010). Using the maintenance game as a guiding thread, we first explore the potential for non-cooperative game theory to shed light on the misaligned incentives that impede cooperation and on some institutional mechanisms that can be put in place to encourage it. We then describe how concepts of cooperative game theory can be leveraged to make the 'best' use of the benefits of cooperation. The last section concludes with a brief discussion on how game theory can support the practice of water diplomacy.

## Decision setting: actions and events

On the face of it, it sounds pretentious and simplistic to build a mathematical model of human choices, as if humans had no free will and complex diplomacy negotiations could be replaced by simple algorithms. And there is, certainly, some truth to that sentiment – it is quite likely that the negotiating parties may not react very fondly if they were being told that some savvy game theory modeler had already figured out what will or should happen. Nevertheless, decision theory and game theory can prove to be valuable frameworks to guide the practically minded water diplomat, both in terms of interpreting past events with seemingly unintuitive or paradoxical outcomes or in terms of thinking creatively about potential future developments. In what follows, we use highly stylized examples to illustrate the general approach and to discuss its strengths and limitations in a concrete manner.

We start with the simplest problem, where a single decision-maker (say, Wakanda) has to decide whether to dredge a dam that she owns before knowing how variable the seasonal flows will be. If they turn out to be highly variable, a well-maintained dam with high storage capacity is essential to use the water effectively and maximize the value of the harvest. If the seasonal flows are not highly variable (e.g., there is no major flood), creating additional storage capacity through dredging and sediment removal would not be necessary, and maintaining it would be a waste of resources. The most typical approach is to formalize this as an expected utility maximization problem, and the first step in formalizing it would be to represent the problem in table form, known as a "decision matrix." An example of a decision matrix is shown in Figure 24.2.

In the most basic form, a decision matrix simply distinguishes between actions (what the decision-maker can control) and events (which are outside of her control but are nevertheless

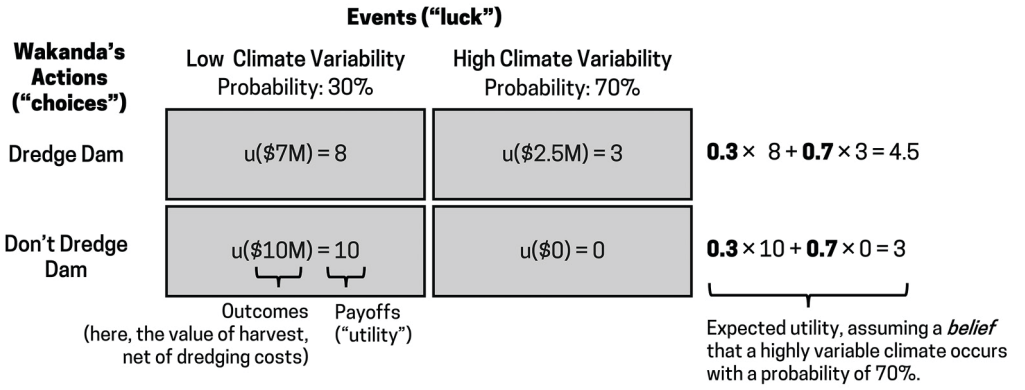



*Figure 24.2* Wakanda's payoff from her (unshared) dam. The net value of the harvest, and associated utility, for Wakanda depends jointly on whether (i) Wakanda decides to dredge the dam (rows) and (ii) the climate is of low or high variability (columns). Climate variability is dictated by nature: whether the climate will be of low or high variability is a random event with known probabilities (here 0.3 and 0.7).

affecting the consequences that she is facing). The actual *outcome*, or the consequences of her choice, are jointly determined by the actions and the events. An outcome may be monetary, or it may be something less easily quantifiable, such as social prestige, pride and health status. What is driving the agent's choice across possible actions, then, are the payoffs that she associates with each outcome. We typically refer to this as *utility*, which are numeric values that, loosely speaking, capture how "attractive" each scenario is. The payoff is not necessarily the same as the harvest value because the additional benefit of an extra dollar may be less salient if the harvest is already plentiful. (This is referred to as "decreasing marginal utility," which would generate risk-averse behavior.). In the figures, this distinction is represented as u($X)=Y, where Y is the utility generated from the monetary profit X associated with the choice; X and Y are related by a (here unspecified) utility function. But it's not the payoffs alone that matter, it's also the decision-maker's belief regarding the likelihood of each possible event. Here, the table visualization is helpful because it reminds us that a consistent belief would associate probabilities to each column (outside event), rather than to individual outcomes per se.

To compute expected utility, one would then, for each row, multiply each payoff with the corresponding likelihood and sum across all columns. The row with the higher expected payoff would be Wakanda's predicted choice. But even if that final computation sounds like a step too far into algorithm land, merely representing the choice as a table and drawing the clear distinction between acts, events, outcomes, payoffs and beliefs can be a powerful tool to frame complex choices. And by perturbing the assumed payoffs and beliefs, we can confirm that dredging the dam is the right move as long as highly variable flows in the following seasons are sufficiently likely, and this decision to properly maintain the infrastructure limits the negative consequences from high flow variability and extreme high/low flows.

## Understanding misaligned incentives

We now bring the second player (Nikanda) into the mix and enter the realm of game theory. Nikanda shares the river basin with Wakanda and is also affected by the maintenance of the dam

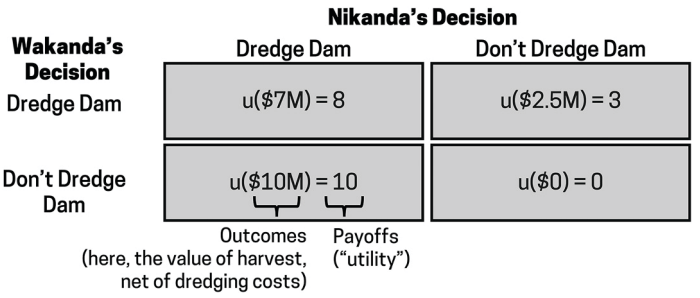



*Figure 24.3* Wakanda's payoffs from a dam that she shares with Nikanda. Wakanda's harvest value and utility are now jointly determined by both parties' dredging decisions.

(Figure 24.1). Because of this, Nikanda also affects the consequences that Wakanda faces, and, like the random events in Figure 24.2, Nikanda's choices are outside of Wakanda's control and vice versa. If Nikanda decides to dredge the dam, both countries will benefit from it, but only Nikanda will pay for the maintenance. These considerations allow us to update our decision matrix as shown in Figure 24.3.

In some sense, there is little difference for Wakanda in whether the more valuable harvest is due to less variable flows or to Nikanda's initiative to pay for the dam maintenance. We can see this in the fact that nothing has changed in the outcomes or the associated payoffs. It is still optimal for Wakanda to dredge the dam as long as she has reason to believe that her opponent will *not* dredge the dam with sufficiently high probability. But what should she believe?

Unlike the flow variability, Nikanda's choices are not randomly determined. Instead, they are the result of reasoning, much like Wakanda. So, rather than looking at forecasts of flow variability (the probabilities in Figure 24.2), she should try to empathize with her opponent by understanding what his relevant outcomes and payoffs are. These will guide her choices and, therefore, will inform whether Wakanda should expect him to step up and pay for the dredging.

To account for this, we should add the payoffs of the other player for each outcome. As is customary, we will always note Wakanda's payoff (the 'row player') first, followed by the payoff for Nikanda (the 'column player') for the same outcome. In the simplest situation, Nikanda and Wakanda are symmetrical, yielding the payoff table in Figure 24.4.

The matrix in Figure 24.4 clearly outlines the choices for each player and identifies separate payoffs for each player from each outcome. In doing so, it acknowledges that some outcomes generate winners and losers and illustrates how this creates an obstacle to collaboration. Looking at the joint payoffs from both players, we observe that the best outcome in this scenario would be for Wakanda and Nikanda to both chip in and split the dredging costs (i.e., Dredges/Dredges in Figure 24.4). Each will earn a payoff of 8, which corresponds to a $7 million profit. No other choices can generate as much total payoff (u($7M) + u($7M) = 16). Unfortunately, our two negotiators run into a problem: They realize that paying for dredging is not, in fact, in their own best interest when they know for certain that their opponent is also planning to chip in. Wakanda has reasons to believe that Nikanda might dredge the dam even if Wakanda does not share the costs because Nikanda will prefer a payoff of u($2.5M) = 3 to a payoff of u($0) = 0. If Nikanda dredges the dam no matter what, Wakanda's best course of action is arguably to *not* dredge the dam. By the same token (with a bit of empathy), Wakanda can also infer that convincing Nikanda of her own good intentions to pay for dredging is not sufficient to achieve the most desirable outcome

| | | Nikanda | |
|---|---|---|---|
| | | Dredge Dam | Doesn't Dredge Dam |
| Wakanda | Dredge Dam | [u($7M), u($7M)] = [8, 8] | [u($2.5M), u($10M)] = [3, 10] |
| | Doesn't Dredge Dam | [u($10M), u($2.5M)] = [10, 3] | [u($0M), u($0M)] = [0, 0] |

*Figure 24.4* Both players' payoffs from the shared dam. Either player's harvest value and utility are now jointly determined by both parties' dredging decisions. Although the upper-left outcome (Dredges/Dredges) maximizes collective utility, the Nash Equilibrium outcome is either of the two off diagonal solutions (Dredges/Doesn't dredge or Doesn't dredge/Dredges).

where both players share the dredging costs (Dredge/Dredge on Figure 24.4). If Wakanda credibly commits to dredging, it only strengthens Nikanda's incentives to shirk responsibility. So what can the two players do?

The game-theory answer to the table above would be that, in the absence of cost-sharing agreements, the only stable outcomes (known as *Nash Equilibria*) of the game are those where one player pays the full cost of dredging while the other freerides and benefits from it. As long as both players are convinced that, say, Wakanda will pay for dredging but Nikanda will not, neither is tempted to deviate from that prediction. These Nash Equilibrium outcomes where one player dredges and the other player does not dredge are self-reinforcing and stable. Yet they are not optimal as the players would (collectively) be better off if only they could find a way to agree about sharing the dredging costs.

## Designing mechanisms for cooperation

The toy model in the previous section depicts a world where Nikanda and Wakanda appear stuck in a situation where nobody can bring themselves to agree to split dredging costs, even though the players would collectively benefit from it. Paradoxically, convincing the other player of one's good faith would only make things worse and reinforce the other party's resolve not to split costs. There are, of course, reasonable objections to these dooming predictions. In reality, collaboration does happen, and negotiations can contribute to a better future. However, we argue that this discrepancy does not mean that game theory is not able to realistically capture real-world dynamics. Rather, it is a helpful illustration of how good negotiations that lead to strong agreements can *alter* the cost–benefit analysis that agents face. How so? Let us narrate one example that highlights the specific role that well-designed institutions play.

Suppose the two parties can sign a binding contract that commits them both to share dredging costs, and otherwise makes them liable to damage payments of $4.5M to the other party. This requires an institution that can do *external enforcement*, such as international courts and contract laws. Let's suppose such options exist. If the agreement is signed, this changes the payoffs for the players by depressing the net profits from deciding not to dredge by $4.5M and putting that amount in the pockets of the harmed party. Now, instead, they are solving the game with the payoff displayed in Figure 24.5.

| | | Nikanda | |
|---|---|---|---|
| | | Dredge Dam | Doesn't Dredge Dam |
| Wakanda | Dredge Dam | [u($7M), u($7M)] = [8, 8] | [u($7M), u($5.5M)] = [8, 6.4] |
| | Doesn't Dredge Dam | [u($5.5M), u($7M)] = [6.4, 8] | [u($0M), u($0M)] = [0, 0] |

*Figure 24.5* Both players' payoffs from the shared dam, assuming damage payments of $4.5M. The Nash Equilibrium outcome (Dredges/Dredges) is now also the outcome that maximizes the utility of both players.

| | | Nikanda | |
|---|---|---|---|
| | | Signs | Doesn't Sign |
| Wakanda | Signs | [u($7M), u($7M)] = [8, 8] | [u($2.5M), u($10M)] = [3, 10] |
| | Doesn't Sign | [u($2.5M), u($10M)] = [3, 10] | [u($2.5M), u($10M)] = [3, 10] |

*Figure 24.6* Both players' payoffs from signing a binding maintenance contract, assuming that Nikanda tends to freeride if no contract is signed.

As we can see, now agreeing to pay for dredging is also money-wise, no matter the beliefs about opponent behavior. Note that this would be true even if deviations are not detected with 100% certainty, in which case the expected value of the penalty would be somewhat smaller than $4.5M. It would also be true if pursuing justice is costly, as long as the cost of litigation is not too high relative to the odds of winning the $4.5M retribution. This shows that even imperfect institutions can be sufficient to incentivize adherence. Similarly, if there is a *social stigma* associated with breaking a promise, and the parties care about their reputation, then this may reduce their payoff from reneging on dredging costs, even in the absence of financial consequences, with a similar effect.

Still, it would be too early to claim success. The dredging decision is not the only choice that agents face in our negotiation process – they also initially have to agree to sign the maintenance agreement. In deciding whether to sign, they have to anticipate the consequences. With the argument above, we can convince both parties of the self-reinforcing nature of the contract. If we explain this well, this generates trust that a signed agreement will be adhered to. Let us also assume that it is well-known that Nikanda is ruthless and that in the absence of a formal contract, the implicit agreement would be the one from Figure 24.4, where Nikanda freerides and Wakanda dredges. This generates the following game matrix in Figure 24.6 as agents think about signing.

Following the payoff table on Figure 24.6, Wakanda is happy to sign (remember, she's selecting the row, and her payoffs are listed first). Unfortunately, Nikanda prefers not to sign, turning our well-intentioned contract into a waste of paper that does not affect dredging decisions.

But what if Wakanda is willing to offer Nikanda $3.2M in exchange for his participation? This *side payment* would not alter the cost–benefit analysis once the contract goes into effect, but it

| | | Nikanda | |
|---|---|---|---|
| | | Signs | Doesn't Sign |
| Wakanda | Signs | [u($3.8M), u($10.2M)] = [4.5, 10.1] | [u($2.5M), u($10M)] = [3, 10] |
| | Doesn't Sign | [u($2.5M), u($10M)] = [3, 10] | [u($2.5M), u($10M)] = [3, 10] |

*Figure 24.7* Both players' payoffs from signing a binding maintenance contract if Nikanda tends to freeride but Wakanda is willing to offer a $3.2M side payment for Nikanda to sign the contract.

would coax Nikanda to view the contract more favorably. It would also change the signing matrix to one where both would be willing to sign, and ultimately dredge the dam and improve payoffs and profits (Figure 24.7).

In the same vein, *bundling issues* (or what game theory refers to as "issue linkage") by expanding the negotiation to include other bilateral issues (such as trade openness or military assistance) that could be provided in exchange for dredging would produce a similar effect.

## Sharing the benefits

In our example so far, Wakanda and Nikanda had similar utility functions. This means that their loss and gain from each possible outcome were the same. When both parties decide to pay for dredging, the obvious fair share is assumed to be half of the total cost, but what if their utility functions are not identical? Indeed, in the real world, the utility functions of the players are rarely symmetric. This is not a problem for us, though, as game theory has some insights for such situations.

Let's assume that Wakanda has a much more modern and advanced farming system than Nikanda with more suitable lands for agricultural production. In that case, the agricultural yield and the resulting profit in Wakanda is much bigger than Nikanda's profit when the dam is properly maintained. If Wakanda's profit from farming is five times bigger than Nikanda's profit, shall the two countries still equally share the cost of sediment removal? Would that be fair in your view? How do Wakanda and Nikanda feel about such cost-sharing arrangements?

Fairness is very subjective, of course. In the world of diplomacy, negotiators are willing to even say no to win-win deals when they feel their shares of the incremental benefit of cooperation (or their share of the cost to make cooperation feasible) are not fair. Cooperative game theory is an important branch of game theory that helps analysts understand why win-win resolutions can be rejected and what can be done to enforce win-win resolutions that are considered fair, efficient and stable.

Let us revisit the dam maintenance game and now assume that, for political reasons, dredging can only be implemented if the two parties are able to split the costs. In other words, either the countries cooperate and split the costs, or the dam does not get dredged. Any self-reinforcing agreement over cost-sharing that results in a higher payoff than the case of non-cooperation should, in theory, be welcomed by a "rational" player. For example, if the profit from cooperation (joint dredging) for Wakanda and Nikanda is $1.7M and $0.4M, respectively, any share of the maintenance cost that results in a profit greater than zero for both players should be attractive to both of them. In that case, Wakanda can contribute up to a little less than $1.7M and Nikanda can contribute up to a little less than $0.4M toward the cost of joint dredging and still be better off than no dredging at all (which would mean zero profit). But this is not how things work in practice. If we assume that

the maintenance cost is \$0.3M, Nikanda might be reluctant to even take responsibility for half of the maintenance cost (\$0.15M, Figure 24.8a), arguing that Wakanda is gaining much more than he is from a cooperative situation.

In search of an acceptable agreement, the parties may find it helpful to first establish a consensus on what the desirable properties of their agreement are. Some may come readily: Both will agree that, no matter how the costs are split, dredging is better than not dredging and that reducing the profit of one should only be justified if it benefits the other (a principle known as Pareto-optimality). Both parties will also likely agree that the cost split should be "fair," but again, a specific and consensual definition of fairness may be difficult to flesh out. One solution might be to try to equalize, as much as possible, the net profit that remains for each country after paying their cost dues. This concept is embodied in the so-called Nash Bargaining solution, one of the best-known cooperative game theory concepts, which was developed by John Nash, a famous mathematician and Nobel Laureate in economics who was the featured character of the *A Beautiful Mind* movie. In the highly asymmetric situation in Figure 24.8b, the Nash Bargaining solution would imply that Nikanda does not bear any maintenance costs, since Wakanda still makes a larger net profit when she covers the full cost of maintenance. Now let's assume that the profit of Wakanda in the cooperative case is \$1.1M and Nikanda's is \$1M, so that they are more similar. In that case, the Nash Bargaining solution suggests \$0.2M and \$0.1M as potentially attractive shares of the maintenance cost for Wakanda and Nikanda, respectively, and would result in equal profits of \$0.9M for both players (Figure 24.8c). Yet Wakanda might reject this resolution, arguing that it is not fair for it to pay two times more than Nikanda to gain the same profit. Wakanda may counter that since they stand to gain 10% more than Nikanda, they will shoulder 10% more of the cost, that is, \$0.157M versus \$0.143M. Cooperative game theory literature provides some other possible solutions for situations like this (see, e.g., Madani and Hooshyar 2014). Exploring those solutions

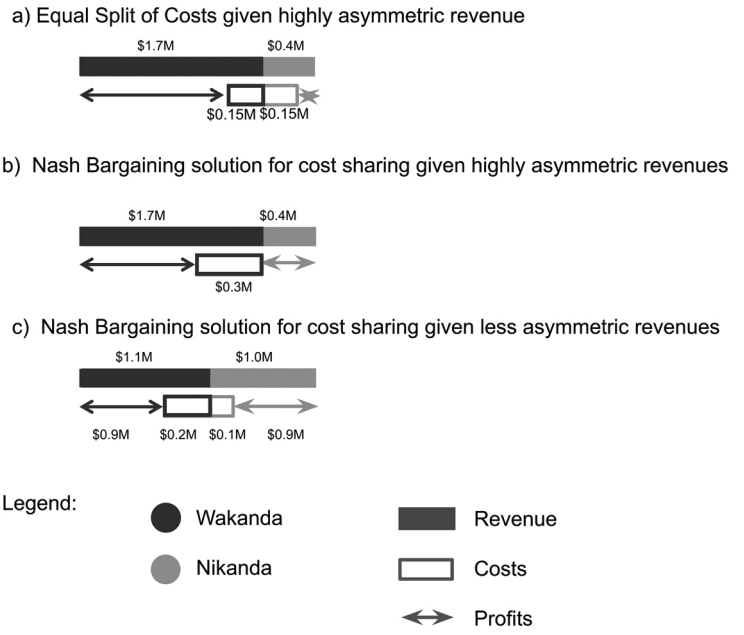



*Figure 24.8* Cooperative game theory: Cost-splitting solutions.

and their rationales might give the negotiators or third-party mediators/analysts some insights about the deal-breaking and potentially acceptable solutions that they should consider and/or could refer to during the negotiations.

## Implications for the practice of water diplomacy

The dam maintenance example discussed in this chapter illustrates the potential for game theory to capture some of the key dynamics of many water diplomacy applications. We showed how expected utility theory can be leveraged to codify the relationship between the objectives, decision variables and constraints that drive the considered problem ("Decision setting: actions and events" section). Principles from non-cooperative game theory can then be leveraged to understand how each party's decisions can affect the other party's incentives and their ability to meet their objectives ("Understanding misaligned incentives" section). These dependencies, in turn, allow us to identify barriers to collaboration and design mechanisms to overcome them and realize the full benefits of cooperative water management ("Designing mechanisms for cooperation section"). Cooperative game theory can finally be leveraged to share these benefits in a fair and sustainable way ("Sharing the benefits section").

What lessons are there for practitioners here? To be sure, water diplomacy outcomes are often idiosyncratic and highly context-specific. The abstract mathematical constructs of game theory can hardly capture the true scope of complex decisions by real humans in unique (and often thorny) socio-political contexts (see Madani 2013). Nonetheless, game theory offers a tractable way to understand – even from a qualitative perspective – how the key components of the choice problem (objectives, decisions and constraints) interact to create situations where even rational and well-meaning actors might find themselves on opposing sides of an issue. This understanding can support the practice of water diplomacy in a variety of ways, including:

- *Creating empathy and understanding history:* By allowing actors to understand how rational decisions by both sides could lead to an outcome that neither party is entirely happy with. Understanding the dynamics that cause this unintuitive outcome might allow each party to make sense of the other party's actions.
- *Framing the problem:* By simulating the outcomes associated with each party's decision – and the other parties' response to it – game theory can be used to evaluate the benefits and costs of (non-)cooperation and identify strategic responses (i.e., what's the best strategy for me?).
- *Designing mechanisms:* By incorporating notions of incentive compatibility and equilibrium, non-cooperative game theory allows the identification of the necessary (although not necessarily sufficient) conditions for cooperation.
- *Sharing the pie:* By incorporating concepts of stability, fairness and optimality, cooperative game theory allows parties to optimally distribute the benefits of cooperation.

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# 25

# GENDER MAINSTREAMING AND GENDER TRANSFORMATIVE APPROACHES

## Assessing Progress and Potential in Water Diplomacy

*Francesca Greco*

**Key Takeaways**

- Gender considerations are almost entirely absent from water diplomacy, and women remain underrepresented in water processes and institutions.
- Gender mainstreaming alone is not enough to ensure gender equity in the hydro-diplomatic process – gender transformative actions need to be considered.
- The role of women in water diplomacy is critical to ensuring the best and most sustainable outcomes – steps can be taken to ensure fair and equal representation in these processes.

### Introduction

This chapter aims to provide the reader with the essential theoretical tools to understand how gender and gender roles are interrelated with topics of water, water and development, and water diplomacy. Important concepts such as "gender and development," "gender in development," "women and development," and "women in development" are unpacked. With this background, the term "gender mainstreaming" is introduced within the context of water policies and, more specifically, in water diplomacy.

The second part of the chapter introduces the concept of a "gender transformative approach," including its theoretical foundations and use. Practical examples of past and ongoing projects that employ these approaches in water diplomacy are provided.

Part three of this chapter explores the interlinkages among the topics of gender mainstreaming, gender transformative approaches, and water diplomacy at different scales and according to different theoretical perspectives. Examples from international cooperation agencies and think tanks, academia, and development practitioners guide the reader in the evaluation of the success or relative failure of women and men in water diplomacy as actors of change and transformation in their respective gender roles. A "toolbox" of gender transformative water diplomacy actions is


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provided. The concluding section offers a non-exhaustive list of current challenges, contradictions, and shortfalls of gender strategies as applied to water diplomacy.

## Water Diplomacy as "A Man's World"

In its early uses, "water diplomacy" was typically referred to as transboundary water diplomacy. All other scales of water diplomacy, such as that at a regional or local scale, had not yet been identified as fields where "diplomatic" actions could occur. The masculine nature of "water diplomacy" and its lack of gender considerations was first identified in 2013 by Earle and Bazilli (2013). It is still considered male-dominated (Sehring and Wolf 2023; Zwarteveen 2017).

The masculinization of water diplomacy can be explained by a number of factors. These include the preponderance of male water professionals involved in diplomacy and international relations, the male domination of water professionals involved in water management, and the prevailing notion of water resource management as a "technical issue" (Earle and Bazilli 2013). Technical staff, water engineers, hydrologists, agronomists, hydrogeologists, and personnel involved in water decision-making have historically all been male. Their presence in water diplomacy can be, therefore, traced back to technical skills and diplomacy having traditionally been male-dominated domains. The professionals traditionally involved in the "hydraulic mission" of the last two centuries were usually male (Zwarteveen 2017). These hydro-bureaucrats were "inspired by colonial hydraulic feats" associated with the domination of nature and irrigation efficiency (Molle *et al.* 2009, p. 328). Transboundary water resources were considered a *man's world* and operating "principles that (were) presented as neutral (were) both shaped by men and based on male experiences" (Sehring *et al.* 2022, p. i).

As hydro-politics evolved, it expanded to include the community level and the introduction of participatory approaches, inspired by the social movement perspective and the institutional perspective in development studies (Potter *et al.* 2008). Through this expansion, other issues became part of the hydro-political landscape. Regional and local water governance, global environmental governance, the human right to water and sanitation, and rural development studies, among many other topics, became part of the contested water landscape and took water diplomacy and water negotiation practices in new directions (Barua 2018; Mirumachi 2020). Conversely, perspectives on water diplomacy have begun to influence traditional diplomatic areas such as peace studies, conflict studies (Gleick and Lowi 1992), human rights (Sultana and Loftus 2013), climate change studies, environmental justice, gender studies, and postcolonial studies, among many others (Barua 2018; Mirumachi 2020). Through this influence, stakeholders involved in hydro-politics and water diplomacy began to expand. Non-state actors such as civil society, non-governmental organizations (NGOs), and the private sector have increasingly become recognized as important actors in Track Two and Track Three diplomacy (Barua 2018; Mirumachi 2020; Zeitoun *et al.* 2020).

The broadening scope of water diplomacy to encompass a large range of issues and actors has increased attention to women's participation and the role of gender in water resource management, as has paralleled the growth of "gender studies" (Kandiyoti 1995) and greater attention to the notion of "gender mainstreaming."

## The Rise of Gender Theories

Prior to the emergence of gender mainstreaming as a concept, the literature on "gender and water" first found its roots in the field of feminist environmental analysis in the 1970s as a subfield of

gender and development studies. Feminist analysis of environmental issues over the past 50 years has broadly evolved in parallel to changes in feminist theories themselves (Arora-Jonsson 2014).

Gender is not synonymous with biological sex. Gender refers to the socially constructed roles, behaviors, and attributes that a society considers appropriate for men and women, which goes beyond a simple categorization based on biological sex (Oakley 1972). Discussions of gender issues are not simply discussions of issues concerning women. Gender roles are shaped by the perceptions of women and men in society, families, and communities (Goodrich *et al.* 2019; Butler 1990). It is the way in which individuals, groups, and entire societies attribute roles to other people based on their gender or biological sex that creates gender roles. Gender relations are, therefore, socially constructed according to societal norms and historically shaped around unequal power relations.

Male elites dominate economic and political institutions in most societies. This strong male gendering of power has an impact on the lives of many women throughout the world, manifesting itself in greater levels of poverty, a lower share of political power, and gender-specific health conditions, such as maternal AIDS-related deaths for example (Kabeer 1994). The existence of such disparities connected gender issues with development theory and practice in the 1990s. While "gender inequality" is more widely used today, feminist scholars in political ecology use the term "gender oppression" to describe these patriarchal relationships (Mies 1986; Salleh 2017).

Through time, feminist perspectives on gender roles have focused not only on women's unequal power in society (Moser 1989) but also on the creation of masculinity and masculine models and perceptions, which shape and reshape masculine gender roles in individuals, communities, and societies (Zwarteveen 2017). The field of gender analysis also covers other intersectionalities[1] such as age, class, ethnicity, and religion (Shields 2008; Butler 1990). Women are typically disadvantaged compared to men in terms of material deprivation, living conditions, income, and resource distribution (Mies 1986).

The uneven distribution of water resources based on gender roles has been amply demonstrated in the literature, especially regarding how gender roles attributed to women (reproduction, distribution, and community roles) have applied to water-related tasks, water and health, and water management at the community level (Moser 1989). As such, the majority of literature concerning "gender and water governance" was focused on households, local irrigation for agriculture, drinking water, and sanitation. Issues of menstrual health, rural development, unaccounted-for labor in water provision tasks, irrigation, and agricultural workforce, as well as education access, often dominated the field of "gender and water" (de Silva *et al.* 2018).

The large gap between women and men in decision-making roles, shaped by gender perceptions, is reflected in water-related institutions. This is the main topic of this chapter.

## Gender Mainstreaming

The term "gender mainstreaming" was introduced at the 1995 Beijing Platform for Action of the United Nations and defined by the Economic and Social Council of the UN and related agreed conclusions in 1997. Table 25.1 provides additional contextual history leading up to this point. The result was that gender studies became well-integrated into development theory and practice and shaped the main institutions devoted to international aid and development, from the UN down to the NGO recipients of aid at the lowest levels. This section provides a short summary and perspective regarding how, when, and for whom a gender mainstreaming approach has thus far been deployed in the field of water policy and, by extension, water diplomacy.

*Table 25.1* Evolution of the Concepts of Gender and Development

| *Concept* | *Timeline* | *Focus* |
|---|---|---|
| Women in Development (WID) | Initiated in the 20th century until the early 1970s | Promoted a more active role of women in society and economic development, mostly in Western societies and as an evolution of feminist movements in North America. Until the 1970s, WID influenced NGOs, donors, and governments in their development projects and actions oriented toward the promotion and improvement of conditions for women (Boserup 1975). |
| Women and Development (WAD) | late 1970s (First UN World Conference on Women in Mexico City in 1975) | As a critique of WID, WAD promoted the idea that women had always been part of development, but they were never recognized in their role because of the existence of a patriarchal economic system. WAD addressed the conditions of women in the Global South and openly denounced the relations between capitalist development and patriarchy. An important advancement of gender studies was the contribution of WAD in the assertion that women should no longer be considered passive recipients of development aid but rather become active actors and participants in development projects. WAD promoted alternative institutions for women and women-specific programs. |
| Gender and Development (GAD) | 1980s rooted in India, was recognized at the Third UN Conference on Women in Nairobi in 1985 | The GAD approach elaborated more on gender roles, specifically on the disproportionate burden of the neoliberal agenda of the Washington Consensus on women in the Global South. GAD contributed to the clarification of the use of the term "gender roles" instead of "women issues." GAD clarified how masculinity and femininity and their associated roles were socially constructed, being the outcomes of perceptions and bias (Oakley 1972; Rubin 1975). The division of labor was demonstrated to be a gendered perception; the same explanation was valid as well for the distribution of power within institutions. |
| Gender Mainstreaming (GM) also known as "mainstreaming gender equality" (MGE) | 1990s (1995 Beijing Declaration and Platform for Action) | GM action incorporates a gender perspective into all policies, programs, and activities. The purpose of gender mainstreaming is to ensure that gender considerations are considered in all areas of decision-making and that policies and programs do not unintentionally perpetuate gender inequalities. This can be accomplished by ensuring that gender considerations are considered in all decision-making areas. |
| Gender Transformative Approaches or Gender Transformative Action (GTA) | 2010 to present | "It seeks to actively examine, challenge and transform the underlying causes of gender inequality rooted in inequitable social structures and institutions. It promotes gender transformative change at the individual and systemic level and across informal and formal spheres of life. At the core of gender transformative programming lie interventions that aim at addressing practical gender needs (e.g., knowledge, skills, access to productive resources) and strategic gender interests (e.g., decision-making power, position/status in society) by triggering changes in agency, social relations and social structures" (FAO, IFAD and WFP 2020). Other actions foresee gender budgeting as a strategy for changing the economic assets of development projects. |

The UN has defined gender mainstreaming as (UN 1997):

> The process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality.[2]

The codification of these terms within the UN drove the mainstreaming of gender, raising gender awareness and the adoption of gender-targeted actions, not only for women-specific programs but also for all development programs. No project was approved without "gender mainstreaming" design and performance indicators, checklists, and means of verification.[3]

## Gender Transformative Approach

Gender mainstreaming has since evolved to a more proactive approach, called gender transformative actions, that aims to fundamentally challenge and transform gender norms, roles, and relations. It seeks to go beyond addressing the "symptoms" of gender inequality and instead targets the root causes of gender-based discrimination and violence. It involves transforming social norms, attitudes, and beliefs that perpetuate gender inequality and promoting the empowerment of women and girls. UN Women defines gender transformative action as an approach that seeks to transform discriminatory gender norms, roles, and relations that limit women's and girls' capabilities, agency, and opportunities and perpetuate gender inequality (Dietrich Ortega et al. 2020). Engaging men is one of the key "transformative" actions of this approach, aimed at changing the paradigms and the gender norms usually linked to the many perceptions of male/masculinity and female/femininity. In this sense, men are challenged to promote gender equality as part of something they not only need to practice but also master to the point of championship. Males, in this sense, are called to become champions of gender transformative actions.

Whereas gender mainstreaming focuses on integrating a gender perspective into all policies and programs with the associated output metrics, gender transformative action also seeks to challenge and transform gender norms and gender/power relations that more directly impact the sustainability of program outcomes. Moreover, a formulation by the United Nations Educational, Scientific and Cultural Organization (UNESCO) suggests a more "practical orientation" compared to the gender mainstreaming approach. It sets specific targets in project management with the open intent of transforming norms as well as involving both women and men in gender equality actions. According to UNESCO, a gender transformative programming "builds knowledge and shapes skills, values and attitudes in order to transform established norms around gender and power by empowering individuals to champion gender equality and challenge all forms of violence" (UNESCO 2016, p. 33).

More specifically, according to the Food and Agriculture Organization, gender transformative programming refers to integrating the gender transformative approach into project and program design, implementation, monitoring, and evaluation (FAO, IFAD, and WFP 2020). Three of the key elements highlighted by UNESCO in the gender transformative approach are:

1 transformation of established norms through the generation of new knowledge;
2 empowering individuals to champion gender equality; and

3 contributing toward change in conventional project cycle management and its targets/outputs/financial requirements in order to remove structural barriers.

Examples of gender transformative action can be found in the "gender transformative strategy for Food Security and Nutrition" related to SDG 2 among the United Nations' Rome-based Agencies dealing with UN SDG 2 related to the goal of "Zero Hunger" authored by the Food and Agriculture Organization of the United Nations, the International Fund for Agricultural Development, and the World Food Programme (FAO, IFAD and WFP 2020). This strategy utilizes a "theory of change" model and sets a specific set of gender-aware targets and goals for the three agencies in their plan to achieve the aim of "Zero Hunger" in SDG 2.

On the other hand, water diplomacy has no specific roadmap, "theory of change," or gender transformative strategy with a specific set of goals, actions, or targets mutually agreed upon among UN agencies. Each UN agency working on water tends to have its own gender transformative strategy, which is not necessarily focused on water but rather on its own goals and objectives (UNICEF 2022; Marcus and Samuels 2020).

It is important to note that the shift from gender mainstreaming to gender transformative action does not imply that the basic targets of gender mainstreaming, or even the targets of Women and Development (WAD), have been achieved in development action or, more specifically, in water diplomacy. Questions still remain around gender mainstreaming in water diplomacy since equal representation has not necessarily resulted in effective or equal participation. In fact, the totality of reports and literature available at present still demonstrate a lesser consideration of women's opinions and the assignment of lower roles in this realm.

In sum, water diplomacy has developed in parallel with our growing understanding of how to best address gender inequalities in development theory and practice. The UN formally recognized the role of women in water decision-making within the Dublin Principles. Outside of the field of water, the role of women in diplomacy, conflict resolution, and peace have been strongly reinforced within other UN resolutions as well as other principles in customary international law (see Box 25.1).

**Box 25.1 Timeline of Official Recognition of Women's Role in Water-related Issues**

- 1992 Dublin Principles on the role of women in decision-making in the water sector. These principles hold that: (1) freshwater is a finite and vulnerable resource essential to sustain life, development, and the environment; (2) water development and management should be based on a participatory approach, involving users, planners, and policymakers at all levels; (3) women play a central part in the provision, management, and safeguarding of water; and (4) water has an economic value in all its competing uses and should be recognized as an economic good.
- At the United Nations Conference on Environment and Development in Rio de Janeiro (June 1992), it was determined that the participation of women was vital for the proper management of water.
- 1992 AGENDA 21, chapters 18 and 24 mentioned the role of women in sustainable development and in water resource management.
- 1995 The UN Beijing Platform for Action listed among its strategic objectives the active involvement of women in environmental decision-making at all levels.

- 2002 The Johannesburg Plan of Implementation of the 2002 UN World Summit on Sustainable Development mentioned that all water infrastructure and services should be gender sensitive.
- United Nations Security Council Resolution 1325 on Women, Peace and Security (adopted on 31 October 2000) focused on the role of women in peace, conflict resolution, and security.
- Between 2000 and 2019 including the UNSC 1325 resolution, there were ten different resolutions of the UN Security Council on women, peace, and security.[4]
- The Millennium Development Goals (MDG 3 Promote gender equality and empower women).
- The Sustainable Development Goals (Goal 5, Goal 6).
- The 2005–2015 International Decade for Action, "Water for Life."
- The 2018–2028 International Decade for Action on Water for Sustainable Development.

## Gender in Water Diplomacy

Has gender equality, either through gender mainstreaming or gender transformative actions, been achieved in water diplomacy? The literature regarding gender and water diplomacy is scant, constituting just a few milestone publications, all of which come to the same negative conclusion. A search of the peer-reviewed and gray literature for the words "women + water" in the Web of Science search engine[5] (de Silva *et al.* 2018) showed that of the 10,439 results found, most pertained to public health sciences. When the word "decision" was added to the search, only 178 results for "women and water" were returned. The search for data regarding women's representation in transboundary water institutions has been dubbed by one author as a hunt for "the invisible women" (Best 2019). A survey of 117 river basin organizations revealed that only 19% of staff in high-level positions in decision-making were female (Best 2019).

One of the first papers discussing gender in diplomacy on transboundary rivers was authored by Earle and Bazilli in 2013 on the water shared among Angola, Botswana, Lesotho, Namibia, and South Africa (Earle and Bazilli 2013). Their analysis of the work of the Orange-Senqu River Commission, the Permanent Okavango River Basin Commission, and related legislation demonstrated that gender issues were neither present nor addressed in transboundary policy, actions, or legislation. This was also seen in a more recent analysis of the Jordan River negotiations by von Lossow, which, he reports, completely disregarded gender issues, which remain "lost in the shadow of a much larger conflict" (von Lossow 2023). The same negative conclusion was reached by WWF International in a comprehensive review paper regarding transboundary water governance for the UK Department for International Development (WWF-DFID 2010).

Despite the lack of evidence of gender-forward approaches in transboundary water negotiations, the overall role of gender in water discussions has been strongly acknowledged. In the edited volume *Water security across the gender divide* (2018), edited by Fröhlich, Gioli, Cremades, and Myrttinen, many authors underline how the "actors and stakeholders of water projects and programs are heavily influenced by the gendered nature of water conflicts and how women and men, in parallel, are differently affected by water projects' infrastructures and related struggles against them" (Myrttinen *et al.* 2018, ch. 1, p. 4). According to these authors, more complex methods and all-inclusive techniques are needed to explore the gender-water-security nexus, especially at the local and intra-regional levels. They propose an analytical framework that incorporates consideration of conflict, adaptive capacities/vulnerability to water-related disasters, and resilience to both conflicts and disasters, whether they be water-related (such as droughts or floods) or influenced by other factors (Myrttinen *et al.* 2018).

A recent work on the topic of gender in transboundary water management is *Gender dynamics in transboundary water governance* (Sehring *et al.* 2022). It is composed of an extensive collection of qualitative case studies from all over the world, including accounts by water practitioners. The findings, however, largely resonate with those from nearly a decade earlier (e.g., Earle and Bazilli 2013); namely, that gender governance challenges in watershed development projects are unequally distributed between men and women (Sehring *et al.* 2022; Kumar and Kumar 2022).

### *Lack of Data on Gender and Water Diplomacy*

The lack of sex-disaggregated data (by women and men) on the presence and effective participation of women and men in water decision-making and in water-governing bodies at all levels (local, regional, national, transboundary, globally) is a major challenge in the overall analysis of gender in water diplomacy. This is not unique to water diplomacy. UN water monitoring agencies themselves have decreased the provision of sex-disaggregated data. For example, the Joint Monitoring Programme stopped reporting sex-disaggregated data in 2014 and noted in 2015 that obstacles were found in collecting such types of information (Fletcher and Schonewille 2015). The sex-disaggregation of data was also omitted in the 2014 UN-Water Global Analysis and Assessment of Sanitation and Drinking Water survey (Fletcher and Schonewille 2015). In both cases, this is likely due to the challenges of collecting sex-disaggregated data in terms of time, resources, and the availability of specialized personnel to collect the data. All this was despite a "call to action" by UNESCO in 2021 (UNESCO WWAP 2021) to obtain sex-disaggregated water data to fill the gender data gap in water monitoring.

This is fixable. Current surveys are often under-resourced and use different methods and indicators, making quantitative comparisons among cases difficult. Community water users, regional water regulatory authorities, water ministries, river basin organizations, transboundary water treaties committees, and water negotiator teams could all be surveyed for gender presence and participation using a standardized assessment method and list of indicators. Ideally, these would be compiled systemically, adequately funded, and hosted by global statistical offices/institutions such as the United Nations Statistics Division or UN Women Data Hub.

While sex-disaggregated data is helpful, it will take time and may not be necessary to make the case. The growing body of case studies and collective and original narratives that demonstrate the urgency and value of addressing gender roles in water diplomacy is, by itself, strongly suggestive of the need to act and should not be ignored.

## Scale and Intersectionality

Water diplomacy is rarely affected by debates around gender issues, but there are some examples. At the community level, Sultana (2011) sought to explain gender roles among women around water collection in rural Bangladesh and how their relationships influenced discussions on water security. Extrapolating, gendered aspects of regional conflicts in transboundary systems may similarly affect transboundary relations. According to Offutt (2022), the mobilization of gendered identities at a local level among the communities of the Cochabamba Valley in Bolivia and the Heiltsuk (British Columbia) played a crucial role in mediating conflicts and shaping the state. In contrast, building on a national ideology, Fantini (2020) observed how propaganda targeting Ethiopian "mothers" on the Grand Ethiopian Renaissance Dam (GERD) built public support for the dam by creating a gendered narrative focused on the "need to protect womens' livelihoods".

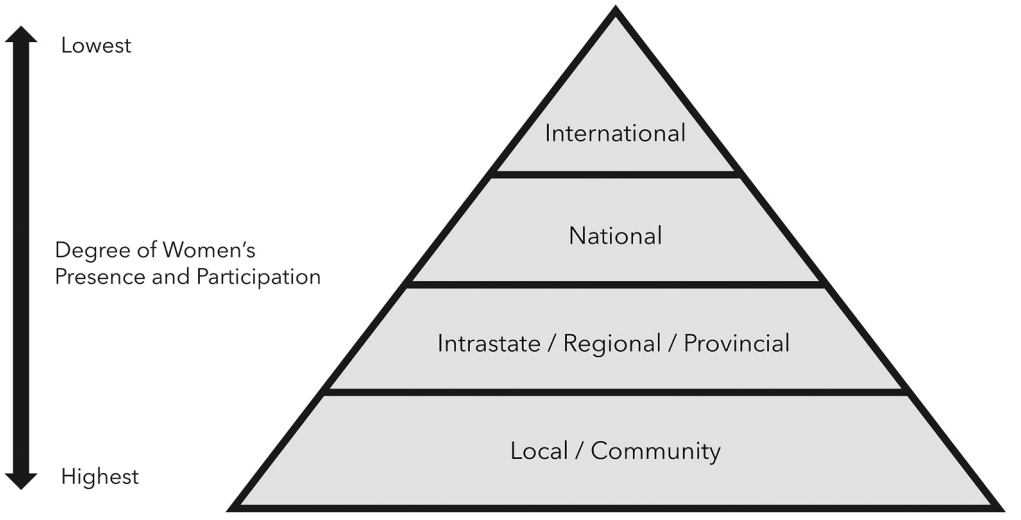



*Figure 25.1* Water diplomacy pyramid of women's presence and participation at different scales of decision-making and water negotiations.

Such examples are few. However, they are powerful in that they demonstrate the interconnections between the role of women and gender issues in water diplomacy. In general, women are significantly underrepresented. UNESCO reported in 2016 that of the 1120 people involved in local water governance in Central America through water users' associations, water boards, or water committees at the municipal level, only 27% were women (UNESCO 2016).

There appears to be consensus that the effective participation of women in water-related decisions is inversely proportional to scale. Effective participation of women is less present at the provincial level than at the community level (Earle and Bazilli 2013; de Silva *et al.* 2018) and even less at the national and international levels, which remain dominated by men (de Moraes and Ferreira 2015). At the international level, there is a general lack of incorporation of gender issues in transboundary water management institutions (Earle and Bazilli 2013). The implications of this are important, as Offutt (2022) suggests: "analyses of water conflict and gender must consider the scalar and multi-scalar dimensions that shape interactions to better understand the dynamics of transboundary systems". Figure 25.1 portrays the current situation: a triangle where discrimination of women in water decision-making is present at all levels but becomes more predominant at the highest points of the pyramid – that is, water diplomacy on transboundary waters. Gender transformative approaches are not found anywhere in transboundary water processes, regardless of scale.

This scale discrepancy in gender representation has been acknowledged. Jara (2022) noted a study on water management in Ecuador that the incorporation of gender mainstreaming "cannot be reduced to local work". Rather, it should be scaled up to higher levels of decision-making at the transboundary level. In 2021, UNESCO declared that "women are generally under-represented in terms of participation at all levels: from institutional bodies that manage national or transboundary waters, to water-related institutions such as governmental water agencies and water utilities, to local water management institutions" (UNESCO WWAP 2021).

This is likely due, in part, to the disproportionate underrepresentation of women in water-related jobs and the obstacles they face as they seek to advance in a career in the water sector (Das 2017).

Even when women are represented, that is, there is a physical presence of women in decision-making groups, questions remain as to whether this participation leads to greater decision-making power in terms of women's ability to express their "views, influence agendas, and take part in final decisions" (Parthasarathy *et al.* 2017).

Another challenge to stronger gender inclusion at the transboundary level is the existence of gender stereotypes associated with managing water at different levels. According to Anamika Barua, from the Brahmaputra Dialogues Initiative, "if you look at domestic water issues, you do see a lot of women appearing in both the discussion and the policymaking" (ter Horst *et al.* 2022, p. 183) since women are seen as being closer to water in their role of caregiver in their private sphere (thus assigning women a gender role of reproduction). But transboundary water has more to do with "productive" aims, such as irrigation or electricity production, which occur in the public sphere. Here, water "becomes a matter of sovereignty, autonomy, power, security, and global politics, where women do not seem to have any role" (ter Horst *et al.* 2022, p. 183).

When evaluating the presence and effectiveness of women's participation in transboundary water, it is important to consider intersectionality – that is, how a woman's experience and effectiveness might be influenced by other overlapping identities such as race, economic status, and disability. These intersectionalities can create unique experiences of discrimination and privilege. One example of the intersectionality of gender roles and race is included in a series of interviews collected by ter Horst. One interview features an interview with the only Black woman at the Water Commission of Namibia at the time. She recounts how, soon after the independence of Namibia, she happened to be not only the only woman in her position at the Department of Water Affairs but also the only Black woman. Being both a woman and Black uniquely shaped others' perceptions of her as an individual and as a professional: she remembers how she used to be asked if she was a secretary (ter Horst *et al*. 2022).

It is also important to note that there are multiple gender identities, such as nonbinary, trans, and queer minorities, which are rarely considered in water governance. They are simply not part of the story today. Furthermore, studies of multiple intersectionalities, such as the role of Black women with disabilities, are rarely encountered.

### *Gender Stereotypes*

Gender stereotypes have shaped transboundary discussions at every level. As Brahmaputra Dialogue facilitator Anamika Barua writes:

> So even when you understand how the river system works, you understand the hydrology, you understand the technical ways of managing a river, you may not even get a chance to speak when all men are speaking. Unfortunately, there is no realisation that the (male) majority needs to create a space for the (female) minority to speak. And that is very irritating.
>
> *(ter Horst et al. 2022, p. 184)*

An additional perspective is provided in Box 25.2. Such patterns create self-reinforcing perceptions of who around the table is a *good diplomat*.
As the World Bank notes clearly (CIWA, 2022),

> Gender stereotypes manifest in management roles at both the institutional and project level. For example, women tend to be assigned the management of perceived female-related tasks

such as taking notes at meetings and gender assessments, while men are responsible for major technical projects, further reinforcing men as the technical leads and marginalising women's roles.

Assumptions are often made that within a negotiation, men will be more aggressive and women more conciliatory (ter Horst *et al*. 2022). Assuming for a moment that this is the case, we might ask: have these traits been selected over time – that is, is it possible that aggressive women are discouraged from becoming diplomats and "conciliatory men" are seen as failing diplomats? What are the characteristic gender roles, regardless of sex, that can influence water diplomacy? Is the perception that negotiations are less aggressive when women are present, a stereotype or a fact (ter Horst *et al.* 2022, p. 181)? Can women speak openly about power, aggression, and hegemony without being framed as masculine? In their analysis of transboundary water literature on the Mekong River, Priya and Debnath found that hydro-hegemony (i.e., maintaining control of water through power asymmetry) was the dominant theoretical perspective among authors regardless of gender (Priya and Debnath 2022, p. 55). They noted that "even when female authors are present, the approach is masculinised, focused on power struggle and conflict" (Priya and Debnath 2022, p. 55).

What should we make of the fact that some female authors reference critical-realist theories (such as hydro-hegemony) in their writings on the Mekong River? Does this mean that these female authors are behaving in a "masculine way"? Or maybe they are just stating their theoretical point as individual scientists, and not as women? Sometimes ideas are just "ideas" and not necessarily linked to a masculine or feminine view of the world. If a woman embraces a "hydro-hegemonic approach" to analyze a specific water case, this does not mean that she is "more masculine" just because this approach focuses on "power." It is just a theoretical approach with no gender connotation. Claiming the contrary would mean that women water scientists are not allowed to talk about power or if doing so, then they become "less feminine" and "more masculine."

**Box 25.2 Example from Namibia**

In an interview conducted by ter Horst with Maria Amakali, a prominent water professional in Namibia, Amakali described how women are "hardly assertive or aggressive during negotiations" and how, despite their strong professional background, they were subject to "mansplaining" (ter Horst *et al.* 2022, p. 181).[6] She further relates how it is often the case that when a female water professional asks for a specific technical detail of a project, the male engineer often provides an explanation as if she were a "toddler" (ter Horst *et al.* 2022, p. 181). As well as diminishing the perception of the professionalism of the woman in front of the larger team of negotiators, the long and unwanted explanation also serves to prolong the time of the negotiation with the inclusion of self-evident information (such as how a river flows from uphill to downhill). These episodes of mansplaining are rarely confronted, and in the end, the woman is perceived to be at fault for asking simple or unnecessary questions.

## Monitoring/Evaluating Gender Participation and Effectiveness

Today, many donors, development agencies, and organizations treat their "duty" to gender-sensitive programming as a checklist exercise. The attitude can be summarized as: "Were some

women at the workshop? Yes? OK, then gender is covered" (Schilling *et al.* 2018). Existing literature reports that most programs use the number of women engaged as sufficient to "tick the box" that gender mainstreaming has been accomplished in projects or programs. Arora-Jonsson (2014) described such practice as a technocratic exercise based on easily collectible data more than a real measure of the mainstreaming of gender techniques into practice.

A similar perspective is shared by von Lossow (2015), who notes that while donors are increasingly advocating for greater gender awareness in their programming, particularly in relation to interstate water politics, he expresses concern that "questions of gender are still addressed at the request of the donors" and are rarely implemented spontaneously by the actors and participants involved in water and water diplomacy processes. According to IUCN, "more research is needed to understand the proportion of women participating in various domains of water governance, from community to international and from formal to informal" (Fauconnier *et al.* 2018). The same IUCN report states that:

> more information is needed regarding the relationship between women's participation and other formal and legislative aspects, such as the formulation of a water sector gender policy and/or the existence of a national gender equality legislation and/or action plan in each country.
>
> *(Fauconnier et al. 2018)*

These comments, in addition to other information gathered from the existing literature and, even more rarely, institutional, and NGOs' reports about gender and water diplomacy, show that:

1 if not required by the project/program sponsor, gender is rarely considered in water diplomacy; and
2 the lack of data collection on gender makes it even more difficult to detect and analyze the subject itself.

These observations are disconcerting since ideas such as the gender mainstreaming approach have been an important part of the development lexicon since the 1980s and a part of international development policies since Beijing in 1995.

In conclusion, based on existing literature and reports, the basic requirements of gender mainstreaming are far from being realized. Historically, even when transboundary cooperation frameworks have existed, institutional procedures disregarded the responsibilities and the roles that women could have played or may potentially play in water governance. As Fauconnier notes, "the respective national water governance frameworks of single countries are often silent on women's responsibilities or simply ineffective on gender equality matters" (Fauconnier *et al.* 2018).

### *Example: Selecting Institutional Staff*

In seeking to understand the recruitment practices of River Basin Organisations, such as consideration of skill sets in nominating personnel, de Silva *et al.* analyzed the Indus Waters Treaty, the Agreement on the Establishment of a Permanent Okavango River Basin Water Commission, and the Convention on Cooperation for the Protection and Sustainable use of the Danube River. The authors found no consideration of gender equality in the nomination of river basin delegates in the three cases (de Silva *et al.* 2018).

### *Example: Women in Water Decision-Making in the MENA Region*

A 2021 report of the Geneva Water Hub (GWH) and Global Water Partnership (GWP) on comparative studies among five countries in the Middle East and North Africa region found that there is a stark difference between "acknowledging, prescribing, legislating" around gender issues and supporting the effective participation of women on water issues, which, they found, still does not exist (GWP and GWH 2021). The report published an illuminating example regarding women in the water sector in Lebanon, where even despite parity in terms of managerial skills and positions compared to male colleagues, women were still not deciding actors or even stakeholders when it came to water decision-making: "although 89% hold a master's degree and are equally involved in senior management positions and/or are heads of the department," … women are "not being part of the decision making" (GWP and GWH 2021, p. 4).

## A "Take Home Toolbox" for Gender Transformative Actions in Water Diplomacy

What, then, are the lessons from the theoretical approaches and practical examples of projects outlined in this chapter? How can one devise actions in water diplomacy that comprise and ensure thoughtful and appropriate gender representation throughout the process? Since it is unclear when, where, and how gender dynamics may play an important role in a complex dialogue or negotiation process, it is necessary to plan ahead to lay the ground for gender-transformative action at different stages of water diplomacy actions. As you think about these, consider the questions posed in Box 25.3, as well as the key consideration for water diplomacy practitioners below:

1 Stakeholder selection – that is, who is in the room and how do you ensure that they properly represent the needed stakeholders and will encourage open dialogue: is there parity between men and women; how were they trained; what views do they represent; intersectionalities; are there gender stereotypical biases that must be addressed; are they self-aware?
2 The process – that is, what steps should be taken to ensure the process itself is free from bias and enables equal representation without interference or penalties: does the setting allow for full participation; is the space safe; are all voices heard and comments free from gender bias; how will you ensure that the authority and the "right to speak" is never undermined or diminished when a woman negotiator is speaking; how will you ensure that gender-transformative points are built into the agenda; establish gender-transformative goals and related budget?
3 Establish metrics – that is, develop and track indicators to measure, monitor, and correct gender-related omissions/disparities: how will you consider the measurement of gender representation and bias among stakeholders coming into a process and at the end of it; how will you track the process and note linguistic behaviors?

## Challenges and Shortfalls

While the participation and presence of women leaders in climate change and environmental negotiations and diplomacy appears to be growing (Reuters 2023), the same does not appear to be true in water diplomacy (Best 2019). There appears to be a concerted lack of effort to integrate gender mainstreaming and effective gender transformative actions into water diplomacy. This is despite multiple calls for action (UNESCO WWAP 2024), position papers, legislative action, and official recognition at international and national levels of the need for gender-oriented actions in water

politics, water security, and water diplomacy. As a result, gender aspects remain absent from many power structures in water diplomacy (Sehring *et al.* 2022).

Moreover, quantitative data and detailed statistics on the effective presence and participation of women and men in water diplomacy at a global scale across countries, produced through a univocal and consistent set of indicators, remain absent. Currently, there is no systematic collection of such data – or requisite funding or long-term sustained engagement – by any international institution such as the UN Women Gender Statistics Unit or The United Nations Statistics Division (Seager 2015). Apart from the monitoring gap, effective decision-making on gender issues, as well as agenda-setting by gender-aware and gender-assorted negotiators, is nonexistent.

Notably, recent COP27 and COP26 negotiations saw an increase in the presence and participation of women negotiators: 37% of party delegations were composed of women while women's participation measured as a percentage of total speaking time was 29% (UNFCCC 2022). This fact denotes a difference between environmental negotiations regarding climate change compared to water diplomacy and water negotiations. As of this writing, the water diplomacy goals attaining to WAD objectives dating back to the early gender and development approaches of the 1980s have still not been achieved: that is, the "participation and presence of women" in water diplomacy itself. The reasons for this failure can still be traced to the entrenched male-dominated characteristics of the world of water diplomacy. At the same time, transformative actions will never work if they do not involve both women and men in the change, not to even mention nonbinary genders.

**Box 25.3 Questions for the Reader**

1) What is the difference between gender mainstreaming and gender-transformative practice?
2) Are gender-transformative targets being reached in water diplomacy?
3) What is the difference between the participation and the presence of women in water decision-making?
4) Is there abundant literature on water diplomacy and gender?
5) Why is there a prevalence of male-dominated professionals in the realm of water diplomacy?
6) What is the current situation of sex-disaggregated data on water and gender issues?
7) How would you currently describe the presence and participation of women in water negotiations and water decision-making, and also in terms of different scales (local, regional, national, transboundary, global)?
8 How would you promote gender-transformative water diplomacy in negotiating actions?

## Notes

1 The dominant scholarship on gender and water, women and politics, and water diplomacy is generally produced, with few exceptions, by authors in the Global North and generally by Western feminists. The author of this chapter is no exception in this regard. "The need to examine a broader range of variables that may be independent and interactive causes of gender inequality and discrimination against women" (Medie and Kang 2018, p. 38) is therefore particularly urgent in this chapter on gender and gender transformative action in water diplomacy. We will ask ourselves if the field of water diplomacy is "ready to acknowledge diversity, intersectionality and multiple types of feminisms in order to engender transformative change" (McIlwaine 2024, p. 3).

2 This formulation might appear as conflating gender and biological sex. The use of the word gender conforms with the definition provided in the chapter and has evolved from this more limited view.
3 The reader should also bear in mind the distinction between gender (in)equality and gender equity. Gender "inequality", a term established in the 1970s, has more recently been substituted with the term "gender inequities." The two words, equality and equity, often used with similar meanings, have been found at the center of a theoretical debate whereby equality referred to the "provision of equal amount of aid and support" for all, while a specific and differentiated help according to individual needs, in order to reach a more just outcome for all, was referred to as equity. For example, consider the Gender Equity Continuum in (UNICEF 2020, p. 6). The two words are still used as synonyms, depending on the type of text and level of analysis. In fact, gender equality is still the most common wording when it comes to policy papers and nonacademic discussions.
4 A list of all United Nations Security Council Resolutions on Women, Peace and Security is available from www.un.org/shestandsforpeace/content/united-nations-security-council-resolutions-women-peace-and-security
5 The Web of Science is a bibliographic database of scholarly articles from 22,000 peer-reviewed journals worldwide. The platform provides tools for advanced search, citation analysis, and bibliometrics.
6 Mansplaining happens to female experts of a certain topic, or simply to women, when they receive from their male counterpart an unnecessary and prolonged explanation, sometimes even off-topic, and often at a lower level of technical explanation usually aimed at diminishing the expertise and the professionality of their female counterpart.

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# 26

# THE USE OF GAMES IN WATER DIPLOMACY WITH COMMUNITIES

*Marco A. Janssen and Raksha Balakrishna*

**Key takeaways**

- A serious game on resource use provides a safe place to discuss governance challenges.
- Games can also enhance capacity building in self-governance.
- Games on groundwater use with moderated debriefing have demonstrated behavioral change and self-governance.
- The use of games can be scaled up and be a tool in the toolbox of extension services.

## Introduction

Governance of shared resources, such as water, is a challenge since one needs to overcome collective action problems. There is a substantial understanding of governing shared resources at the community level (Ostrom, 1990). When communities can create their own rules, define boundaries of the resource and resource users, and have active monitoring to enforce the rules, we often see sustainable use of shared resources (Ostrom, 1990; Baggio et al., 2016).

However, allowing communities to create their own institutional arrangements is not always possible, since it will require capacity and experience to do so. Imposing rules, even if they are socially optimal rules, is found not to be effective since such a process might be considered to be unfair and lead to displacing moral sentiments that could have led to cooperative outcomes (Bowles, 2008; DeCaro et al., 2015).

How do we stimulate self-governance of shared resources? In this chapter, we discuss the use of experimental games as a tool to stimulate communities to work together to self-govern their shared resources, including water. We will first discuss the literature on using games in natural resource governance and the evidence that the use of games leads to measurable changes in collective behavior. Then, we discuss our experience with the use of games addressing the problem of groundwater extraction in rural India.

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### *Playing games to change behavior*

There is a long history of using games in education. Child psychologist Piaget (1932) was influential by pointing to the importance of play and studied the way children play games of marbles in their learning of moral judgments. Nowadays computer games are used in education and experimental studies find measurable impacts on learning (Mayer, 2019; Aprea and Ifenthaler, 2021).

Games are also used to learn about the management of complex systems. In fact, those tacit skills are difficult to learn from reading books and have to be experienced (Dorner, 1989). It is therefore no surprise that games are used to facilitate learning of natural resource governance (Rumore et al., 2016; Redpath et al., 2018; Meyer et al., 2021).

In this chapter, we focus on commons dilemmas related to water. Learning to cooperate with other participants is often not sufficient. Experimental research has demonstrated that participants have difficulty understanding resource dynamics, which hinders their ability to manage the resource (Moxnes, 2000; Cronin et al., 2009). As such, the challenge to govern the commons includes the understanding of the dynamic system.

### *Games as potential intervention tools for self-governance*

Researchers doing field experiments on common-pool resources noticed informally that participants started to observe that the use of research games led to discussions among resource appropriators on how to improve their institutional arrangements (Cardenas and Carpenter, 2005). If games might stimulate self-governance, how do we know and how do we measure impact? If games are used in education, there is typically a specific concept that is taught. This allows one to measure what is understood before and after playing the game, or how the learning outcomes improve in classes where games are used. There is a clear evaluation criterion. However, stimulating self-governance is not aimed at teaching a certain solution, but to enable people to find their own solutions. These could be novel solutions and solutions with different goals in mind. This makes it hard to objectively measure the impact of the use of games as interventions. We will discuss now in more detail our own experience in using games as intervention tools in rural India.

## Playing games to save groundwater in rural India

### *Groundwater in India*

As per United Nations' 2019 estimates, over 2 billion people live in countries that are experiencing high water stress (WWAP, 2019). Globally, India ranks 13th among countries that are classified as extremely water stressed (Hofste et al., 2019). At least 600 million Indians (almost half of the country's population) are facing extreme water stress (NITI Aayog, 2018). An estimated 60% of India's irrigation needs and 85% of drinking water needs are being met by groundwater (Central Ground Water Board, 2021). However, the groundwater situation in India is characterized by overexploitation leading to falling groundwater levels. About 16% of blocks (administrative units) in India are categorized as overexploited (using >100% of available groundwater[1]) while 15% and 4% are in semi-critical (using >70% of available groundwater) and critical (using >90% of groundwater available) conditions (Central Ground Water Board, 2021). Therefore, the high dependence on the resource threatens the water security of the majority of the population of the subcontinent.

### *Groundwater in Andhra Pradesh*

The south Indian state of Andhra Pradesh has some of the most water stressed regions in the country. The south-eastern part of the state known as the Rayalaseema region is characterized by recurring droughts, irregular and erratic rainfall and hard rock aquifers. Historically dependent on tanks for meeting irrigation and domestic water needs, a decline in the tank management system over the years has resulted in an increasing dependence on groundwater sources (Narayanamoorthy et al., 2021). More than 49% of the total irrigation needs of the state is met by groundwater (Kumar et al., 2011).

Anantapur, a district in Rayalaseema, is one of the most drought-prone regions of the country, with an average annual rainfall of 535 mm (Vidyadhar, 2013). About 33% of the district has groundwater depth over 20 meters, indicating high groundwater extraction (Government of Andhra Pradesh, 2022). While shared management of surface water has existed for years in the region, shared groundwater management has been a challenge.

### *Pilot study*

In 2013, a pilot study started in Anantapur, India, to study the impact of experimental games as an intervention tool. This region was selected since collaborating NGOs, Foundation for Ecological Security (FES) and Jana Jagriti (JJ; meaning "awakening people"), have been working with communities in this region to strengthen governance of common-pool resources, including water management. They have been involved with some communities for over two decades, and their work includes activities such as promoting sustainable agriculture, developing watersheds, crafting institutional arrangements to strengthen land and water governance, and generating public awareness. The organization has a team of dedicated field-level functionaries who are constantly interacting with the communities in villages where they work to identify and address the issues that people are facing with respect to their livelihoods. Both NGOs have provided the tools and expertise for villagers to measure their groundwater levels and worked with the villagers to see the relations between water budgets, crop choice, and groundwater levels. An international team, led by the International Food Policy Research Institute (IFPRI), facilitated the study, the results of which are reported by Meinzen-Dick et al. (2016, 2018).

Despite those efforts, groundwater depletion is a clear and present danger. Many communities experience acute water shortage during summers, which becomes exacerbated during droughts. This brings significant losses to farmers, but even nonfarmers are affected by falling water tables depleting domestic water supplies. The paucity of potable water is forcing many people to buy water cans on a regular basis, which adds to the financial burden of rural households. Finally, in some cases, the shortage of water for drinking and irrigation is forcing households to migrate. These facts point to the urgency of effecting sound groundwater governance mechanisms to strengthen the backbone of the rural economy of Anantapur.

Building on the expertise of various dynamic resource games (Cardenas et al., 2013), a groundwater game was developed that simulates the effect of crop choice on groundwater levels. A group of five participants share a single groundwater resource of 50 units. During each round, the participants were asked to select one of two crops for planting:

- Crop A, which uses one unit of groundwater and provides two units of income
- Crop B, which uses three units of groundwater and provides five units of income.

The decisions were made in private and recorded on a decision form, but the total amount of water used was announced publicly and subtracted from the groundwater level. After the remaining groundwater level was announced, five units of water were added for the start of the next round, representing the aquifer recharge level. The group played the game for ten rounds or until, at the end of a round, the groundwater resource had less than ten units of water remaining. This condition ensured that at least 15 units of water would be available after replenishment and all participants could choose Crop B without reaching negative amounts of groundwater. Figure 26.1 shows a visual aid used in explaining the groundwater game.

The water use and recharge levels were set up so that if all participants chose to plant Crop A every round, the game could continue indefinitely. If all chose Crop B, the groundwater resource would be depleted and the game would end after four rounds, which is the Nash equilibrium in which each player is assumed to be selfish and rational, and to assume the others do likewise. The group earnings under the Nash equilibrium would be 100 units of income. If participants would plant Crop A for ten rounds, the income of the group would be 100 units too. The participants were not told that there would be ten rounds. If they would know this, and perfectly coordinate their actions, the group earnings could rise to 166 units of income. There are many game variations consisting of choice combinations of Crop B (22 times) and Crop A (28 times) that lead to the social optimum, where the group earns 166 units of income. All these combinations would lead, if

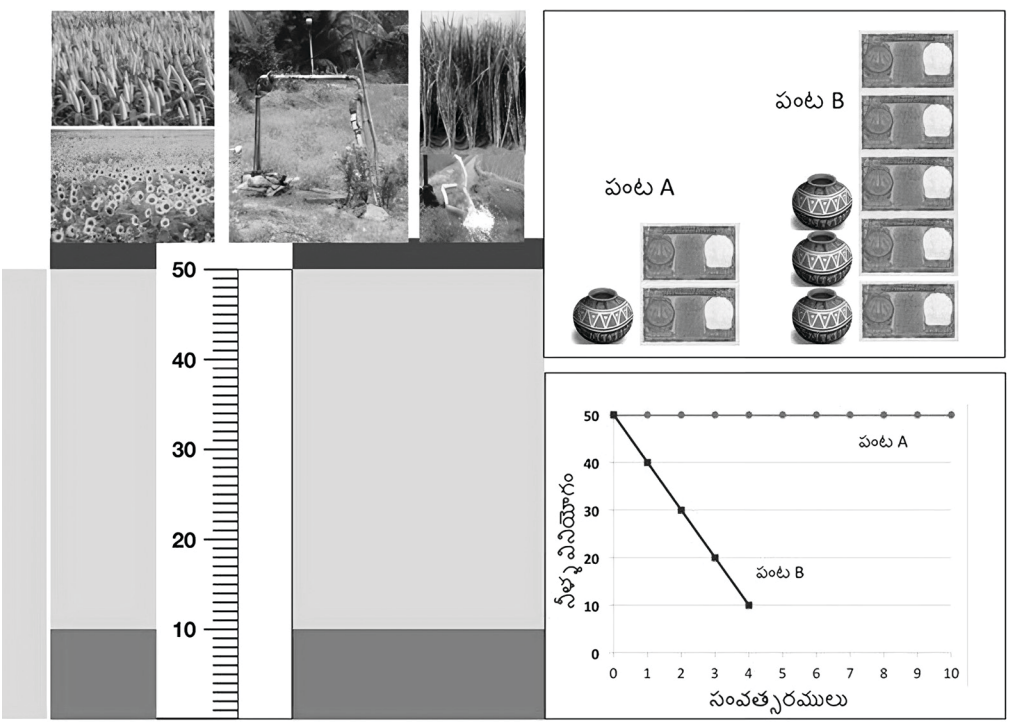



*Figure 26.1* Visual aid used in explaining the groundwater game.
Source: Meinzen-Dick et al. (2016).

properly coordinated, to a game for the full ten rounds, and the groundwater would only become exhausted at the end of the tenth round.

In each community where the game was played two groups of participants were recruited: five men and five women. During the session, other community members were excluded from the room where the experiment was conducted to minimize distractions or outsiders' influence on the participants. Each group played two sequential games of ten rounds each (although the players were not told how many rounds there would be). In the first game, no communication between the participants was allowed. After the first game was completed, the group was instructed to discuss the game with each other for three minutes. A field team member acted as secretary, recording the topics discussed during the communication periods. Following the discussion, a second game was played, this time with short communication periods of up to one minute following each round.

Following the sessions with both men's and women's groups, the field team conducted a community-wide debriefing meeting to discuss the groundwater exercise and aggregate the results from the games. The debriefing was a form of participatory exercise to encourage discussion of the issues around groundwater depletion and what farmers could do about it. The community debriefing was usually held in the afternoon or evening after the games. The debriefing was a guided conversation for game participants to relate their experiences from the game to the groundwater situation in their area and to discuss with other community members possible courses of action. As in the experiment sessions, a field team member acted as secretary, writing notes on the discussion and comments raised during the meeting. We also collected a brief survey from each participant after they had participated in the game. The survey covered background information about the individual, their household, as well as their attitudes toward environmental issues, to be used to assess factors that might explain their choices in the game.

When the groundwater game was pretested, we noticed that the game was well-received. In one community, a participant remarked that he never understood past activities like water budgeting, but now with the groundwater game he understood what the problem was. We realized that many participants have an incorrect understanding of the causes of groundwater levels. They relate groundwater levels to rainfall, not to crop choices they make. By playing the game, they simulate the dynamical system and get an understanding of the causal relations and the importance of crop choice for groundwater levels. The lack of understanding of groundwater dynamics might be explained by the relative novelty of the use of powerful electric pumps for which the farmers do not have to pay the electricity costs. The relative invisibility of groundwater levels makes it difficult for water users to learn how their actions impact groundwater levels.

One of the concerns of the Indian NGOs was the use of individual monetary rewards based on the decisions they make. It is the convention in experimental economics to provide real, substantial incentives for the decisions players make. However, individual payments lead to practical challenges. It is more difficult to implement and may lead to frictions in communities where some individuals will get a financial windfall. It was therefore decided to test an alternative payment system in half of the communities. It is a standard practice for NGOs to make a contribution to a community fund when the community members participate in studies, and in half of the communities, a flat-fee contribution was made. Hence instead of paying individual players, a contribution was made to the community fund. We found that there was no significant impact on the way the games were played.

The groundwater game was played in 17 communities, 34 groups, while an additional 9 communities were selected as control communities. As Meinzen-Dick et al. (2016) reports, the participants did not deplete the groundwater resource 65% of the time. Participants who have higher trust

in their community members are more likely to make cooperative choices. We also found that participants who are active irrigators used more water in the game, indicating that players translate their personal experience to the game. No gender effect was found, but education level had a significant effect. Those with more education selected less frequently the water-intensive crop.

In the debriefing sessions, the participants indicated that they started to make the connection between crop choice and groundwater levels, which was not fully understood before. But what was the long-term impact of playing those games? One reason for the selection of those communities was their participation in a project facilitated by the NGOs on measuring groundwater levels. This would potentially allow us to measure groundwater differences between different types of communities before and after the intervention. Unfortunately, a rainy monsoon and a discontinuation of groundwater level measurements, due to changes in government assistance programs, did not allow us to make a viable strategy.

However, more than a year after the games were played, the research team went back and did a survey of a sample of community members in all communities. Those surveyed were not necessarily the individuals who participated in the game-play. Nevertheless, we found a significantly improved understanding of the role of crop choice in the sustainability of groundwater levels in communities where games were played compared to the control group.

### *Continuous use of groundwater game*

The use of the groundwater game did not end with the pilot study. In fact, the game has been adopted as an integral part of a larger 'package of practices' designed and implemented by the FES to strengthen governance of water as commons. The project named "Water Commons – Influencing Practice and Policy" funded by the Hindustan Unilever Foundation (HUF) provided an impetus for this. While supply-side management of groundwater has been carried out through restoration of catchment areas, construction and maintenance of water harvesting structures and reforestation activities, much less attention has been paid to the management of water demand – crop choices, irrigation practices, and domestic water use. The groundwater game served as an effective entry point for facilitating discussions around demand-side management of groundwater. Having seen the impact of the groundwater game on community perceptions of water use and availability, the NGO adapted the game to suit the different local contexts within which they operate. The game serves as an effective tool for triggering discussions around collective use and management of groundwater.

As in the pilot study, the game is played in two parts – one with no communication allowed between players and one with communication between players. While the game is still played with five players, a mixed group of both men and women is encouraged. This is also part of larger efforts of the NGO to strengthen the involvement of women in collective management and decision-making processes. Besides, women play an active role in agricultural activities, including cropping decisions. In order to make the game more relevant to the local contexts, local crops that represent low water-consuming (Crop A) and water-intensive (Crop B) are chosen.

The domestic water needs of regions that heavily depend on groundwater are also met through this source. The game was slightly modified to include this. Apart from the water units used for irrigation, some water is also used to fulfill domestic needs – this is fixed at two units per round. Thus, at the end of each round, total units of water used (based on players' crop choices) plus two units of water (for domestic use) is deducted. To maintain the Nash equilibrium, seven units of water are added at the beginning of each round (representing water recharge). The pilot study had a fixed recharge rate of five units of groundwater throughout the game. However, this is rarely the

case, especially in areas such as Anantapur, which is characterized by erratic rainfall and recurring droughts. To introduce this uncertainty, dice have been used in the game. At the end of each round, instead of a fixed recharge rate (five or seven), a die is rolled and the number on the die is considered as the number of units of groundwater recharge for that round. Two dice are used with numbers from zero to five (the side with number six on the dice is changed to zero), allowing a recharge limit from zero to ten. This variation has led to numerous discussions on strategies that would have to be adopted to account for the possibility of no rainfall.

To understand the impacts of the game and the larger set of interventions for improved water management, FES conducts impact assessments periodically. Over the span of four years, significant improvements have been observed. About 40% of the target villages reported higher participation of people, especially women and youth, in planning and decision-making around water management and use. Over 15,000 farmers adopted better agricultural practices, including adoption of water-saving technologies and low water-consuming varieties of crops.

### *Large-scale experiment*

Implementing the groundwater game is a resource-intensive process and requires trained facilitators who can moderate the game effectively. This has been one of the biggest challenges of playing the groundwater game with a large number of communities. In order to address this limitation, a large-scale experiment titled "Scaling up experiential learning tools for sustainable water governance in India" has been undertaken by FES, IFPRI, and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), with support from the German Federal Ministry for Economic Cooperation and Development (BMZ), to scale-up the implementation of the groundwater game. This undertaking aims to reach 245,000 households across 3,500 communities and promote experiential learning through the use of collective action games, community debriefings, and participatory water planning tools. This herculean task is being achieved by training cadres in implementing this 'package of tools' with the use of technology. The project is purposed with inducing behavior change in these communities, toward more sustainable water management.

A total of 600 communities across six states in India have been identified for the initial roll out of the project. The project was scheduled to start in the Spring of 2020 and has experienced delays due to the COVID-19 pandemic. Nevertheless, about 450 villages have been reached and data collection and monitoring is underway in these villages. As of 2021, more than 600 rural cadres have been trained in the use of experiential games. In addition to the groundwater game, FES is also implementing the surface water game (Falk et al., 2019) in regions that are still primarily dependent on surface water sources. In total, the games have been implemented in over 790 villages, with over 14,000 community members having participated in the games and over 16,500 community members taking part in the debriefing sessions. The FES is working on expanding its reach to more village communities, and follow-up information on the implementation of the project will be collected throughout the next couple of years to evaluate impacts of the interventions.

You can find more information, including a handbook to use the game as well as videos, at https://gamesforsustainability.org/practitioners/#groundwater-game.

## Conclusions

Research on collective action and the commons has demonstrated that if people self-govern their own resources and are involved in creating their own institutional arrangements, this can lead to long-lasting productive outcomes. This is in contrast to top-down interventions where physical and

intellectual resources are imported to a community, such as latrines, water pumps, drip-irrigation systems, and water budgeting approaches, but without sufficient engagement of the community itself. However, not all communities have the capacity and experience to solve collective action problems like groundwater extraction.

In this chapter, we discussed the increasing use of games as a tool to facilitate communities to build capacity and experience for self-governance. We demonstrated our experience with a game used by FES with thousands of communities in rural India.

What explains *why* the use of games can be a fruitful approach? We identify four factors, namely:

1 The game provides a simulation of the groundwater problem for a number of seasons. This helps participants to understand the connections between their actions and the groundwater level.
2 The game provides a safe place to discuss governance challenges. Participants play a role and can discuss changes that may lead to better outcomes.
3 The debriefings of the game lead to broader governance discussions within the community. The participants raise the issues themselves and may refer to the game for potential scenarios.
4 The communities may feel they are being taken seriously since they can discuss the issue and ask about potential solutions, instead of one solution being introduced to them.

To conclude, we know that participatory approaches to stimulate self-governance could be powerful, but to reach a large number of communities, we need programs that could be applied by extension agencies. The use of games could be part of those programs, and the current development of practices related to a groundwater game in rural India looks promising.

## Note

1 Available groundwater here refers to the recharge capacity of the aquifer.

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# 27

# INTERNATIONAL LAW AND WATER DIPLOMACY

*Dinara Ziganshina*

**Key takeaways**

- Build normative communities through well-developed treaty regimes and increasing synergies between environment and water-related treaties at all levels to improve coordinated management and protection of shared waters
- Support and further strengthen joint bodies that provide platforms for continuous interactions at the professional level to produce knowledge and understanding and to build durable relationships and a habit of cooperation
- Develop a sound procedural system of cooperation over shared waters through information exchange, consultations, and prior notifications, along with coordinated monitoring and assessment to ensure equitable and reasonable use of shared waters
- Foster implementation and integration of water treaties in the national legal order

## Introduction

With the overarching goal of maintaining international peace and security (United Nations 1945a, Article 1), diplomacy and international law are in a symbiotic relationship. The practice of diplomacy is defined and constrained by norms of international law, which in turn are formed and changed in the course of diplomacy. Diplomacy plays a crucial role in forming a treaty and a custom – two main sources of international law. Treaties are the result of diplomatic negotiations and processes. Customs are shaped by diplomatic engagements through building up state practice and *opinio juris* – two essential elements for an international custom to emerge (United Nations 1945b, Article 38(1b)). Not only does diplomacy shape international law, but it also facilitates its operation, situating a state's behavior within the framework provided by international law. As to international law, it both empowers and limits the practice of diplomacy, defining the boundaries for the possible actions available to states. It serves as a medium through which actors in the international system communicate and provides a framework for the coexistence of and cooperation among states. This chapter examines how international law, through its system of norms and processes, may be used in line with diplomacy to promote cooperation over shared waters.


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## International law as applied to shared waters

Shared waters are subject to a multilevel legal framework encompassing water and related treaties and other instruments at universal, regional, basin, and bilateral levels. Basin agreements addressing specificities of individual basins or issues (e.g., Indus Water Treaty, Mekong Treaty, Columbia River Treaty) are complemented by global framework conventions such as the 1997 UN Watercourses Convention (UNGA 1997) and the 1992 Water Convention (UNECE 1992) outlining general principles and norms. The Draft Articles on the Law of Transboundary Aquifers adopted by the United Nations General Assembly in 2008 (United Nations International Law Commission 2008) can serve as a tool for assisting the elaboration of management regimes for transboundary aquifers, such as in the case of the 2010 Guarani Aquifer Agreement. Multilateral environmental agreements (MEAs) contribute to addressing challenges related to water use, management, and protection in a more comprehensive way, with the Convention on Biological Diversity promoting the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources (United Nations 1992a); the Convention on Desertification aimed at combating desertification and mitigating the effects of drought through effective actions at all levels (United Nations 1994); and the Convention on Climate Change setting an overall framework for intergovernmental efforts to tackle climate change (United Nations 1992b); and the Ramsar Convention providing a cooperative framework for the conservation of wetland habitats (UNESCO 1971). Water-related matters are also treated in other areas of international law, such as trade and human rights. Combined reading and implementation of these instruments enable integrated solutions to contemporary water-related challenges.

The following sections outline key norms and procedures that together provide the normative frame for any actions of states and enable a sound legal framework for cooperation over shared waters.

## Context and scope

The scope of the legal regime governing shared waters covers the geographical or hydrological extent of water and other related resources, defines the types of uses or activities governed by its provisions (including quantity and quality), and determines the range of legal actors eligible to participate in the watercourse utilization (Vinogradov *et al.* 2003).

Contemporary approaches to water use and protection define a hydrological scope based on the concepts of a 'watercourse' (or a river system) defined as "a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus" (UNGA 1997, Article 2(a) and 2(b)). Such understanding implies that the scope of regulation would also include land-based activities, which might affect the protection, preservation, and management related to a shared watercourse. This is more so with respect to provisions related to freshwater ecosystems, given that forests, wetlands, grasslands, and agricultural land play vital roles in the hydrological cycle through the services they provide.

Basin-specific agreements define their scope in different ways. For example, the 1961 Columbia River Treaty between United States and Canada established a regime for sharing benefits as part of the transboundary waters management in the basin, while under the 1944 Colorado River Treaty the United States and Mexico agreed to a specific allocation of "the waters of the Rio Grande (Rio Bravo) between Fort Quitman, Texas and the Gulf of Mexico" (United States and Mexico 1944, Article 4) and "the waters of the Colorado River, from any and all sources" (United States and

Mexico 1944, Article 10). The Rhine Convention contains detailed provisions on geological and ecological scope, providing that the Convention applies to

> a) the Rhine; b) groundwater interacting with the Rhine; c) aquatic and terrestrial ecosystems which interact or could again interact with the Rhine; d) the Rhine catchment area, insofar as its pollution by noxious substances adversely affects the Rhine; e) The Rhine catchment area, insofar as it is of importance for flood prevention and protection along the Rhine.
>
> *(ICPR 1999)*

## Substantive rights and obligations

Key substantive norms of the law governing the conduct of states in relation to shared waters include equitable and reasonable utilization, the no significant harm rule, and emerging obligations related to the protection of shared watercourses and their ecosystems.

Under the rule of equitable and reasonable utilization, a state has the right and duty to utilize the waters within its territory in a way that is equitable and reasonable vis-à-vis other states sharing the watercourse. The equitableness and reasonableness of any utilization are to be determined by weighing all relevant factors and comparing the benefit that would follow from the utilization with the injury or burden it might inflict on the interests of another watercourse state. In the event of a conflict between uses, its resolution shall be guided by the principles of equitable and reasonable utilization and prevention of significant harm, with special regard to the requirements of vital human needs.

The no significant harm rule derives its normative foundation from *sic utere tuo ut alienum non laedas*, or the good neighborliness principle. This due diligence obligation requires states, in utilizing an international watercourse in their territories, to take all appropriate measures to prevent the causing of significant harm to other watercourse states (UNGA 1997, Article 7(1)). In other words, states are not under an absolute obligation to guarantee that no significant harm will occur to other watercourse states but rather do their best to endeavor within their capacity in each particular circumstance and case to avoid significant harm. For instance, the state may be responsible for not enacting necessary legislation, for not enforcing its laws, for not preventing or terminating all illegal activity, or for not punishing the person responsible for it (International Law Commission 1994, p. 103).

The equitable and reasonable utilization and the no significant harm rule – both customary norms of international law – work in tandem, constraining the conduct and protecting the legitimate interest of all states, irrespective of their geographical location on a watercourse, on an equal footing.

Despite increasing support for the ecosystem approach in modern treaty practice and the work of international organizations, the obligation to protect and preserve the ecosystems of international watercourses is still treated as 'emerging' or 'developing' (McCaffrey 2001, pp. 257, 462, Birnie *et al.* 2009, pp. 559–560).[1] The 1992 UNECE Water Convention establishes sound rules for the Parties to 'take all appropriate measures' in order 'to ensure that transboundary waters are used with the aim of ecologically sound and rational water management, conservation of water resources and environmental protection,' and 'to ensure conservation and, where necessary, restoration of ecosystems' (UNECE 1992, Article 2(2)), and calls for measures to promote sustainable water-resources management, including the application of the ecosystem approach (UNECE 1992, Article 3(1)(i)). Further clarification on the ecosystem approach to water management can be found in the UNECE guidelines and recommendations, such as the 1993 Guidelines on the Ecosystem

Approach in Water Management (UNECE 1993) and the 2006 Recommendations on Payments for Ecosystem Services in Integrated Water Resources Management (UNECE 2006). The Ramsar Convention (UNESCO 1971) and Convention on Biological Diversity (United Nations 1992a) contribute to the protection of water ecosystems by focusing on maintaining water quality for wetlands and protecting biodiversity resources to ensure that hydrological ecosystems continue to perform their water purification functions, groundwater recharge, and flood control. The Ramsar Convention appears as a factor in several case studies in this volume, including the Sava River Basin (Chapter 42), the Sundarbans (Chapter 45), and Urmia Lake (Chapter 46).

## Procedural cooperation

The procedural norms of international water law encompass a range of obligations, from a general duty to cooperate to obligations concerning data and information exchange, prior notification, and consultation. They are instrumental in providing concrete content to substantive obligations and ensuring that they are consistently implemented and complied with.

A state has a general duty to cooperate with other riparian states on the basis of sovereign equality, territorial integrity, and mutual benefit in order to attain optimal utilization and adequate protection of an international watercourse. Being an autonomous legal obligation, the general duty to cooperate regarding shared waters also translates into specific procedural obligations to exchange information with riparian states, consult with each other, notify regarding proposed activities, conduct environmental impact assessments, and work together in emergencies. The extent to which this repertoire of obligations is built into the existing legal architecture of transboundary water cooperation varies from basin to basin.

As a matter of a general legal duty, states shall, on a regular basis, exchange readily available data and information concerning an international watercourse (UNECE 1992, Article 13, UNGA 1997, Article 9). While states are also encouraged to the widest exchange of information, the data and information that are subject to exchange usually relate to the condition of the watercourse, particularly hydrological, meteorological, hydrogeological, ecological and water quality status as well as related forecasts. Many river basin commissions developed their own procedures and systems for information exchange (e.g., The 1968 Columbia River Treaty Hydrometeorological Committee Terms of Reference, The 2001 Procedures for Data and Information Sharing in the Mekong Basin, The 2009 Nile Basin Data and Information Sharing and Exchange Interim Procedures, The 2010 OKACOM Protocol on Hydrological Data Sharing for the Okavango River Basin, The 2014 Policy on the Exchange of Hydrological and Meteorological Data in the Sava Basin).

Riparian states are also required to consult with each other regarding their shared waters. As a matter of customary law, the 1997 UN Watercourses Convention requires states to consult each other at least in two instances: (i) when planned measures in one state may cause significant transboundary effect in another, and (ii) when it is necessary to achieve and maintain equitable and reasonable use. The Ramsar Convention requires the Parties to "consult with each other about implementing obligations arising from the Convention, especially in the case of a wetland extending over the territories of more than one Contracting Party or where a water system is shared by Contracting Parties" (UNESCO 1971, Article 5(1)).

As a part of customary international law, riparian states have obligations to exchange information, conduct an environmental impact assessment, give prior notification, and consult each other on possible effects of planned measures that may have a significant adverse effect. The 1997 UN Watercourses Convention and the 1991 UNECE Convention on Environmental Impact

Assessment in a Transboundary Context (the Espoo Convention) (UNECE 1991) envisage the most detailed provisions in this regard,[2] while some basin agreements also developed their own procedures in the case of planned measures (e.g., Mekong).

The general duty to notify each other and cooperate in cases of emergencies is widely endorsed in state practice (United Nations Conference on Environment and Development 1992, Principle 18; International Law Association 2004; Handl 2007, p. 542; Birnie *et al.* 2009, p. 571), including on shared waters (UNECE 1992, Articles 3(j), 14; UNGA 1997, Articles 27, 28). The need for anticipatory and responsive cooperation throughout all phases of emergency situations, such as prevention, preparedness, response, and restoration, gains even greater significance in light of continuing extreme climatic and other events.

## Joint bodies

Shared water management is most effectively accomplished through joint bodies established by the states concerned. Given the diversity of the contexts, joint bodies differ from each other in their design and the tasks assigned to them. They serve diverse functions, ranging from informational (gathering, analyzing, disseminating data), operational (actual water allocation, dealing with waterworks, construction, operation, and maintenance), normative (establishing joint or harmonized water quality objectives and standards, setting water allocation limits, developing procedures, guidelines, and other regulations), control (establishing observation and control on water quantity and quality), coordination (aligning national plans and measures), scientific and technical (conducting research, assessments, and other studies), forum (providing a place for exchange of views, experiences, consultations, and decision-making), and dispute resolution (facilitating initial examination of issues, fact-finding, and settling disagreements).

Many pan-European countries, in their national reports submitted under the UNECE Water Convention, highlighted the contribution of joint bodies to the maturity of transboundary interactions. Joint bodies are seen as playing a "leading role in [the] whole process of co-operation" (Slovakia), ensuring "maintenance of regular interaction among the countries in the region" (Uzbekistan), and "consistent present cooperation on working groups level" (Poland), as well as enabling "direct contact and communication between the parties at different levels" (Austria). Also recognized were the specific achievements of the joint bodies in "communication and arrangement of open forums for discussion" (Finland), and "open consultation and discussion on specific emerging water issues to identify shared solutions and prevent disputes" (Italy) (Ziganshina 2021).

It is of paramount importance that work within joint bodies enables continuous interactions at the professional level to produce knowledge and understanding and to build durable relationships and a habit of cooperation. Politics and formal negotiations matter, but confidence, trust, and respect will not be nourished without continuous interactions among professionals.

## Implementation and compliance

Means of implementation and compliance verification consist of a set of rules and procedures aimed at monitoring, assessing, and facilitating implementation and compliance with treaties.

Many global and pan-regional treaties have specific mechanisms to facilitate and review implementation and compliance. All conventions under the umbrella of the UNECE and global MEAs, such as the Ramsar Convention, the Convention on Biodiversity, the Convention on Desertification, and the Convention on Climate Change, provide sound institutional support to

facilitate implementation and compliance with their requirements through the meetings of the parties, secretariats, implementation or compliance committees, and various working groups and boards. Most of these conventions provide for some form of general reporting and monitoring to review performance to which all parties are subject and a noncompliance response (compliance or implementation committee or an inquiry commission).

The Implementation Committee under the UNECE Water Convention, which is designed to be simple, non-confrontational, non-adversarial, transparent, supportive, and cooperative in nature, stands out from other similar bodies by its advisory procedure. Under this unique tool, a Party, or Parties jointly, can request advice from the Committee about its or their efforts and difficulties in implementing or applying the Convention (UNECE 2012, Appendix I, para 19–20). In 2020–2021, the Implementation Committee assisted Albania and Montenegro to improve cooperation under their 2018 Framework Agreement on Mutual Relations in the Field of Management of Transboundary Waters and the bilateral commission established therein. Montenegro made a request for advice related to its concerns about the possible transboundary impact of planned additional small hydropower plants on the Cijevna/Cem River in Albania. Albania consented to participate in the advisory procedure. As a result of joint consultations with these two countries held by the Implementation Committee, Albania and Montenegro have agreed to establish a joint technical working group on monitoring and assessment and to develop and implement an information exchange protocol to operationalize their cooperation on the shared Cijevna/Cem River basin (UNECE 2021). It can be hoped that other countries will also take advantage of such an opportunity to prevent potential tensions.

## Avoiding and settling controversies

Procedures for dispute prevention and settlement are governed either by the terms of general international law or by the provisions of a particular legal instrument. Dispute settlement mechanisms range from the negotiated settlement of controversies to rarely used highly formal procedures of binding adjudication and can be broadly divided into diplomatic and judicial means. Diplomatic means are those procedures where the parties retain control over the dispute insofar as they may accept or reject a proposed settlement (consultation, negotiation, fact-finding, inquiry, mediation, conciliation). Judicial means result in binding decisions for the parties to the dispute (arbitration and judicial settlement). It may also be possible to have recourse to regional arrangements and international organizations (such as joint bodies) as a means of dispute settlement.

Dispute prevention and settlement provisions in treaties usually encompass a multistep approach, which typically starts with discussions within joint institutions or expert group negotiations, followed by diplomatic negotiations between the parties only or employing third parties assisting the parties to find joint solutions (good offices, mediation, conciliation) and may end, as a final step, with dispute resolution by the binding decision of a third party, such as an independent/impartial expert, court, or tribunal. There is also the possibility of finding advisory or binding decisions through the involvement of a neutral expert or expert commission (e.g., Indus Waters Treaty) or through establishing an impartial fact-finding commission to resolve a dispute (UNECE 1992).

This broad repertoire of means provides parties with a choice of internal and external dispute settlement procedures depending on their preferences, cultural and political circumstances, and context. Internal dispute settlement processes such as joint institutions, technical group meetings, technical investigations, and negotiation enable joint problem-solving by the parties by securing confidentiality and control over the decision. On its part, third-party involvement through good

offices, mediation, conciliation, a neutral expert or expert commission, arbitration, and court provides for neutrality and impartiality and can bring additional technical and scientific expertise.

With few exceptions, formal dispute settlement provisions such as arbitration and judicial settlement provided for in treaties remain rarely used. The recent exceptions include the Indus Waters Kishenganga Arbitration and the International Court of Justice's case on the Silala River. A seven-member Court of Arbitration has been set up by India and Pakistan pursuant to the Indus Waters Treaty upon Pakistan's request for arbitration concerning India's construction of the Kishenganga Hydro-Electric Project. The award rendered by the Court of Arbitration in 2013 was binding upon the Parties and without appeal, whereas Chile and Bolivia agreed to submit the dispute over the status and use of the waters of the Silala to the International Court of Justice, which rendered its binding decision on December 1, 2022. See Chapter 44 in this volume for more details of the Silala case.

Both procedures have proven effective in settling water disputes and promoting equitable and reasonable use of shared waters. However, the judicial settlement of water-related disputes brought into question the need for more effective integration of scientific experts in dispute resolution procedures. In this regard, the tribunal set for the Kishenganga Arbitration, composed of engineers, was able to address technical aspects more effectively and quickly.

There are also clear signs of strengthening the role of joint bodies in dispute prevention and settlement. In many river basins, joint bodies are already tasked with addressing and resolving any issues and differences that may arise between riparian countries or their authorized entities. For example, India and Pakistan created the Permanent Indus Commission to promote cooperation in the development of the Indus waters, which has managed to survive wars, military stand-offs, and the recent rise of water nationalism between the two countries. Commissioners are high-ranking engineers who represent their respective governments and serve as the regular channel of communication for all matters related to the implementation of the 1960 Indus Waters Treaty. According to the Indus Waters Treaty's multitiered conflict resolution mechanism, the Permanent Indus Commission must undertake the initial examination of any "question" that might arise between the countries relating to the Treaty. Since its inception, the Commission has resolved most submitted questions, with few exceptions.

Another example is the long-standing cooperation of the United States and Mexico within the International Boundary and Water Commission, which is tasked with settling the differences that occur between the countries concerning the interpretation or application of the 1944 Water Treaty (United States and Mexico 1944), subject to the approval of both countries. This cooperation is described in more detail in Chapter 43. Over the years, the Commission helped to address a range of water-related controversies, including the salinity crisis on the Colorado River, the United States' plan to line the All-American Canal, Mexico's fulfillment of agreements to deliver Rio Grande water to Texas, and the difficulty in securing ecological values in the Colorado River Delta groundwater disputes. In late 2020, the Commission settled the Mexican water debt crisis on the Rio Grande (International Boundary and Water Commission 2020).

## Conclusion

Shared waters pose serious challenges to legal regulation, given the need to address complex hydrological, ecological, and socio-economic issues in a peaceful and sustainable manner. International law has already responded to these multiple challenges by providing a distinct corpus of norms and principles that identify parameters (rights and duties) of the required conduct of states and

outline specific means and procedures for peaceful and sustainable management of shared waters. All these together provide the normative frame for any actions.

It is true, however, that international water law, with its two basic norms of equitable and reasonable utilization and no significant harm, is one of those areas of international law where open-textured norms prevail. It is explained by the need for a flexible, all-encompassing approach to reconciling a broad range of existing and new economic, social, and environmental issues in each particular watercourse constantly changing over time. To complement this approach, the procedural system of cooperation over shared waters between riparian countries and through joint bodies is well developed. Among the oldest of international organizations, river commissions have long been at the forefront of technical and diplomatic interactions over shared waters between riparian states.

The multiplicity of treaties at different levels and at the intersection of various areas of law, such as water, biodiversity, climate, and environment, contributed to the improved management and protection of shared waters. But this diversity also requires more rigorous actions from states and treaty bodies in increasing synergies and enabling their complementary implementation and application to avoid the risk of conflicting interpretations.

Treaty-based institutionalization, such as practiced within the UNECE Water Convention and the Ramsar Convention, may be seen as a fruitful way of cultivating mutual learning, coordination of actions, socialization, and partnerships between treaty parties and non-parties but also between various legal instruments. For instance, the UNECE Water Convention and its programs of work support the achievement of numerous MEAs and international commitments, including the Paris Agreement, Addis Ababa Action Agenda, Sendai Framework for Disaster Risk Reduction 2015–2030, and the Outcome document of the United Nations Conference on Sustainable Development "The future we want" (UNECE 2022). In addition to joint work within expert groups and task forces, the Water Convention operationalizes these obligations, working closely with the countries, international organizations, development agencies, and financial institutions. Similarly, the Ramsar Convention continuously cooperates with all relevant conventions, organizations, and initiatives to contribute to enhancing global, regional, and coherent national-level implementation of MEAs as well as to advance mainstreaming of wetlands and biodiversity concerns into relevant sectors (Contracting Parties to the Ramsar Convention on Wetlands 2022).

The variety of norms and treaties suggest that states trust in the rule of law and institutions; however, as with any other area of law, international water law finds itself in constant need of improvement to be better prepared for future challenges. Thus, certain issues such as governance of groundwater, virtual water, and atmospheric water have not been or are only partially addressed by international regulation. These are just a few examples of the areas where law and diplomacy could further contribute to improved shared water governance systems for a better future for all. Ironically, the need for forward-looking legal regulations also follows from the 2023 UN Water Conference, which did not have a legally binding document as its outcome but sent a clear message that water issues are too diverse and complex and, therefore, require context-specific, evidence-driven, and rule-based responses.

## Notes

1 For the opposite view, see (International Law Association 2004, p. 28).

2 See (UNGA 1997, Article 13) (Period for reply to notification), (UNGA 1997, Article 14) (Obligations of the notifying State during the period for reply), (UNGA 1997, Article 15) (Reply to notification), (UNGA 1997, Article 16) (Absence of reply to notification), and (UNECE 1991, Article 3).

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# 28

# CONFLICT SYSTEMS ANALYSIS

## Integrating climate and water risks

*Tobias Petrelius*

**Key takeaways**

- For actors aiming to promote peace, systems conflict analysis is useful because it allows for a more holistic view of the different conflict drivers, thereby increasing the possibility of finding entry and leverage points for achieving systemic change.
- Systems thinking and systems conflict analysis enable us to understand how different driving factors in a conflict relate to and influence each other.
- By integrating the impact of climate and environmental change into our analyses, we can gain a much deeper understanding of the dynamics that fuel and affect conflict.
- Integrating the impact of climate and environmental change into already existing conflict analyses will provide an opportunity for conflict prevention and peacebuilding organizations to include and listen deeply to actors that might previously have been ignored or marginalized.

### Introduction

In recent years, it has become more evident that changes in climate and the environment put additional stress on our man-made systems. In many contexts, the negative impacts of climate change, such as stress and disruption in water systems, can create severe climate-related security risks. Access to clean and fresh water constitutes one of the most fundamental needs for all living things and is an important part of the development and prosperity of a society. However, if it is mismanaged, it can fuel dynamics that will tear at the very fabric of societal relationships, increasing the risk of further fueling deep-rooted grievances and possibly igniting them. A broader understanding of these conflict dynamics is paramount, especially if we want to engage in preventive, effective, and sustainable water diplomacy.

Many of the conflicts we witness today are complex and multifaceted. They consist of a multitude of social, political, and economic factors that interact with each other, creating complex conflict systems. Trying to understand these systems can be overwhelming and it is easy to resort to generalized ideas of what drives conflict or oversimplify by trying to break conflict down into what is sometimes described as "manageable pieces". However, if we aim to engage in responsible and credible dialogue and mediation efforts to prevent conflict and build sustainable peace, we need to


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be well-prepared for the complexity of today's reality. A key feature of being prepared is to undertake conflict analysis to understand how to best identify, design, and implement effective dialogue and mediation strategies (United Nations, 2012).

During the last two decades, there has been a lot of research and evidence from practical experience published that relates to the effectiveness of peacebuilding and how peacebuilders can become better at capturing the complex nature of conflicts in their analysis. Some interesting thoughts and reflections can be found in CDA[1] Collaborative Learning's ambitious Reflecting on Peace Practice (RPP) project, where conflict systems analysis is brought forward as a key recommendation.

Conflict systems analysis is a method to understand the complexity of conflicts (CDA Collaborative Learning Projects, 2016). It is one of the main analytical methods that Folke Bernadotte Academy (FBA)[2] uses, and it has enabled the agency to engage in more effective and sustainable prevention and peace efforts. It is a method that can be used by all actors who aim at achieving positive change in an area affected by conflict. For actors aiming to promote peace, it is useful because it allows for a more holistic view of the different conflict drivers, thereby increasing the possibility of finding entry and leverage points for achieving systemic change. For actors working with projects, programs, and processes not directly related to peace, such as humanitarian, development, or business actors, conflict systems analysis is a method that can be used to employ a do-no-harm perspective making sure that we do not inadvertently fuel existing conflict dynamics.

In addition, the versatility of the method allows for it to be used as a vehicle during an organization's or institution's strategic decision-making processes as well as a tool to use to engage a broad range of local stakeholders in a dialogue or conversation concerning challenges, and opportunities that need to be addressed jointly in a conflict prevention, peace, or state-building process. In the former example, the results of the analysis might not be shared broadly outside of the organization or institution, while in the latter example, the results would become the collective property of all actors involved in the process.

However, the interlinkage between the global climate system and conflict systems is not always easy to grasp. Therefore, we need tools and methods to help us identify and understand these links. At FBA, we are starting to make headway in our journey to fully integrate climate-related security risks into our work. We have developed and tested a 3-phase process where we look at (1) how climate impacts the environment and nature, (2) how this change impacts humans, and (3) how humans cope with and interact with each other because of this change.

In this chapter,[3] I will briefly describe the main features of the conflict systems analysis method as well as further explain the 3-phase process to integrate climate-related security risks mentioned earlier. I hope that this will inspire a broad range of actors working in or with conflict to embrace conflict systems analysis as well as the nexus between conflict and climate change.

## *Understanding the underlying systems that drive conflict*

At FBA, we understand a conflict system as an interconnected set of conflict-driving factors that is organized in a way that creates reinforcing, balancing, and interconnected feedback loops all to uphold existing social, political, and economic power dynamics. Conflicts do not exist in isolation. Considering the system of the conflict is, therefore, essential for proper analysis. Systems thinking, and conflict systems analysis, enables us to understand how different driving factors in a conflict relate to and influence each other.

Different people and groups in a society will have different perspectives on and perceptions of what constitutes the core conflict and peace dynamics. It is, therefore, important to use an

analytical method that allows for different perspectives and perceptions to be integrated. It is not uncommon that the conflict analysis process can create tension among the actors involved. Competing views over what constitutes the most important conflict factors create frustration over which narrative, perception, or perspective should be included. Feelings of being excluded or marginalized can inadvertently do more harm than good (Ernstorfer, 2023).

Conflict systems analysis is an approach that helps identify the bigger picture, with an emphasis on understanding the dynamic relationships between the most important factors for peace and conflict. The method focuses on understanding the nature of the relationships among different driving factors with particular concern for 'feedback' in the system (issues that influence, reinforce, or counterbalance each other). This enables us to understand where the leverage points are within the conflict system, which issues, and topics the dialogue and mediation process should address, as well as identify where we as actors seeking to support change would be able to inject positive energy to push a conflict system in a positive direction.

In addition, the method encourages inclusion for a multitude of actors and voices to be heard and their stories, perceptions, and perspectives to be integrated. If the analysis process is set up in such a way that conflict actors and stakeholders feel safe to share, not only their positions but also interests and needs, the analysis can also play the role of, or transform into a dialogue process. As such, the method can facilitate the creation of trust among different stakeholders in a conflict.

### *Engaging practically with the conflict systems analysis method*

Conflict systems analysis is a flexible method that can involve different sets of actors depending on the specific purpose and aim of the process. For example, organizations and institutions that aim to increase their understanding of a particular context or conflict can choose to facilitate a process "in-house" with internal staff. On the other hand, organizations or institutions that aim to develop their projects, programs, or processes operationally would benefit from including actors with different resources, capacities, and influence such as representatives from local and regional peacebuilding organizations, local and national governance structures, research institutes as well as representatives from different marginalized groups. However, regardless of the aim of the analysis, a good practice is to undertake the analysis in smaller teams, facilitated by a person who has prior knowledge of the systems analysis method.[4]

Once the analysis team has been set up and a facilitator has been selected, the conflict systems analysis process starts with identifying and understanding as many driving factors for conflict and peace as possible as well as prioritizing which ones are considered the most important or influential factors in the conflict system. This can be done using different kinds of methods such as reading articles, analysis, and reports (desk review), conducting interviews, focus group meetings, and workshops with different actors and stakeholders.

The next step in the process is to start identifying how the different driving factors for peace and conflict interlink to create reinforcing or balancing feedback loops in the system. Since the systems approach teaches us that all elements in a system are interlinked, we can work with the assumption that none of the identified factors will exist in isolation. Driving factors for peace and conflict will affect other driving factors as well as be affected by others. Clues about these connections can usually be found in the desk review, notes from interviews, focus group meetings, and from the results of workshops.

At this stage in the process, we can start to visually map out the interlinkages between the driving factors for peace and conflict. The following examples show how a set of driving factors

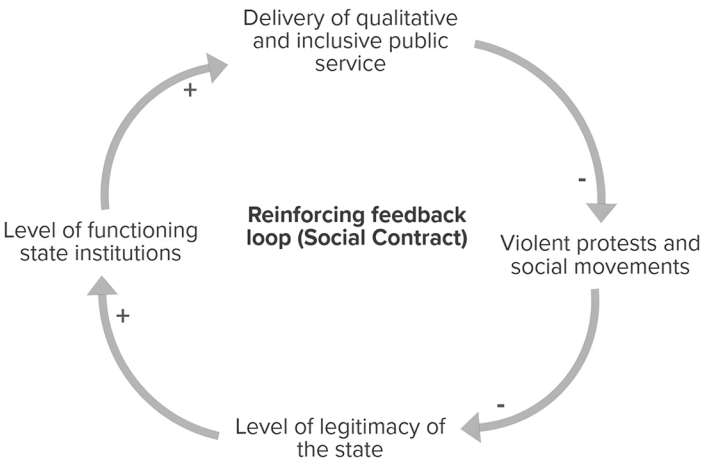



*Figure 28.1* Reinforcing dynamic concerning social contract.

for conflict, identified as part of one of FBA´s conflict systems analysis processes, connects creating seemingly never-ending patterns of either self-perpetuating virtuous or vicious cycles.

In Figure 28.1, the (+) and (−) signs depict the relationship between the different driving factors for conflict. The (−) sign indicates an adversarial relationship where an increase in one factor leads to a decrease in the other. For example, an increase in the "delivery of qualitative and inclusive public service" will lead to a decreased frequency of "violent protests and social movements". We can trace the same adversarial relationship between the "frequency of violent protests and social movements" and the "level of legitimacy of the state" as an increase in the frequency of protests leads to a decreased level of legitimacy of the state. The (+) sign, on the other hand, indicates relationships that build on each other. As shown in Figure 28.1, increased "levels of legitimacy of the state" will result in increased "levels of functioning state institutions". This in turn will increase the "delivery of qualitative and inclusive public service" thus leading to a decrease in the frequency of "violent protests and social movements".

Systems analysis can also depict balancing dynamics, where patterns of behavior and action serve to return the situation to a certain desired state of equilibrium or to counteract a reinforcing dynamic.

In Figure 28.2, the driving factor for peace counterbalances the vicious dynamic that has developed. This opening might happen because of a shift in attitudes, beliefs, or mindsets. Any given action (e.g., facilitated dialogue for structural change) might not lead to immediate results, and hence, there will most likely be a certain 'time delay' before seeing a response to this de-escalation attempt. The possible change process resulting from this effort is therefore not linear – progress may be interrupted by setbacks and so on.

At FBA, we have come to realize that the facilitation of these processes is most effective if it is done within a workshop format with a selection of different stakeholders, conflict specialists, and conflict prevention and peacebuilding practitioners. Through a facilitated conversation and using visual aids such as sticky notes and flipcharts, the process enables the participants to move factors around freely, "testing" different interlinkages. As more and more connections are identified and discussed, an interesting visualization of the conflict system starts to take form. As we continue

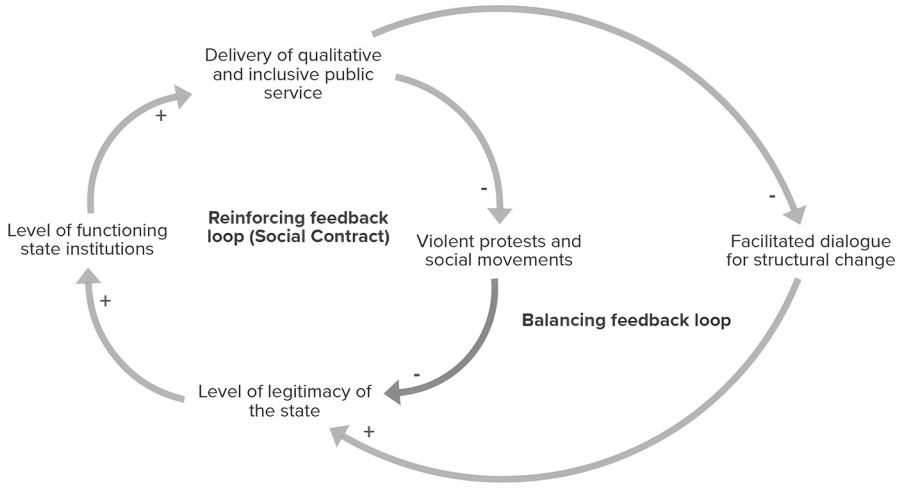



*Figure 28.2* Reinforcing and balancing dynamic.

to engage with stakeholders in a conflict, more and more reinforcing and balancing dynamics will appear, creating a more holistic view of the complexity of the conflict.

### *Integrating the impact of climate and environmental change into conflict systems*

Like many organizations working with conflict prevention and peacebuilding, FBA has focused its conflict analyses on man-made conflict factors of social, political, and economic character. However, upon review, we came to understand that our analyses lacked connections to environmental factors or aspects related to changes in climate. This started an internal discussion on how these could be best integrated without having to redo the entire conflict analysis process from scratch. The result became a 3-phase process that I will briefly explain below.

As a first step, we need to understand how changes in the global climate system impact the environment and nature in the conflict area. At FBA, we quickly realized that this was knowledge that did not exist within the agency. To get to the bottom of these issues, we therefore connected with international research centers, such as the Stockholm Resilience Centre (SRC), and independent international institutes, such as Stockholm International Peace Research Institute (SIPRI) and the Stockholm International Water Institute (SIWI). Through discussions and workshops with climate and conflict researchers, we increased our understanding of, not only which slow and extreme onset events (United Nations Framework Convention on Climate Change, 2012) currently impact the conflict area, but also that these onset events create systems of reinforcing and balancing loops much like the conflict systems explained earlier. In addition, we came to realize that it was possible to model how the magnitude of these onset events will increase or decrease over time. This understanding allowed us to move to the second phase.

During the second phase of the process, we want to understand how people in conflict contexts are affected by changes in their environment and nature. This includes unpacking how different onset events, such as an increase in temperature with resulting heatwaves, droughts, and water scarcity, affect and impact different groups living within the conflict area. To gain this understanding,

we must connect with and listen to local people and communities. This brings local partner organizations and their local networks of communities into the center of the process. Through interviews, online meetings, and focus group discussions, voices and stories from affected people and communities could be elevated and integrated into our analysis process. If this is done with humility and careful thought, this phase can serve to increase the participation of marginalized and otherwise excluded groups of society in the process, thereby making the process truly inclusive. Relying on and encouraging our local partners to engage in the process also increased their ownership over the analysis process.

In the third and final phase of the process, we seek to understand how people cope with and adapt to the changes in their environment and nature. Based on the knowledge gained during the first two phases, we have come to understand how the negative impacts of climate change force people and communities to change behaviors to cope. Often these coping mechanisms seem to create tension and conflict as different interests and needs are played out against each other. In more stable and inclusive societies, people can solve these differences through dialogue, mediation, or simply by referring their issues to different governance structures for adjudication or arbitration. However, problems quickly arise if these structures don't exist or if they are biased or corrupt, favoring some groups to the detriment of others. It is in the latter situation that we start to see how changes in climate and environmental systems connect to, and start to interact with, the different driving factors for peace and conflict already identified through our conflict systems analyses.

An important step in this phase is therefore to discuss and identify how changes in climate and environment impact the driving factors for peace and conflict already identified (see Figure 28.3). In Figure 28.3, also identified as part of one of FBA's conflict systems analysis processes, slow and extreme onset events connect, build on, and strengthen each other, creating an additional reinforcing feedback loop that in turn connects with and impacts the reinforcing feedback loop of driving factors for conflict. In this example, it was identified that scarcity of water had a direct impact on the ability of the state to deliver qualitative and inclusive public service to its population. However, an onset event can impact a multitude of driving factors for peace and conflict. As more and more of the onset events are added to the systems conflict analysis, it will become clearer which parts of the conflict system are the most vulnerable. This is where it becomes interesting. As mentioned earlier, the first phase enabled us to understand how the magnitude of the different onset events will increase or decrease over time. At this final phase, this knowledge can be used to build future scenarios that in turn facilitate a discussion regarding the relevance of our conflict prevention and peace-building engagement.

### *Positive aspects of integrating climate and environmental change into conflict analysis*

In this chapter, I have taken the opportunity to briefly describe the main features of the conflict systems analysis method as well as the outline of FBA's 3-phase process to integrate climate-related security risks into existing conflict analyses. As we are approaching the end of this chapter, I would like to share some of the positive lessons that we have drawn from engaging with these methods.

First, by integrating the impact of climate and environmental change into our analyses, FBA has gained a much deeper understanding of the dynamics that fuel and affect conflict. It is very difficult to predict how different conflicts will evolve. As mentioned in the beginning of this chapter, many of today's conflicts consist of a multitude of complex actors, all their unpredictable

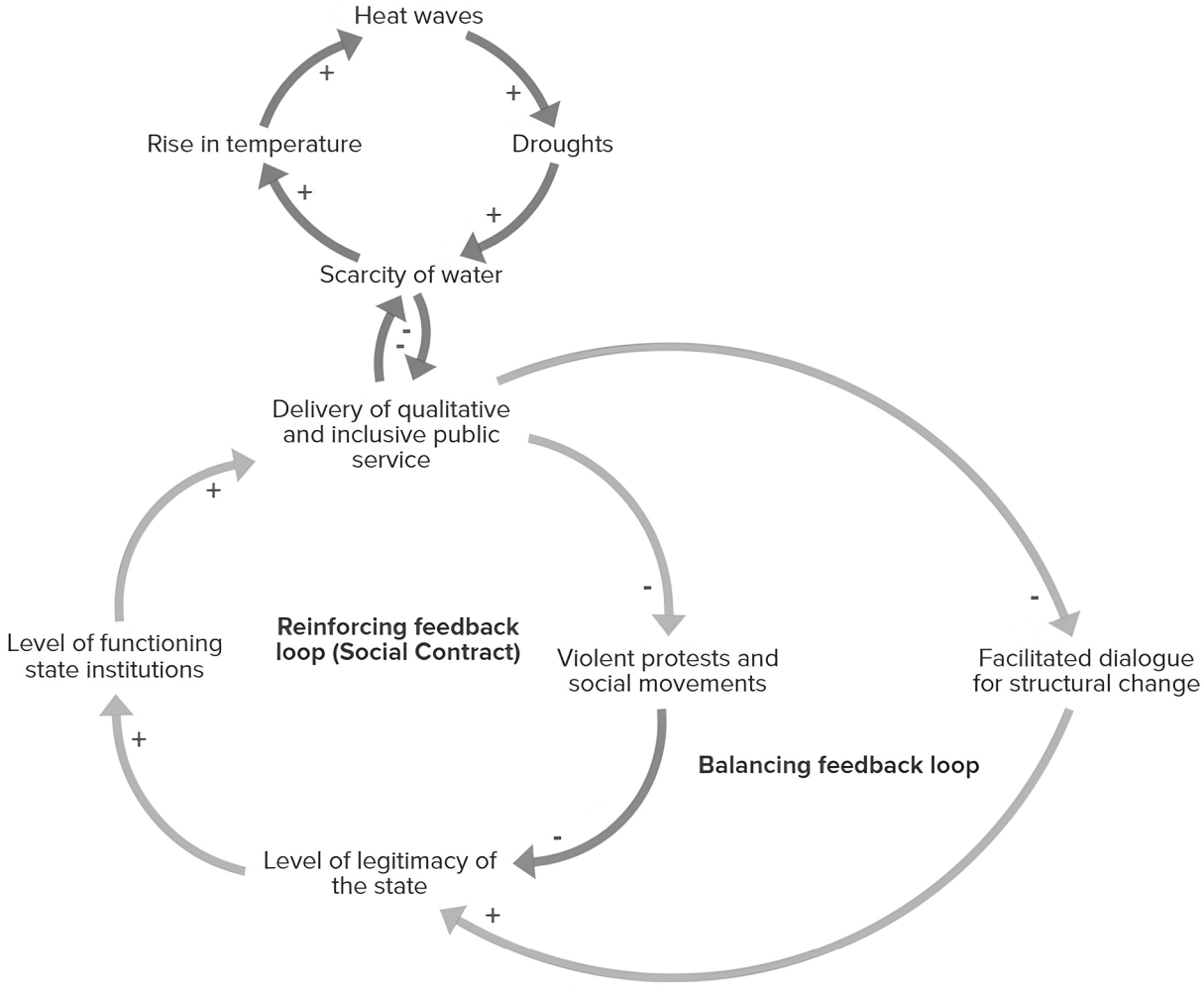



*Figure 28.3* Impact of changes in climate.

logic, making predictions and scenario building extremely hard. However, understanding how the impacts of climate change will affect a geographic context adds an element of stability to the analysis since climate researchers can model and, with some degree of certainty, build future scenarios. By relying on this data and these projections, we can start to predict how specific climate-related security risks will put additional stress on the conflict systems that we engage with. At FBA, this understanding has enabled us to start testing our theories of change and facilitated our internal discussions regarding what preventive measures such as dialogue, mediation, or diplomacy would be the best types of engagement in the conflict context.

Second, integrating the impact of climate and environmental change into already existing conflict systems analyses will provide an opportunity for conflict prevention and peacebuilding organizations to include and listen deeply to actors that might previously have been ignored or marginalized. As previously mentioned, systems conflict analysis allows for a multitude of actors and voices to be heard and their stories, perceptions, and perspectives to be integrated. However, addressing issues that relate to climate change and environmental impacts, using the outlined 3-phase process facilitates the inclusion of actors, such as Indigenous people, youth, and women's groups, that might have been forgotten or even ignored during the analysis of social, political, and economic conflict factors. And, if the analysis process is set up in such a way that conflict actors and stakeholders feel safe to share, not only their positions but also interests and needs, the analysis can transform into a dialogue process that can address structural grievances in a given society.

Lastly, by engaging in this 3-phase process, FBA facilitated connections, collaboration, and coordination between peace and conflict practitioners and researchers, local stakeholders, and climate researchers. In fact, the different phases in the 3-phase process gave these different groups spaces to share and discuss based on their specific competence or experience. This was important as it brought them all a bit closer to each other. Breaking the barriers between the different professional and social groups allowed for a richer dialogue and a deeper understanding of all the aspects that impact conflict dynamics in a particular area.

## Notes

1 CDA originally stood for "Collaborative Development Action" but now it is simply part of the organization's full name: CDA Collaborative Learning Projects.
2 FBA, or Folke Bernadotte Academy, is the Swedish government agency for peace, security, and development.
3 The chapter draws learning from FBA's internal processes of integrating climate security aspects into our conflict analyses, with further insights from the FBA paper "Strategic peace mediation and dialogue efforts to shift conflict systems", written in 2023 by one of FBA's longstanding consultants, Ms. Anita Ernstorfer.
4 There are currently several organizations working practically with systems conflict analysis. For further inspiration please visit, among others: CDA-Collaborative (www.cdacollaborative.org), Chemonics (www.chemonics.com), Interpeace (www.interpeace.org), United Nations System Staff College (www.unssc.org), and Folke Bernadotte Academy (www.fba.se). In addition, USIP hosts an online course in systems thinking (www.usip.org/academy/catalog/systems-thinking).

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# 29

# CAPACITY DEVELOPMENT FOR WATER DIPLOMACY

## The Experience Exchange Approach

*Virginia Lee Tice, Martina Klimes, and Kerry Schneider*

### Key Takeaways

- Traditional approaches to developing capacity, where participants are expected to receive information passively, are inadequate for preparing modern water practitioners.
- A participatory capacity development methodology is more effective at transferring and building upon professional skills, but can also forge relationships, challenge power dynamics, and unlock new pathways in water diplomacy.
- This participatory methodology is called the experience exchange methodology, and it emphasizes cocreation, interaction, and engagement.

### Introduction

Traditionally, capacity development[1] has been operationalized as a top-down transfer of knowledge, skills, and institutions, with little regard for the importance of relationships to overall capacity. This inattention to relationships makes traditional capacity development ineffective for water diplomacy, where relationships are foundational not only to setting and achieving collective goals but also in the everyday management of shared waters.

This chapter examines how to make capacity development for water diplomacy more effective. First, it discusses common issues with the typical framing of capacity development and how this framing impacts the day-to-day practicalities of creating effective workshops and trainings as well as performing monitoring and evaluation. Second, it outlines an emerging approach to capacity development focused on the holistic development of capacity (including relationships) through experience exchange. Collectively, we hope the chapter provides a more nuanced view of how capacity development is a critical component of productive cooperation over shared waters.

### Practical Considerations

As any teacher knows, the true transfer of knowledge is a complex endeavor. A mix of art and science, there are a tremendous number of obstacles to learning. The following are some of the common pitfalls we've witnessed in carrying out capacity development programs and how we have sought to overcome them.

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### *Capacity Development Is a Process*

All too frequently, donor organizations expect quick results; a one-week training touted as the solution to an institution's lack of capacity. In reality, meaningful capacity development takes time, is iterative, and in some sense is never complete. One-off trainings have limited impact and organizations should scale back expectations on what can be achieved in the short term. There should be a realistic perspective, for example, on whether capacity development that focuses on a few departments will affect the organization, as well as the degree to which there will be spill-over benefits to the wider system.

It should also be explicitly acknowledged and accounted for that in many fragile and conflict-affected countries, brain-drain and rapid turnover within governmental departments are significant impediments to retaining capacity. This loss of talent must be reckoned with in capacity development plans and in how training programs are designed. It is sometimes possible to mitigate the harm, for example, by shaping the training as a "train-the-trainer" program, where the local department is given the training and tools to train new colleagues and staff when there is turnover.

### *Local Context Is Paramount*

There are no easy formulas to capacity development that work well in all circumstances; there is no "how to do it". Practitioners should focus on specific objectives, with flexible and imaginative thinking about the methods that are right for the local circumstances. In other words, there is not a "how to do it" but a "what might work *here*?".

There are several elements of the local context that should be considered when formulating a capacity program, particularly in fragile and conflict-affected countries, which will likely have sensitive issues that must be understood in order for the trainer to be effective. These elements often include non-water challenges that impact the political and social context in which water diplomacy is carried out, such as national security threats and development economic concerns. Trainers must take into consideration conflict dynamics, including the dynamics between the participants of a training (and those who may have been excluded from the training altogether).

Another element for consideration of the local context is having some appreciation for what trainings have already occurred on that topic, in that country, ministry or department. It is unlikely that you are the first trainer to train on a given topic in a country; having some awareness of that can help reduce duplication, build on existing capacity, and, perhaps, add some humility and perspective to a trainer's expectations.

### *Trainings Should Be Focused*

Practitioners should begin by asking the question "capacity for what?" and focus on the specific capacities needed to accomplish clearly defined goals. In order to do that, generally speaking, there are three things to keep in mind when organizing training materials: (1) what are the learning objectives (what, overall, am I trying to describe/explain?); (2) what are the outcomes (what are the 2–3 key ideas I want the participant to have a clear understanding of by the end?); and (3) what skills are being improved (what will the participant be able to do better after the training?). These may sound basic, even obvious, but keeping these questions at the forefront helps keep the trainer and the material focused and provides clear indicators for success.

Water diplomacy capacity development is often focused on either negotiation and diplomacy trainings for staff of technical and water-line ministries or on giving an overview of water-related

issues for ministries of foreign affairs. In recent years, more effort has been made in water diplomacy trainings to combine representatives of different sectors, often using training workshops as an opportunity to bring together different stakeholders. In any case, whoever the audience, the trainer should shape the workshop around the specific outcomes and skills he/she is seeking to augment and focus the training accordingly.

### *Presentation Matters*

There is seemingly widespread poor utilization of technological tools for learning (like PowerPoint). In presentation after presentation, we see basic, common mistakes that dramatically distract from the presenter's message and either confuse or bore the audience. You, dear reader, have likely seen them as well: slides with several paragraphs of text and cheesy clip art. A poorly designed presentation not only detracts from a presenter's message but can even hurt his or her credibility as a professional.

Audiences can listen or read, not both. As a trainer, you need to be familiar enough with the topic and the presentation that you can do it without reading the slides and confusing your audience as to whether they should be listening to you or reading the text. Additionally, with every slide, ask yourself, "Can I say this with a picture/graphic/chart or fewer words?" There are countless free resources online on how to create a more effective presentation: use them.

### *Do More Than Lecture*

To "lecture" has traditionally meant a passive, one-sided exchange. The teacher speaks; the students listen, and this has been utilized in classrooms the world over. Lectures, however, are not always an effective way of conveying information so that the audience remembers it. Instead, we often learn best when new information is connected to information we already know, when it elicits an emotion and, particularly for adult learners, the relevance and importance of the new information is made clear. Rather than lecture, therefore, a trainer should *engage*.

One of the best ways to foster engagement, we've found, is to focus on experience: experience of the trainer but also experience of the trainees. First, experience sharing makes theoretical information immediately more practical, useful, and, hopefully, more interesting. Second, sharing an experience often engenders emotions and personal recollections of the listener, which significantly increases memory retention. Third, participants who are given an opportunity to share their own experience are often more motivated in the overall training, contribute to more boisterous discussions, and build on that experience for better learning.

None of this is to say, of course, that there is no room for traditional-style lectures or explaining the theoretical underpinnings of, for example, negotiation strategy. It is only to say that abstract concepts should be bolstered by practical examples, preferably from the lecturers' or participants' personal experience and, more specifically, that this experience sharing should not happen merely by accident, through the standard question-answer segments. But rather, experience sharing should be a specific objective of the training itself and intentionally incorporated into the workshop.

### *Who Is the Teacher?*

To be able to share one's experience, of course, entails having had that experience in the first place. Depending on the country and context, various types of professionals participate in water diplomacy: politicians, diplomats, scientists, lawyers, academics, engineers, and other technical experts – each playing their specific role in a complex dynamic. These technical experts often have

tremendous knowledge of their subject area. However, not all technical experts have the skills or training to convey that information in an effective way to an audience. Just like not every good football player is a good coach, not every expert is a good teacher.

An effective trainer should have a mix of attributes, understanding both the intricacies of the subject matter and the relevant teaching methodologies and learning needs of the participants. Indeed, much of the gap in building capacity in the development context could likely be filled if more attention were given to the capacity *of the trainer*. Careful thought should be put into who is selected as a trainer, paying attention not only to their practical experience in water diplomacy but also their skills as an educator.

### *Who Is the Student?*

Knowing the participants, their backgrounds and their level of knowledge in the subject matter are helpful. Unfortunately, in practice, this is often difficult. As a result, trainers frequently spend part of the training going over basic concepts to ensure everyone has the same level of knowledge of the subject before moving toward more complex issues. While this "teaching to the lowest common denominator" approach has its merits, it renders at least parts of the training useless for more advanced attendees and, in short training courses, oftentimes means forgoing exploration of deeper, more meaningful topics. One way of avoiding this is to distribute "homework" on things like key ideas and terminology to participants to read before the training so that a basic level of knowledge can be presumed by the presenter.

One reason participants sometimes lack basic knowledge about the training subject matter is that inappropriate people are sent as trainees. Trainings, particularly those given in nice locations, are sometimes treated as rewards for well-connected persons rather than as an opportunity to increase the professional skills of staff members. Every attempt should be made by the course coordinator to prevent this kind of nepotism, such as by reviewing the attendance list beforehand and working with the local government or institution on refining the list.

### *What Is the Role of Digitalization?*

There have been efforts to digitize water diplomacy learning for the past decade, mainly via e-learning courses. These courses usually provided limited contacts with teachers, which consisted mostly of chat groups and assignment feedback. New opportunities for online discourse came with the expansion of digital platforms during the COVID-19 crisis. The pandemic travel restrictions forced interactions to move online, which inadvertently yielded an advantage to reduce cost and time as well as environmental impact, as people logged into their computer instead of checking in for a flight.

Although the widespread utilization of online trainings was largely motivated by the pandemic, there are actually numerous benefits to online sessions over traditional face-to-face trainings, including:

- because they are remote, online sessions allow for a broader variation of participants and potentially a much higher number of trainees;
- women are usually not as able as men to travel for trainings, which significantly hinders their professional development opportunities. Offering the courses online is therefore a more gender-sensitive approach to capacity development;

- as already mentioned, the staff turnover rate at governmental institutions is sometimes high. The risk with face-to-face trainings, therefore, is that once it is over and the person leaves, the knowledge goes with them. With online trainings, which can be recorded and stored on a shared platform, that knowledge will be retained and can be re-given to new staff.
- allows for simultaneous translation into multiple languages and, with subtitles, is more accommodating to the hearing impaired or those with less English proficiency;
- the sessions are available anytime, from anywhere with a computer, which is more accommodating to participants' schedules;
- the sessions can be re-watched for increased comprehension and shared for increased impact.

But can water diplomacy be taught online effectively? Can the nuanced networking and disruptions in power dynamics that can occur at an in-person workshop happen through a screen?

The answer, of course, is both yes and no. In our experience, some aspects of water diplomacy learning can be moved to digital platforms albeit in an altered manner. As mentioned above, workshop effectiveness often depends on whether the lecturer can actively engage and build rapport with participants. If carried out online, the workshop facilitator must strive to maintain contact with the participants through chat groups and other means. Just as coffee breaks are important during informal dialogue Track 1.5 and Track 2 processes to give the participants a safe space to ask questions outside of the plenary group, online sessions need a dedicated area or segment of the session designed for interaction and dialogue.

Digitalization has helped with delivering trainings in countries where opportunities for physical workshops can be limited due to security concerns. But, in some cases, requirements for online access can be a barrier for participation. Chatting platforms are sometimes blocked by repressive governments or participants can face shortages in power supplies or difficulties with Internet connection or access.

Overall, digital training can likely never replace in-person learning but it can be a good stepping stone, especially when planning a series of training workshops. Online platforms can also serve as a meeting place for existing stakeholder networks. When, for example, actors already know each other, online sessions can serve to share knowledge even without a sustained in-person contact.

### *Example: Stockholm International Water Institute (SIWI) Role Play*

In late 2020, the SIWI digitized its transboundary water negotiation role play. New features were added, like quick break-out rooms, side chats, and opportunities to break the game into segments reflecting on the negotiation process. The digital version seems especially suitable for early and mid-career professionals to practice alternate aspects of transboundary water negotiation.

However, digital platforms provide limited opportunities for bridging divides between actors with ongoing disputes or experience sharing on more sensitive issues. Countries with water disputes often have long-standing historical disagreements on issues like fair use and allocation. In-person capacity development workshops can be used as a safe meeting space to facilitate interaction between countries and actors whose relations are affected by low levels of trust or limited diplomatic relations. It is unlikely that these types of meetings can be effectively moved entirely online.

### *How to Perform Effective Monitoring and Evaluation*

Selecting and applying adequate measures of achievement is a challenge. Many programs use measures of performance as proxies for capacity. Depending on the learning objectives and desired outcomes, a mix of qualitative and quantitative indicators can be used to evaluate success.

An important component of understanding and appraising whether learning objectives are being met is through continuous dialogue on expectations with workshop participants. This dialogue should begin before the meeting takes place, through pre-engagement participant evaluation. Then, during workshops, daily check-ins can help maintain connection with participants beyond the workshop room. Post-engagement participant assessment is standard but, in some cases, going beyond a paper survey to more in-depth debriefing interviews with key stakeholders can yield a better picture of the real experience participants had.

In some cultural contexts, participants tend to respond 'satisfactory' or 'very satisfactory' to all questions, as expressing any other view would be considered as inappropriate or disrespectful to workshop hosts. Further to this, simple multiple-choice questions also do not provide sufficient space to capture nuances of participants' experience that can inform future capacity development planning and provide a true assessment of the activity. Instead, conducting a follow-up debriefing interview four to six months after the workshop adds a perspective to evaluation and assessment of how knowledge and experience gained during the capacity development activity is used in their daily work.

Well-designed evaluation and monitoring assessment can significantly improve long-term effectiveness of capacity building efforts – asking the right questions in the right way can glean much better understanding into how effective capacity development exercises are. Measuring success depends on the context of every situation and specific goals set together with participants and/or participating organizations. "Improvement" is when participants, in a context where water diplomacy was not previously considered as a tool for advancing cooperation over shared water resources, is now considered as a possibility for advancing relations. In other contexts, where water diplomacy tools are already in use, successful workshop results can be a specific plan for a basin-wide project or a project between a set of stakeholders sharing a water resource.

## The Experience Exchange Approach

A participatory capacity development methodology has emerged that we feel best encapsulates the principles we have discussed so far. This experience exchange approach places emphasis on a process of cocreation during meetings or workshops with participants, starting with agenda setting through the process of monitoring and evaluation. The methodology seeks to foster an informal atmosphere to build trust and peer-to-peer experience exchange focused on regional water cooperation opportunities and challenges that complements formal tracks of diplomacy among the same stakeholders. Maintained connectivity between participant decision-makers beyond the workshop environment provides an additional channel of communication and knowledge exchange.

### *Key Concepts for the Experience Exchange Approach*

Although there is no one way to approach capacity development, we have found a common set of useful concepts that can be tailored for local contexts. The list below, though not exhaustive, is a good starting point when designing a training course's pedagogical approach.

Some of the key concepts for the experience exchange approach include:

- *Stakeholder Engagement and Participation*: Engage all relevant stakeholders – such as governments, non-governmental organizations, community groups, and the private sector – in all stages of planning and decision-making. This inclusiveness ensures diverse perspectives and knowledge bases are accounted for and helps build a shared understanding and ownership of decisions.
- *Facilitated Dialogue and Negotiation*: Use facilitated dialogue and negotiation techniques to help stakeholders understand each other's perspectives, reconcile differences, and develop mutually acceptable solutions. This can include methods like mediation, consensus-building, or conflict resolution.
- *Interactive Workshops and Trainings*: Organize interactive workshops and training sessions to educate stakeholders about the challenges and opportunities associated with transboundary water resources management. These could include role-playing exercises, case study analysis, or group problem-solving tasks.
- *Knowledge Sharing and Learning Platforms*: Create platforms for knowledge sharing and learning, such as online portals, discussion forums, or learning networks. These platforms can help stakeholders share their experiences, learn from each other, and build a shared knowledge base.
- *Community of Practice (CoP)*: Develop a CoP around transboundary water resources management. CoPs are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.
- *Use of Information and Communication Technology (ICT)*: Use ICT tools to facilitate communication, collaboration, and knowledge sharing among stakeholders. This could include social media, virtual meeting platforms, or digital learning tools.
- *Monitoring, Evaluation, and Learning (MEL)*: Implement a robust MEL framework to track progress, identify challenges and successes, learn from experience, and continuously improve performance. This should include both formal evaluations and more informal, ongoing learning processes.
- *Joint Field Visits*: Encourage joint field visits to the shared water resource areas. This not only facilitates a common understanding of the ground realities but also fosters empathy and mutual respect among stakeholders.
- *Scenario Planning and Role Play*: Scenario planning and role play allow stakeholders to envisage different outcomes of their decisions, promoting a better understanding of the system's complexity and fostering adaptive management.
- *Iterative Learning and Adaptive Management*: Encourage an iterative approach to learning, where experiences and lessons learned feed into ongoing decision-making and management processes. This promotes adaptive management, which is key in the context of uncertainty and change.

### *Case Example: Shared Waters Program*

SIWI has implemented the Shared Waters Partnership (SWP) since 2012, a program designed to strengthen transboundary coordination in regions where water either is or is likely to become a source of conflict, seeking instead for it to become a source of sustainable peace. Activities implemented under the SWP largely revolve around capacity development as a vehicle to bring stakeholders together, often seeking to strengthen the skills, tools, and approaches of decision-makers to pursue

water diplomacy as a means of reaching shared solutions to shared problems in the development or management of transboundary water resources.

By employing the experience exchange methodology, SIWI helps ensure that capacity development activities reflect the needs of the participants. In cases where multiple countries are represented in a workshop and needs are not shared consistently or evenly among participants, the process of cocreating meeting agendas, identifying relevant experts or practitioners to share experiences, and collectively reflecting on the value of working together through a workshop tends to expose these differences and provides facilitators with indicators of where greater alignment would be beneficial. If support is bilateral, that is, provided by SIWI to a single government, the process of cocreation remains the same and efforts are aimed at laying the groundwork for sustainable diplomacy to take hold once all parties to a cooperation process are able to engage on a level field.

SIWI's capacity development approach is exemplified through its support to the Federal Government of the Federal Republic of Somalia, where transboundary water cooperation has become an elevated priority as decades of internal instability and increasing climate variability have left uncountable impacts on Somalia's freshwater security for both humans and ecosystems. Somalia's primary sources of surface water come from the Juba and Shabelle Rivers shared with Kenya and Ethiopia, respectively. Despite Somalia's reliance on these rivers, there are no formal agreements or jointly managed infrastructure among the countries to underpin cooperation. Both Kenya and Ethiopia have been engaged on water issues linked to the Nile River for decades, but Somalia is not riparian to the Nile and sits entirely outside of the formal cooperation process in that basin.

SIWI's support for Somalia has largely been tailored to support future diplomatic engagements over the Juba and/or Shabelle Rivers. Through the process of cocreating a series of capacity development workshops for a multi-ministerial and multimember state committee responsible for developing and implementing a foreign policy related to fresh water, SIWI and the Federal Government have developed a list of short- and long-term prioritized needs of government focal points.

A series of workshops have provided Somali focal points for transboundary cooperation with enhanced skills and tools to better articulate needs and ambitions with regard to transboundary water management and have also served as important opportunities to strengthen interministerial coordination among the participants. Topics ranging from the role of third parties in cooperation processes and negotiation skills to the importance of valuing gender inclusivity in transboundary water dialogues have been linked to Somalia's ongoing implementation of a National Water Resource strategy. While theoretical examples can be useful in many capacity development initiatives, Somalia has requested more grounded, practical support, so SIWI has engaged several current and former government representatives, experts, and practitioners from around the world to share their experience in pursuing or supporting water diplomacy from different vantage points. Driven by real-world experience exchange, workshops have allowed the Somali government to learn directly from those that have faced similar challenges to discuss what worked, what didn't, and why.

## *Conclusion*

Traditional approaches to developing capacity have fallen short. One-sided exchanges, where participants are expected to passively receive information, have shown themselves to be inadequate for memory retention and comprehension. Some technological tools, like PowerPoint, have become over-relied upon to convey information, with presenters too often mindlessly reciting the

lines of text from the screen rather than seeking active engagement. Clearly, a new pedagogical model is needed in order to improve capacity in the water sector.

The experience exchange methodology offers this new approach, placing an emphasis on interaction and participation. Given the absence of any one-size-fits-all approach to capacity development, the peer-to-peer experience exchange approach has demonstrated its effectiveness in allowing representatives from participating countries to informally delve into areas of common ground, pinpoint differences in perspectives, and enhance their comprehension of their neighboring nations' water situations and the decision-making processes related to them. Furthermore, this method offers a platform for participants to actively engage, share their insights on different aspects of regional water diplomacy, work toward a shared understanding of challenges, clarify their roles, and pinpoint priorities and confidence-building measures.

Donors and facilitators of capacity development programs meant to strengthen water diplomacy can strengthen the impact of their support by modernizing their approach. Traditional formats that rely on one-way (teacher to student) pipelines are limited in reach. Creating dynamic, interactive, and participatory meeting opportunities that recognize the value of trust building in a cooperative process should be prioritized and utilized to the greatest extent possible.

## Note

1 In this chapter, we use "capacity" to refer to the knowledge, skills, institutions, and relationships that enable individuals, organizations, and societies to set and achieve goals and manage their affairs successfully. Likewise, "capacity development" is the process through which individuals, organizations, and societies obtain, strengthen, and maintain the capabilities to set and achieve their own development objectives over time.

# 30

# MOVEMENT BUILDING TRANSFORMATIVE WATER DIPLOMACY APPROACHES

*Elizabeth A. Koch and Aaron T. Wolf*

**Key takeaways**

- Sustainable water agreements – in the context of water insecurity and climate change – must be inclusive, participatory, dynamic agreements lived and practiced not only by national ministries of water and basin authorities but by all members of basin communities who value water.
- With a focus on boundary-crossing water communities, transformative water diplomacy approaches can support groups of actors in reevaluating information, enabling openness, supporting trust building, and even accepting new information and perspectives.
- Western discourse is well suited to examine aspects related to physical and mental water while often excluding entirely issues related to emotional and spiritual water, even though these latter constructs are often the core of the dispute and provide a wide entry for a diversity of community groups to identify with and contribute to shaping water decision–making.
- Recognizing and addressing these 'four worlds' of water can help orient dialogue in a way that balances past and future, justice and mercy, and the needs of individuals with the needs of the basin as a whole.

## The 'enabling environment' of water diplomacy

As elaborated in this Handbook, water diplomacy processes entail lengthy engagements linking diverse actors and sectors across a matrix of relationships at various scales in dynamic and increasingly uncertain contexts. These processes often build up and take shape informally for generations in advance of 'formal' negotiations and continue to evolve for generations beyond 'agreement' through implementation and institutionalization processes enacted (or not) by a range of actors in diverse basin and country contexts. Discussions on the 'enabling environment' around water diplomacy are often focused on the social discourse and informal civic engagement that surround, link with, and inform formal processes. Assessments and even efforts to 'enhance,' 'enable,' (or spoil) the setting surrounding formal water diplomacy processes are inherently linked to issues of inclusion and participation and the afforded space to a broad spectrum of stakeholders to be informed about and engaged with water and environmental decision-making. Additionally, when formal water diplomacy processes are not conducive or ripe for solution finding, focus on supporting


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informal relationships and discourse around a challenge or opportunity can support a problem-solving approach that can unlock, build, and institutionalize boundary-crossing relationships at various scales. These approaches are often referred to as informal water diplomacy approaches – inclusive of tracks of water diplomacy beyond official discussions (i.e., Tracks 1.5, Track 2 and beyond).

In fragile political and environmental contexts, formal water agreements have understandably been focused on addressing specific urgent challenges quickly (drinking water supply, water for irrigation) before a challenge becomes a crisis (food insecurity, unemployment, social or political unrest). This approach, from a conflict resolution lens, could be considered water management for conflict management with both interstate and intrastate applications. Water agreements designed in the context of conflict management must be understood to reflect the power asymmetries of the basin context at the time of their agreement. Agreements advanced in the context of divergent power relations are prone, if rigid, to perpetuate *disparate* and *cumulative* benefits and costs among and across riparian communities over generations. As such, issues of intergenerational water justice are rife in the absence of agreements, as well as in static agreements designed around both timebound challenges and agreements enacted between asymmetrical riparian powers.

To meet the urgency of today's water and climate challenges, the rigid, fixed-quantitative-orientated agreements designed to resolve timebound national challenges are no longer the go-to 'best practice' for the future. Sustainable water agreements in the context of water insecurity and climate change are inclusive, participatory, dynamic agreements lived and practiced not only by national ministries of water and basin authorities but all members of basin communities who value water. Business as usual is clearly a roadmap to disaster. Uncoordinated planning, especially in the water sector, is a lose-lose approach. A critical saturation of boundary-crossing water community engagement is needed to support sustainable long-term water management.

## Adopting and adapting transformative approaches in water diplomacy

*Transformative water diplomacy approaches* aim to support boundary-crossing water communities and constituencies to sustainably engage with boundary-crossing water challenges and opportunities. While the principles of conflict transformation are ancient, it is in recent decades that the arguments in its favor over "resolution" have gained traction (Galtung, 1995). With an explicit focus on making visible and addressing power structures affecting water and affected by water, transformative water diplomacy approaches aim to support relational water linkages across and between communities, catalyzing the development of boundary-crossing constituencies necessary to support, inform, and partner with basin leadership in shared water decision-making over time. Leveraging both the principles of good water governance (transparency, accountability, participation) as well as environmental justice (disparate and cumulative impacts), and informed by strategic nonviolence approaches, *transformative water diplomacy* aims to elevate a shared sense of water community now and for generations to follow. With realist acknowledgment of challenges, *transformative water diplomacy approaches* keep focus on sustainable water for all and pushes back against fear-based water narratives focused on short-term solutions for a water-privileged few.

*Strategic issue framing* of both the challenges and the solutions around water is critical. Key actors and practitioners in all fields and scales of diplomacy are often skilled in the art of leveraging explicit and implicit frames to advance a value, priority, need, or interest – to inform or impact the enabling environment around a formal process. Consider again which studies are undertaken, by whom, when, who is convened, who is missing, where those meetings take place or at what time, which case studies are elevated and shared as 'best' or 'good' practice, which

stakeholders nominated or elevated or expert opinions sought, or how resources are distributed – and the framing embedded in formal and informal water diplomacy processes is not so implicit.

In formal water diplomacy processes, implicit and explicit frames are often embodied in the level of engagement, the selection and mandates of decision-makers and agencies involved in negotiations and decision-making, which specialists or intermediary influencers are around those decision-makers, the internal decision-making structure and organization, the selection of information provided, data collected, even staffing, recruitment and retention decisions which favor particular schools of thought or genders – all can be utilized to advance strategic or tactical objectives through strategic issue framing. In informal water diplomacy processes, the application of implicit framing and construal and problem-solving workshop design have long been leveraged to raise awareness around challenges and opportunities outside of, or bring nuance to, the official school of thought/narrative. Informal actors and organizations often play a role in catalyzing new information or perspective into the formal decision-making space. As with formal processes, informal water diplomacy engagements and actors bring their own inherent assumptions, diverse knowledge, and experiences to bear informing water diplomacy practice.

Strategic issue framing is deeply embedded in normal, functional human behavior. There is nothing inherently cynical, dubious, or specific to diplomacy about it – implicit and explicit frames are everywhere. In an age of digital diplomacy, artificial intelligence, and water and climate-related misinformation, young professionals and natives to a landscape of digital misinformation and construal, increasingly respond with mistrust (Lorenz, 2021, *Birds Aren't Real, or Are They?*) in the face of ever more complex information manipulation. Moreover, because of our uniform human tendency to assimilate information into our own prevalent schema (and the corresponding algorithms that shape our information lens) – nuances or breaks in broadly held narratives can be largely kept to the fringe.

With focus on boundary-crossing water communities, transformative water diplomacy approaches can support groups of actors to reevaluate information, enable openness, support trust building, and even acceptance of new information and perspectives. By their nature transformative water diplomacy approaches seek to not only address the qualitative and quantitative aspects of water sharing across boundaries but the social, environment context of the shared water – including inequities that, if not made visible and addressed, are instead likely to be perpetuated – a status quo in which vulnerable communities on all sides bear disproportionate and cumulative harm.

This entails many, recurrent and often uncomfortable conversations between people. Much effort is needed to make space and support boundary-crossing communities interested in exploring the context of water management practice, norms, and agreements as well as the dynamics of power and water in a basin or region, and the history of how water inequalities have shaped communities – often with deep structural racial, ethnic, and gender inequities mixed with legacies of conquest, occupation, and colonialism spanning generations. A multitude of pathways to engage diverse communities with water in many tracks is thus necessary. Embracing complexity – particularly in fragile contexts in which communities in conflict are often inextricably both segregated and embedded with each other in various sectors and scales – is essential.

## People are at the heart of water diplomacy

The contemporary discipline of water diplomacy could be considered a relatively new intersect of foreign policy and natural resource management – the purview of a seemingly small group of experts with limited mandates across siloed and diverse governance structures. This interpretation

of course fails to recognize the diversity of stakeholders engaged at all scales of water diplomacy as well as the traditions of water diplomacy embodied in boundary-crossing water relationships developed and maintained by basin communities across all of human history.

Supporting and fostering boundary-crossing water constituencies should be approached with humble authentic curiosity. Supporting or 'enabling' linkages across and among basin communities means getting to know complex, intersecting, nuanced pillars of identity such as age, ability, gender, nationality, religion, language, family, community, and professional networks as possible linkages in boundary-crossing water communities. With increased value and framing of water as part of our identities and relationships, a *critical saturation* of boundary-crossing water communities is catalyzed, eroding rigid in-group and out-group psychological barriers to cooperative and more sustainable water management, and enabling the 'person across the river' to become 'my neighbor' in a shared movement.

One framework that has been useful to erode barriers and make space for a myriad of stakeholders to identify as part of a water community or movement is the recognition of at least four meanings of "water" that are often conflated or excluded in dialogue. There is, of course, physical water, that is, the water that is seen, moved, and handled. In a quest for efficiencies, we often introduce the concept of *mental water* – water for which we calculate "crop per drop," or effective costs for different uses. More conceptually, and often more importantly, there is *emotional water*, water tied to history, power, sovereignty, and control. Finally, there is *spiritual water*, the water used to effect spiritual transformation in faith traditions worldwide. One constraint in dialogue is that Western discourse is extremely well suited to examine aspects related to physical and mental water while often excluding entirely issues related to emotional and spiritual water, even though these latter constructs are often the core of the dispute and provide a wide entry for a diversity of community groups to identify with and contribute to shaping water decision-making. Recognizing and addressing each of these "four worlds" of water can help orient dialogue in a way that balances past and future, justice and mercy, and the needs of individuals with the needs of the basin as a whole. By embracing all four meanings of 'water' in water diplomacy dialogues, complex water heritages, including disparate and cumulative impacts at the heart of water justice issues, find grounds for dialogue and solution building.

## Every generation takes responsibility

The toolkit of *transformative water diplomacy* is not, in its essence, new. Supporting the development of boundary-crossing water communities to inform the enabling environment or social discourse across basin dialogues is informed by a rich legacy of civil engagement and strategic nonviolence. In Gene Sharp's *There Are Realistic Alternatives*, strategic nonviolence is defined as nonviolent techniques applied according to a strategic plan prepared on the basis of a conflict/context analysis – including the strengths, weaknesses, opportunities, and threats of groups alongside capacities and resources (Sharp, 2003).

Contemporary scholarship led by Erica Chenoweth and Maria Stephan has evolved well beyond this understanding, demonstrating the *systemic superior success rates* of nonviolent campaigns and inspiring climate and water-focused movements for sustainable change worldwide. In their groundbreaking (2011) book, *Why Civil Resistance Works*, Chenoweth and Stephan provide detailed empirical data and analysis demonstrating that nonviolent campaigns and movements have a distinct strategic advantage over violent techniques and concluding that nonviolent movements are *twice as likely* to achieve their goals as compared to violent campaigns.

This effectiveness is rooted in practical principles for increasing longevity and turnout, as Roger Hallam, a founder of Extinction Rebellion, explains:

> You have to stay strictly nonviolent. Indulging in violence and aggressive language excludes vulnerable groups – the old and young – from participation. Crucially it has to go on day after day. Like a labour strike you have to impose economic and reputational damage on the opponent over an extended period. Finally, it has to be fun – many more people are attracted to celebratory cultural spaces than narrowly political ones.
>
> *(Hallam 2019)*

Indeed, Chenoweth has gone on to find that while the exact dynamics in any context are dependent on a broad spectrum of factors, empirically, *no government across hundreds of analyzed cases could withstand a challenge for change if just 3.5% of its population was actively engaged in advocating for that change* (Chenoweth 2013). This groundbreaking study established the '*3.5% rule*,' a modest benchmark for critical saturation required for broad social change now found at the heart of many environment and social campaign strategies.

## Strategic nonviolence and transformative water diplomacy approaches

Reaching a critical saturation, that is, *aiming to actively engage 3.5% of the population through boundary-crossing transformative water diplomacy approaches,* has the potential to catalyze the enabling environment for sustainable, resilient, and cooperative management of our world's shared water resources. The toolkit to achieve this objective is rich and adaptable to diverse basin contexts the world over. Robert L. Helvey's summary list of the 198 nonviolent strategies (2004) originally described by Gene Sharp in his seminal work *The Politics of Nonviolent Action* (3 Volumes, 1973a,b,c) provides quick reference to a full range of methods – many with strong relevance to today's water and climate priorities. These methods are generally categorized as *methods of protest and persuasion*, *methods of social and economic noncooperation*, and *methods of nonviolent intervention*.

Methods of nonviolent protest and persuasion are abundant across transformative water diplomacy approaches, benefiting from widespread adaptation of the methods within both the intersecting political/diplomatic and environmental dimensions of the sector. Informal organizations positioned to support public engagement in water decision-making play a significant role in supporting, nurturing, and sustaining public engagement necessary to achieve critical saturation and provide the constituency and community with sustainable decision-making. Methods of social and economic noncooperation are perhaps less visible. However, both as the freshwater scarcity crisis spreads amidst accelerating climate change, and as alternative sources like desalination, wastewater reuse, inter-basin transfer, as well as new sources of water information such as satellite data become readily available, water relations between neighboring states are impacted. Just as some publics have rejected transboundary energy transfers as a signal of social and economic noncooperation, so too could this strategy gain traction in transboundary water dialogues. Sharp's third general category of strategic nonviolent methods relates to methods of direct intervention – psychological, physical, social, economic, political intervention. Many of these are traditional tools of diplomacy and statecraft, with the addition of digital interventions to Sharp's categorization of methods to give space to innovative methods of today's digital landscape. Table 30.1 provides an illustrative sample of transformative water diplomacy approaches methods in real-world contemporary use drawing primarily upon examples from the author's direct engagements.

*Table 30.1* Indicative examples of transformative water diplomacy approaches

| *Method: Formal Statements* | *Examples: Public speeches, letters of opposition or support, declarations by organizations or institutions, joint statements, group petitions …* |
|---|---|
| Joint Statements: During the 2020 Network Forum, the Women in Water Diplomacy Network in the Nile, supported by the Shared Waters Partnership program and its partners, crafted a Network Joint Statement[a] calling for improved inclusion in water decision-making, with specific focus on the importance of enhancing women's roles in decision-making processes to better leverage all available knowledge and experience in the Nile Basin. As the Network grew to include basins across several continents, a Global Network Joint Statement was released as part of the Network's 2022 Global Strategy "A Path Forward for Women, Water, Peace and Security," and subsequently became the foundation for the Women in Water Diplomacy Network's commitment to the UN Water Action Decade.[b]<br><br>A 2013, EcoPeace Middle East convened conference entitled "Rehabilitating the Jordan River: A Commitment of Faith" brought senior clerics and lay faith leaders together from Muslim, Jewish, and Christian communities to learn and share perspectives on the holy Jordan River and jointly endorse the 'Covenant for the Jordan' calling upon regional governments to expedite the cooperative rehabilitation of the shared holy river. | |
| *Method: Communications with a Wider Audience* | *Examples: Slogans, symbols, banners, posters, billboards, leaflets, publications, books, newsletters, journals, journalism, radio (podcast) and television (video) productions, music, and song, earthwriting …* |
| Nile Media Awards: The Nile Media Awards, initiated in 2015, is an activity of the Nile Basin Initiative's Nile Basin Discourse (NBD) that serves to elevate the value of an informed and robust public dialogue around cooperative waters across the Basin through the award of journalistic excellence. The Nile Media Awards encourage self-nominations open to all journalists, including freelancers in the basin and globally. There is no entrance fee, and submissions are made in five format categories: print, digital, photography, radio, and television, and are accessed using agreed upon criteria, evaluated by an international Award Jury made up of experts from partner organizations with specializations in transboundary water cooperation. In 2021, with the support of the Shared Waters Partnership program, the Awards mainstreamed additional criteria adding a gendered lens to the assessment process and awarding a new prize for the best entry from a female journalist, which led to a spike in engagement from the Basin's female journalists as well as citations of women water diplomats in Basin reporting. | |
| *Method: Symbolic Public Acts* | *Displays of flags and symbolic colors, wearing of symbols, prayer, and worship, delivering of symbolic objects, symbolic 'gifts', new signs and names/languages, symbolic reclamations, gestures, establishing new 'holidays' or joint celebration of neighbor's holidays or milestones, unofficial 'passports' …* |
| River/Basin Days: Drawing inspiration from a long tradition of river celebrations such as the Nile Basin Initiative-supported Nile Day, Asfara River Day and other transboundary river days in Central Asia and Afghanistan were recently initiated by the Regional Environmental Centre in Central Asia (CAREC) and partners as part of the Smart Waters project. The festive annual events bring together representatives of the Small Basin Councils, the local authorities, departments of water management, drinking water supply, public and international organizations, young people, members of the community, and media "to strengthen the interstate cooperation and have already become a good tradition for the residents of border communities to mark friendship, good-neighborliness and mutual trust of the parties." | |

(*Continued*)

*Table 30.1* (Continued)

| | |
|---|---|
| *Method: Symbolic Public Acts* | *Displays of flags and symbolic colors, wearing of symbols, prayer, and worship, delivering of symbolic objects, symbolic 'gifts', new signs and names/languages, symbolic reclamations, gestures, establishing new 'holidays' or joint celebration of neighbor's holidays or milestones, unofficial 'passports' …* |
| Blue Passport: An initiative driven by the International Network of Basin Organizations (INBO) and the International Secretariat for Water (SIE ISW SIA) and launched in 2013 for the International Year of Water Cooperation, Blue Passports[c] mark one's own basin residence, providing basin residents with "official acknowledgement of citizen participation in water protection, use, conservation and management. It promotes citizens who take action – individually or collectively – for water at local level throughout the watershed." | |
| The 'Rising Tide' Women in Water Diplomacy Network symbol: Launched alongside the Women in Water Diplomacy Network's Global Strategy at the 2022 World Water Week– a collaboratively designed gold 'Rising Tide clip' is worn by members of the Women in Water Diplomacy Network to bring collective positive visibility to the cause of equal participation and influence of women in water related decision-making. The symbol has since been worn and showcased by Network members and supporters championing the Network's shared objectives at a range of high-level global and basin dialogues bringing attention to the boundary-crossing movement for gender equality in transboundary water decision-making. | |
| *Method: Drama and Music* | *Skits and pranks, performances of music or plays, singing* |
| Songs: Rivers and waters have long inspired a diversity of musical traditions celebrating and honoring shared waters. A contemporary example, the Jordan River Love Song[d] was written and produced by young people from Jordan, Palestine, and Israel involved in EcoPeace Middle East's Good Water Neighbors Programme in 2013 to describe and celebrate a shared vision of a rehabilitated and peaceful Jordan River Basin. The workshops to develop the lyrics, music, and video production supported young people to express their vision of a shared basin despite ongoing conflict in the region. | |
| *Method: Processions* | *Marches, parades, religious processions, pilgrimages, motorcades/bike-cades, boat-flotillas …* |
| Faith-Based Water Ritual and Pilgrimage: Water has profound symbolic meanings in religious and local traditions. Water can symbolize life, liberation, purity, renewal, reconciliation, healing, or regeneration in humanity's diverse faith traditions. As such, water is often incorporated into faith-based and spiritual practices, and water rituals can thus serve as key actions to elevate the values of water. Practices such as Christian immersion in blessed waters in ritual *baptism*, Muslim ritual purification of *wudu*, Hindu pilgrimage to the sacred Ganges to immerse the ashes of the departed in the holy water so that souls might get closer to *moksha*, Jewish symbolic casting-off of sin in the new year through ritual *tashlich*, and many other rituals tie communities closer to spiritual and physical waters. Faith-based and spiritual water-related practices are often embraced as part of public engagement in water cooperation processes in many contexts. Faith leaders, such as those engaged in the Swedish Water House Cluster Group on Water and Faith or participating in the recurrent Water and Faith events at the World Water Week,[e] play an important role in highlighting cultural and spiritual values of water as demonstrated in a rich mosaic of faith-based water rituals and often act as influencing intermediaries to decision-makers. Interfaith pilgrimage and study along shared holy rivers such as the Jordan River[f] have provided opportunities for joint learning, experience exchange, and shared engagement among boundary-crossing communities of faith. | |

*Table 30.1* (Continued)

Notes

[a] Women water leaders from Nile basin states issued a joint statement in 2020 calling for enhanced inclusive transboundary water cooperation, emphasizing the need for decision makers to leverage all available skills and leadership to improve cooperation across the basin and achieve shared goals of sustainable water management and development. For the full statement, see https://siwi.org/latest/nile-women-water-leaders-issue-a-joint-statement/

[b] "A Rising Tide of support for women in water diplomacy" is a voluntary commitment to the United Nations Water Action Agenda by the Women in Water Diplomacy Network, which aims to support improved gender equality in high-level decision making in transboundary basins and enhance women's leadership in dialogues around shared waters, with positive implications for regional peace and security. For the full partnership details and commitments, see: https://sdgs.un.org/partnerships/rising-tide-support-women-water-diplomacy

[c] The Blue Passport is an initiative by the International Secretariat for Water (SIE) and International Network of Basin Organizations (INBO) that provides official recognition of citizen involvement in water protection, use, conservation, and management. Any basin resident who has been involved in water-related actions can apply for this passport, which confirms their status as a "bassinois" (basin citizen) and connects them to a network of water citizen initiatives at the watershed level. For more information about obtaining a Blue Passport, see: https://web.archive.org/web/20140111000433/http://www.sie-isw.org/fr/passeport

[d] Youth from Friends of the Earth Middle East's Good Water Neighbors project - including Israelis, Jordanians, and Palestinians living along the banks of the Lower Jordan River - collaborated to write and perform a song about the River Jordan, demonstrating cross-border cooperation and shared environmental concerns in the region. For the video of their performance, see: www.youtube.com/watch?v=aqnfMfeJgC4

[e] The World Water Week 2021 featured an interfaith virtual city walk where participants made virtual visits to different religious places in Stockholm and around the globe, with faith leaders from Buddhism, Christianity, Bahá'í, Judaism, and Hinduism presenting and demonstrating their faith's water rituals to highlight the cultural and spiritual values of water, aimed at strengthening partnerships between Faith Based Organizations (FBOs) and the water community to achieve SDG 6. For the video of this interfaith presentation, see: www.youtube.com/watch?v=MeyuvdHxPKw

[f] The "Partnering in Good Faith Jordan River Seminar" was organized by the Interfaith Center for Sustainable Development (ICSD) and Friends of the Earth Middle East (FoEME) on March 31, 2014, bringing together Jewish and Christian seminary students and clergy to address the ecological crisis facing the Jordan River, which holds religious significance for Jews, Muslims, and Christians but has lost 96% of its natural flow and now carries sewage and agricultural runoff, inspiring interfaith action toward rehabilitating these sacred waters. For the full account of the seminar and its activities, see: www.interfaithsustain.com/partnering-in-good-faith-jordan-river-seminar/

As can be discerned by the few examples of transformative movement building water diplomacy approaches in Table 30.1, the utility of the methods of strategic nonviolence to impact positively on the enabling environment for transformative water cooperation is only as limited as one's imagination. In all methods, *strategic design focus is placed on inclusion* – enabling many diverse pathways for a broad, intergenerational, and mixed gender spectrum of society to engage in the co-creation of boundary-crossing water constituencies necessary to actively engage a critical saturation, *3.5% of the population*, for sustainable and inclusive water decision-making.

Bringing actors from boundary-crossing water communities around the table together can be a first step but is not in and of itself sufficient to spur transformative change. Strategic planning and facilitation to carefully and safely expose and address issues of power and instrumentalization is critical. In the absence of intentional efforts to address power asymmetries, the status quo and disproportionate burden on vulnerable communities will likely be reinforced and perpetuated. Often state and nonstate actors are brought together in dialogue offering the *illusion of equity*. Even legal power balance can be illusory, such as between Israel and Palestine or between the US Federal

Government and sovereign Tribes. Process support for self-reflection among all actors – including third parties – across boundary-crossing communities can catalyze dialogues. Addressing the *illusion of neutrality* and providing time for self-reflection on one's own assumptions and those of the actors involved in a decision-making process is vital.

## Emotional environment

Without understating the foundational importance of legal context in formally shifting behavior (e.g., tax and regulatory code), the complex emotional context of water diplomacy dialogues is likewise central to navigate to build and support behaviors of cooperative water management. The options available for management of shared waters are analyzed by all engaged through a prism of preexisting beliefs, emotions, and worldviews, processed, and applied to individuals as well as groups. Understanding the emotional context of water diplomacy processes is important to fostering transformative water relationships. No actor is operating in a psychological vacuum and ideology and emotion contextualize values of water. In-group and out-group psychological frames are not static; but they are context specific. Perceptions of others as part of one's own in-group (or not) plays an important role in both personal and intergroup situational assessments, affecting support or dissent for possible decisions and actions. It is with this context that the approaches of transformative water diplomacy are focused on *broadening the space for in-group identification* through trust building informed by the relationships of the decision-makers as individuals and as members of groups.

Boundary-crossing relationships on strategic issues such as water affects cognitive appraisal of events or new information. A member of the Women in Water Diplomacy Network illustrated this point in a 2022 dialogue when she referred to the Network's community of women water diplomats as offering the basin 'early warning among friends,' noting that information and perspectives elevated by other Network members in high-stakes negotiations were afforded a high degree of trust given their joint engagement in the shared Network. In the parlance of political psychology, boundary-crossing communities build intersecting in-group affiliations that interact and inform one's primary individual and group relationships. Despite its complexity, emotional context analysis provides a fundamental opportunity for transformative water diplomacy processes. Implicit and explicit affiliation with different in-groups and out-groups are malleable and fostering a *sense of shared-ness* of both challenge and opportunity, as forged in boundary-crossing water networks and movements, broadens personal and group identities, affecting openness to new information and the emotional prism of information assessment.

## Eroding barriers to listening, hearing, understanding

Understanding the relationship between the individual and the group is vital in process techniques that enhance dialogue, a relationship that can be heavily influenced by culture. In much of the East, for example, direct discussion of conflict is often considered rude, and in some circles, showing anger is seen as a mental disorder. Some Westerners have expressed frustration when conflicts are not dealt with directly, making the process seemingly more difficult and definitely lengthier. In contrast, Diana Suhardiman, a European-trained engineer and social scientist originally from Indonesia, and currently with the International Water Management Institute in Laos, explains the view from her perspective: "In the East, an individual does not exist without their community. It's not that we are avoiding conflict. It's that we are working really hard to retain harmony." Processes that allow for cultural distinctions and promote balance are described in several key

texts, including Rosenberg (2003), Senge et al. (2004), and LeBaron and Pillay (2006). They include, among others (from Wolf 2017):

a The practice of "letting go of ownership" of ideas. One such approach is to explicitly encourage multiple viewpoints on an issue but also to advocate for full consensus for decision-making. Ideas from participants are encouraged, and as they are introduced into the discussion, they are *disassociated* from the individual; there is no ownership. This disassociation is actually advocated as a practice; separating one's ego from one's ideas can be difficult, but it leads to richer conversations. Decisions are then made by consensus if possible, allowing continued refinement of ideas until they are acceptable to all.
b Weighing the positions of the individual with the impacts on the basin. One immensely useful question a facilitator might pose regularly in dialogue is some version of, "If you get everything that you want, what would be the impact on the basin?"
c Active and transformative listening. Listening is one of the most important yet undervalued skills in promoting productive processes, and there are rich sources for learning the art of deep listening. One helpful distinction is between active and transformative listening. The former includes a common set of skills taught regularly in communication and conflict workshops, including paying attention to body language, eliciting information through questioning, repeating main points, using "I" not "you" statements, and talking about the future, not the past. The latter is deeper and more useful when real pain or trauma is present and can be referred to as "*listening from the heart*." Skills are more evocative than strategic, and more about presence than about guidance, and include such approaches as cultivating silence and slowing processes down to allow for reflection.

## Concluding thoughts

Transformative water diplomacy processes are by their nature long term processes which seek to foster boundary-crossing water communities at scale over long periods of time. A growing need for transformative approaches to water diplomacy which engage a critical saturation of the public is felt not only in today's water insecure 'hotspots' in the Middle East, Africa, and Central Asia but across communities the world over addressing complex, urgent water and environmental inequities and challenges. With focus on transformative water diplomacy approaches we can yet foster a critical saturation of engaged communities and decision-makers to act to ensure sustainable water for all for generations to come.

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# SECTION V

# Perspectives



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# 31

# THE UN WATERCOURSES CONVENTION AND ITS RELEVANCE TO WATER DIPLOMACY AND NEGOTIATED AGREEMENTS

*Alexandra Campbell-Ferrari and Luke Wilson*

**Key takeaways**

- Binding customary international law and the UN Watercourses Convention provide basic guidelines for managing shared waters but will require negotiators to develop clearer, more measurable commitments within any transboundary agreement; negotiators should use the Convention as a starting place but be creative and thoughtful in their own right.
- Domestic water law and environmental law matter to transboundary agreements: knowledge and acknowledgment of each other's powers, responsibilities, and limitations under their respective domestic law are key to creating transboundary negotiated solutions that can be and will be implemented domestically.
- Clarity of key terms is critical for ensuring States are on the same page: terms such as "equitable" and "reasonable" should be clearly defined so that each country is applying the same principles within their respective countries, increasing the likelihood that an equitable and reasonable distribution of water resources will result.
- While transboundary law is being negotiated, countries should evaluate and strengthen their domestic water laws as stronger domestic water laws will support the implementation of transboundary water obligations.

## Introduction

International diplomacy relies on agreements between countries to memorialize and formalize the commitments that States make to each other. With these agreements, the high-level policies are set and States are able to create enforceable accountability under the rule of law. Many of these agreements—which are almost always formal legal agreements known as treaties—create bilateral or tripartite relationships. Sometimes the agreements are regional or multilateral, showing greater consensus and creating a greater impetus for broad implementation and diplomatic enforcement.

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Bilateral agreements tend to have a greater specificity and negotiators often can work more effectively; multilateral and regional agreements tend to be more foundational, laying out rules that are broadly accepted—usually those developed in customary international law—and moving States forward incrementally from there. Multilateral conventions can serve as a starting point for future agreements and negotiations by States, providing useful guardrails and touchpoints for negotiations.

In international water law, the UN Watercourses Convention seeks to provide a foundation for negotiating agreements. The Convention reflects the work of the International Law Commission—the UN's legal think-tank—and the broad approval of the UN General Assembly (UNGA) after input from the UNGA's Sixth Committee (Legal Committee), even though only 37 countries have accepted its obligations as binding. Some of the rules in the treaty, those built on customary international law, are technically enforceable outside of the scope of the Convention at the international level. For the most part, however, the Convention was developed to create a basic framework for the protection and management of watercourses shared by multiple States. This was noted by the International Law Commission when they submitted the draft articles of the Convention to the General Assembly:

> [This approach] takes into account the difficulty, as revealed by the historical record, of reaching such agreements relating to individual watercourses without the benefit of general legal principles concerning the use of such watercourses. It contemplates that these principles will be set forth in the framework agreement.
>
> *(ILC, 1994)*

As this quotation notes, the Watercourses Convention was intended to be the starting point for negotiations between States parties with a flexible framework that could be tuned to the specifics of any specific watercourse (Convention, Art. 3(3)). Notably, this framework was intended to be applied between "States parties," those States who had accepted and ratified the Convention. This framework's vision was to create a common starting point for negotiation and for agreements to reduce the barriers between States that might derail negotiations. This, in turn, would allow for deeper and more effective development of rules for specific watercourses.

Primarily, the Convention was intended to mandate cooperation and preserve the rights of States along a shared watercourse, particularly downstream States. Because of this, the provisions are aimed at preventing pollution, adulteration, and overutilization of water. The treaty also provides specific rights and remedies for various situations, including emergencies, and creates dispute settlement options when a State believes its rights have been infringed. The language of the treaty is not shy, and many of the provisions are cast as obligations that "shall" be followed. This mandatory language exists both in the broader substantive provisions—mandating equitable use and prevention of significant harm—and also in those provisions that are more procedural—harmonization of laws and practices, cooperation in developing utilization and conservation plans for watercourses, and joint action in emergencies. It is likely because of the concrete obligations, which empower all States along a watercourse to command action and cooperation, that the treaty has not been widely ratified. Additionally, the final Convention elevated and expanded a carve-out from the Convention's applicability that limits the Convention's application where a preexisting treaty or agreement exists, including those created under colonial rule or prior to knowledge of climate change and other environmental threats (Convention, Art. 3(1)). For those Watercourses where utilization and usage were previously defined in treaties, like the Indus or the Nile, the

Convention would not set aside the preexisting regime. The Convention is intended to set a path for States to build watercourse agreements, not to create the regime necessary to address the unique problems basins face.

In its most optimistic reading, the Convention removes the power differential that naturally exists between upstream and downstream States. The treaty attempts to set out ideals of cooperation, equity, and sharing, but it does not create a mechanism for enforcement. In essence, the same power differential exists between States whether they negotiate as Convention signatories or not. Upstream states will still have primary command and control over what water flows in a watercourse to another State or how the water in their own territory will be used. This is in part because equal sovereignty of the States over territory does not translate to equal sovereignty over a transboundary water. While States may be equal in other ways, the natural origins and flow of most transboundary waters defines a relationship that is inescapably unequal. One State will always get the water first. This inherent power dynamic will not change unless the upstream State willingly yields their right to decide how the river is used, managed, and protected to an external or neutral body. The treaty valiantly uses equitability and reasonableness and the prohibition on significant harm between countries to try to rebalance the scales. But it cannot change the overall inequity and unreasonableness of the natural world, nor does it try to do so. The treaty, instead, acts more as a safeguard against extremes, against cruelty and negligence by the more powerful States. In essence, the treaty cannot challenge the natural sovereignty that States have over a resource; in the end, it does not try to. For negotiators, this means that the treaty does not provide a foothold for them to compel or demand. Instead, it creates a simple foundation on which an agreement can be built, with success or failure determined mostly by factors extrinsic and external to the watercourse itself.

Since its adoption, the treaty has struggled to gain widespread acceptance among States and in legal tribunals. Just over half of the General Assembly voted for the Convention when it was presented for signature and ratification. The Convention has not fared better in international tribunals. The International Court of Justice, in particular, has often turned to customary international law and ignored the Convention (*Pulp Mills, 2010; Construction of a Road in Costa Rica Along the San Juan River*, 2015). When it has cited the Convention, it has limited itself to stating that equitable and reasonable utilization are reflective of customary law (*Gabčíkovo-Nagymaros*, 1997; *Dispute over the Status and Use of the Waters of the Silala (Chile v. Bolivia)*, 2022). In one case where the Court did address the relevant rules of the Convention, the results did not bolster the Convention's status. The Court found that Article 11 of the Convention, which requires Parties to the Convention to share information, consult each other, and negotiate to address potential impacts prior to implementation, is not binding on non-Parties to the Convention (*Chile v. Bolivia*, paras. 110–112). Additionally, the Court found that Article 12, which requires notification and information sharing before actions that might cause "significant adverse effect" on another State, did not create a "more rigorous" obligation than that contained under customary law and found that "the general obligation to notify and consult [under customary international law]" is a requirement defined "in [the Court's] own jurisprudence," ignoring the Convention (*Chile v. Bolivia*, paras. 113–118). The Court's judgment suggests that the Convention does not add much to customary law obligations. The Court did, however, use the Convention as evidence that international watercourses create "the basis of a common legal right" among riparian states that allows for equitable and reasonable use of that watercourse not "in an abstract or static way, but by comparing the situations of the States concerned and their utilization of the water at a given time" (*Chile v. Bolivia*, paras. 97–98).

In all, while a few of the Convention's rules are obligatory for non-Parties, the Convention itself can be used as a framework for negotiations or agreement between States—whether Parties or not. The Convention is a starting point for an agreement. States can choose to write an agreement that ignores, sets aside, or enhances those rules. While the Convention's rules are strict and use strong, mandatory language, Article 3(3) allows States to "apply and adjust the provisions of the present Convention to the characteristics and uses of a particular international watercourse or part thereof." This plainly means that any watercourse agreement developed under the strictures of the Convention can set aside any or all of the provisions of the Convention if that is desired by the parties. This potential set-aside would seem to include even the most core provisions of the regime—on equitable and reasonable use and the prevention of significant harm. Even when faced with two parties to the Convention, the Convention allows those parties to create a regime that is diametrically opposed to the Convention. As a result, the Convention serves as merely a roadmap for States, a set of common principles that fill the gaps when there is no agreement or an under-developed agreement. For non-parties or parties who wish to take a different approach in creating an agreement, the Convention serves as a reference point as the negotiations begin, providing options, not obligations. Negotiators will have to take the Convention and convert it into binding, active law that addresses the dynamic realities and challenges of each shared watercourse. We now address how that transition might be accomplished.

## How to use the UN Watercourses Convention

Transboundary water resources should be governed by shared principles and rules. A shared rulebook ensures equity and fairness despite differences that would allow one country to maximize their use of a shared watercourse at the expense of another country. This also ensures countries properly manage the waters within their borders. For signatories, the UN Watercourses Convention creates a starting point for determining how shared watercourses should be governed.

An ideal international framework convention for shared watercourses should include broader rules that govern the use of shared water resources *and* a dispute resolution mechanism. This Convention establishes general rules to govern how watercourse States should use the water within their territories, a broad obligation to do no harm, requirements for data and information sharing, and suggestions for how to resolve disputes. The Convention sets out general guidelines and principles, but without the level of detail or specificity needed to fully inform how shared watercourses should be governed. The UN Watercourses Convention does not provide specific enough guidance on its own to simply be applied by negotiators. The Convention instead offers an important starting place and a general direction for establishing shared governance. Therefore, while the Convention creates a broad philosophy for how shared waters should be governed, negotiators will be required to fill in the gaps.

In the sections that follow, we walk negotiators through select sections of the Convention and identify where additional clarity and detail is necessary to ensure that countries develop a truly shared understanding of how their shared watercourse should be managed and governed.

### *Equitable and reasonable use*

The Convention sets forth a broad standard for determining how shared waters should be used by watercourse States, meaning negotiators will play a critical role in clarifying key terms that determine what usage of shared water resources is acceptable:

> Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse.
>
> *(Convention, Art. 5(1))*

First, the Convention addresses water use within each watercourse State, but does not address the broader concept of apportionment between the States. Because the amount of water in a watercourse is finite, the equitable and reasonable decisions in one country may not necessarily guarantee equity in the broader basin. A country can equitably and within the bounds of reasonableness allocate and use water within its own boundaries, and at the same time unfairly limit or reduce the amount of water available to other countries within the basin. Therefore, negotiators should set a standard by which to apportion the water between Parties or determine when a country has used more water within the basin than is fair and equitable.

Negotiators will have to determine how the water resources of the shared watercourse should be equitably apportioned or shared between the watercourse countries. A negotiator will need to identify the different factors and criteria necessary to determine how the waters should be shared between countries and whether a country has used more than its fair share. The negotiator will have to create a standard that both acknowledges current usage, yet creates space for the future, allowing for both predictability and flexibility in light of changes in need, use, and water resource availability. The apportionment standard adopted should take into consideration the current uses, and people and needs dependent on that water, while simultaneously ensuring that current uses do not forever dictate future availability or use. For example, where a country has used 65% of the water in the basin for decades, that country will likely expect that they should be able to continue using that amount of water in perpetuity. In some circumstances it may be equitable to allow them to continue that use—if they do not have alternative sources while other States do, if their population depends on those water resources for basic drinking water and domestic/household purposes, and if the water is being used efficiently. It will be important to ensure that the apportionments between watercourse countries are predictable, flexible, and changeable, without being limited to historical use.

There is also an inherent competition in Article 5 between the "equitable and reasonable use" doctrine, and the requirement that States "attai[n] optimal and sustainable utilization thereof and benefits therefrom." This requires that States fully develop or utilize water resources, which encourages development and reliance on that water. Development, once begun, can be painful to stop or unwind, particularly if what constitutes "sustainable utilization" changes over time. For negotiators, this means domestic laws and policies on development, conservation, and management are even more critical. States are encouraged to maximize equitable resource usage, but this can create economic inertia that binds negotiators in the future. This language can create a tension that requires negotiators to think about their own State's use in the context of the watercourse and all the people who use it, of greater societal needs, of the protection of the watercourse, of the need for optimal utilization, all with an eye to the present, the past, and the future (crystal ball not included). It is a challenging task.

Second, the Convention's operative terms need greater definition by negotiators in order to ensure a shared understanding of how water resources are to be governed and shared. Terms such as equitable, reasonable, optimal, sustainable, and adequate protection define broadly what is theoretically expected of watercourse States, but are not actually defined expressly, leaving their

meaning open to interpretation. Understanding and defining what these terms mean is necessary for creating mutually accepted expectations.

Negotiators will need to clearly define "equitable and reasonable use" and other key terms as an anticipated result in an agreement. The Convention says that equitable and reasonable use is defined by taking into account "all relevant factors and circumstances," including, but not limited to, the six illustrative criteria that are explicitly listed in the Convention, and weighing the factors based on their importance in comparison with that of the other factors (Convention, Arts. 5–6). These factors—including hydrological and climatic factors, social and economic needs of the States, the population dependent on the watercourse, the impact of use in one State on another State, among others—allow the States to evaluate the uses fairly broadly and comprehensively. The inclusion and evaluation of these factors is subjective, necessitating that negotiators conceptualize an objective metric, outcome or result to ensure compliance. For example, an objective outcome could be that no State's use endangers the availability of sufficient water resources within the basin to meet the drinking and household water needs for the existing and projected population.

Additionally, the Convention leaves it up to the negotiators to define the parameters of the evaluation, to use the results, and to get the other States to accept limits based on these evaluations. For example, what if a current or anticipated use is determined to be unreasonable? How is the process to evaluate these uses triggered, and how would an unreasonable use be addressed? For this term to be meaningful, it should result in action, and the negotiator will be responsible for defining the processes, the metrics, and the responses in the agreement.

At its core, equitable and reasonable use should allow each country to share in the water's benefits. Such use should ensure that household domestic needs are met, that sufficient water resources are set aside through the maintenance of environmental or minimum flows to protect the surrounding environment and ecosystem, which will allow the watercourse to remain healthy and viable, and that the use of the water resources does not threaten or diminish the watercourse's existence or use for other purposes. Equitable and reasonable use also means that the value of the water is maximized, which requires water efficiency and the elimination of water wastage. To ensure that a meaningful result is reached, negotiators will need to define the needs of their country in a holistic and multigenerational way to pave the way for an effective discussion on equitable and reasonable uses. The first step is collecting the data, and the second is honestly sharing that data.

Water agreements must strike a difficult balance between clarity, predictability, and flexibility. Climate change is not mentioned in the Convention. However, we know that climate change impacts the availability of water resources from a quantity, quality, and timing of availability perspective. Some uses might need to be curtailed; new uses now might be unadvisable. Negotiators will have to carefully consider the impact of climate change and determine whether that impacts the equity and reasonableness of water uses. Negotiators should also include a provision, which requires independent periodic reviews of how resources have been shared. Such periodic reviews help to anticipate future challenges or shortages and provide space to plan accordingly. This may prevent future conflicts.

### *Relationship between different kinds of uses*

In light of Sustainable Development Goal (SDG) 6 and the worldwide commitment to ensuring universal access to safe drinking water, those negotiating a treaty for shared waters should ensure that treaties clearly and unequivocally prioritize the use of water for domestic, household purposes above and against all other uses. According to the Convention, "In the absence of agreement or custom to the contrary, no use of an international watercourse enjoys inherent priority over other

uses" (Convention Art. 10(1)). Where there is a conflict between uses, the Convention requires "special regard [be] given to the requirements of vital human needs" (Convention, Art. 10(2)). Negotiators are in the perfect position to ensure that agreements between countries prioritize water for drinking and household purposes such as hygiene, cooking, and subsistence farming in all circumstances, at all times.

It will also be important for negotiators to include clauses that consider changing circumstances. For example, if there is a drought and the availability of water resources declines, certain water uses may be prioritized where in normal conditions such priorities need not exist. Similarly, population growth should be tracked and considered in negotiations. Together with periodic reviews of the equity and reasonableness of uses, such additional measures can ensure that relations between countries remain strong and challenges anticipated.

### *Prevention, reduction, and control of pollution*

The Convention directs countries to individually and jointly "prevent, reduce and control" pollution. The Convention states:

> Watercourse States shall, individually and, where appropriate, jointly, prevent, reduce and control the pollution of an international watercourse that may cause significant harm to other watercourse States or to their environment, including harm to human health or safety, to the use of the waters for any beneficial purpose or to the living resources of the watercourse. Watercourse States shall take steps to harmonize their policies in this connection.
>
> *(Convention, Art. 21(1))*

Negotiators should encourage countries to adopt shared and cooperative commitments to pollution prevention which can help build trust between States. This requires clear, shared expectations for pollution prevention and a mix of activities and rules to meet those expectations. First, preventing versus reducing or controlling pollution requires different levels of commitments. Preventing pollution requires adopting measures that will prohibit pollution from being introduced at all. Measures to reduce and control pollution, instead, simply reduce the amount of pollution that can be introduced into the watercourse. Clear expectations and shared goals help enhance equity.

Second, without shared goals, the pollution prevention efforts can be undermined. For example, a downstream State might be effectively reducing or even eliminating the release of nitrogen into the watercourse. But if an upstream State does not create and enforce the same nitrogen standards, every effort will be undermined. The upstream–downstream dynamic of rivers means it is even more important for negotiators to ensure that the rules go beyond harmonization to create shared pollution prevention goals and standards, and accountability measures. Third, negotiators will need to define "pollution" and the sources of that pollution governed by the treaty. Most water quality laws define pollution and create systems to identify and regulate contaminants. At the treaty level, negotiators should build consistency in the contaminants regulated into the agreement.

Also, negotiators should include a clear timeline for when pollution prevention measures must be met. Pollution control is largely a factor of law, technological availability, and financial resources. The law can prohibit the release of pollution. But if the technology does not exist to treat the wastewaters of certain commercial or industrial processes, or if the technology is prohibitively expensive, this can cause problems. Therefore, it will be important for a negotiator to help countries to create a manageable compliance timeline. The timeline can reflect a phase-out and gradual tightening of restrictions on the release of certain types or all pollutants. By harmonizing action

through the development of cooperation and shared commitments, oversight, and accountability, the goals of these treaties can be better realized.

### *Obligation not to cause significant harm*

Based on the Convention, watercourse states are required to "take all appropriate measures to prevent the causing of significant harm to other watercourse States" (Convention, Art. 7(1)). Negotiators should understand the international law interpreting this provision and ensure that the policies and practices adopted surrounding equitable and reasonable use and pollution prevention realize countries' commitment to not cause significant harm. It will be important for the negotiators to detail what types of "appropriate measures" are expected to be taken, while also clearly defining or creating mechanisms to define significant harm. Clear standards ensure that expectations are aligned and that countries are working together toward achieving the same goals and outcomes and are accountable to the same standard. While the Convention does not clearly define "significant harm," customary international law has defined a few case-specific examples. Having a few examples does not release negotiators from defining that threshold, as the meaning of this term under international law is very case-specific and tends to define the floor instead of the continuum. Harm will impact each watercourse differently, making "significant harm" a watercourse-specific standard. It is incumbent on negotiators to fully understand their river, and to clearly define what "significant harm" entails, instead of leaving it to customary international law's case-by-case definitions.

### *Management*

Negotiators can help countries develop a stronger agreement by including a commitment to oversee the management of the shared watercourse. One of the most effective ways is to create an independent and empowered international joint commission to perform this shared management role. The Convention states: "Watercourse States shall, at the request of any of them, enter into consultations concerning the management of an international watercourse, which may include the establishment of a joint management mechanism" (Convention, Art. 24). Establishing a joint commission within a watercourse treaty creates a baked-in support structure for implementing the negotiated agreement and should be considered strongly by negotiators.

Countries have every incentive to maintain the full scope of their sovereign authority, even where it is in their best interest to let go of some of it. Downstream states will be the most likely and willing to hand over some of their sovereignty to a commission; an upstream state will be less likely to diminish its power. But for both upstream and downstream states, the rewards can be tailored. The scope of authorities and responsibilities of the commission can be shaped to serve an important and authoritative role in administering the treaty or more of a review and reporting role. Shared rules set the foundation for a shared understanding of what can and cannot be done within the basin. However, a commission plays a critical role in overseeing the management and protection of the basin on behalf of the broader basin rather than the independent countries' interests. For example, the negotiator can position the commission to collect, review, and evaluate data and information about the basin and to create forums to discuss the data analyses and day-to-day challenges faced by watercourse states. Alternatively, the commission can be given greater oversight and management authority, including the approval of projects that have an anticipated impact on the basin. The commission can be empowered to draft regulations that help to implement the

rules and to both arbitrate disputes between watercourse states and bring actions where the watercourse states are not complying with the rules. The negotiator plays an important role in crafting the design and structure of commissions in watercourse agreements, and ensuring a commission is included as a critical, central institution within the treaty.

### *Dispute settlement*

The Watercourses Convention creates a permissive dispute settlement procedure that mirrors the basic dispute settlement procedure under international law. Under the Convention, States are asked to "buy in" to most of the Convention's dispute settlement procedures (Convention, Art. 33). As States can also generally opt in to dispute settlement procedures, like international arbitration or the International Court of Justice, on a broad or case-by-case basis for all international disputes, the Convention does not add anything to the obligations of States. For signatories, the Convention does create the structures of a mandatory fact-finding commission—essentially an *ad hoc* international arbitral body, without the power to bind the parties to follow its decision—if a dispute cannot be settled by negotiation. Negotiators will need to consider the likelihood of disputes and the existing dispute settlement options and structures that might limit or guide the parties. These existing options should be closely considered while considering the creation of any new institutions.

## Building the domestic law necessary to support the implementation of a treaty

The success of negotiating the treaty as well as implementing and enforcing the treaty also depend on the national law of the country. National law reflects the values, priorities, and commitments of the national government. Existing national laws provide other countries and negotiators with insight into a country's approach to water management and protection. Parties can see the rules that a country has adopted, providing perspective on the timeline of compliance, the stringency of the rules and expectations on different actors, and the types and scope of rules. They can also see the processes that have been put in place to adopt implementing regulations and to enforce the rules, including any institutions that have been formed to adopt the regulations and enforce the rules. Examining and understanding the existing laws and rules of countries provides an important perspective on where and how negotiating parties' approaches are different or similar and where it may be easier or harder to reach an agreement on a treaty for shared waters.

Given that management of shared watercourses largely depends on the independent internal actions and activities of the watercourse states, it is important that national law and the rules of the treaty align. The Convention largely makes managing and protecting shared waters up to each individual country. Therefore, it is critical that each watercourse state have national laws that enable and support the achievement of the treaty. This means having laws that:

1 Enable and require equity and non-discrimination,
2 Identify clear responsibility for achieving the purposes of the law,
3 Have as a clear purpose the prevention of pollution,
4 Have as a clear purpose proper water resource management and use,
5 Clearly designate enforcement power, and
6 Set meaningful penalties and consequences for violations of laws and regulations.

Each of these elements make it possible to achieve water security, the broader objective of any treaty governing shared watercourses, and any national laws governing water resources and water, sanitation, and hygiene (WASH). Laws missing one of these elements will be less effective in governing water resources and achieving water security and could make it easier or harder for countries to cooperate. For example, if one country manages contamination from all sources, nonpoint source or point source, while an upstream state explicitly prohibits regulation of nonpoint sources such as farms, the upstream state is likely to resist treaty requirements that reduce or eliminate pollution from nonpoint sources. In this example, the domestic legal limitations will prevent compliance at the international level, leaving only voluntary measures to control diffuse pollution. The international law and domestic law regimes are interconnected when it comes to water and must be developed in tandem for either regime to work.

## Conclusion

While the Watercourses Convention creates a basic foundation for negotiations—one that is stronger for signatories compared to non-signatories—negotiators will have to do a lot more work to create an effective agreement. While international law can be used to rebalance natural inequities, the law must be used effectively by negotiators to create agreements that will protect water for each State, and their denizens, for the future. The Convention is a tool that helps set out some of the basic principles, essentially guidelines and guardrails for negotiators. On its own, it is insufficient to address the needs of the complex agreements that need to be struck. It is up to negotiators to use it to address growing demands made on water by States, development, and the multivariate threats faced by water today. The Convention helps create signposts for the components of an agreement.

Overall, the Convention does not create a sufficiently robust normative framework that limits States in what they can do in international watercourses. But this reflects the desires of States. The Convention is not more prescriptive because States want maximum flexibility when it comes to water. For the Convention to work, it has to be seen as a starting point: step one. From here, States must agree that they cannot exploit water as they have—even if they are an upstream State—instead, they must understand that shared watercourses must actually be shared and coordinate efforts to maximize water's usage and utility. This is a massive challenge. Concerns about food security and economic security will almost always force States to make the self-interested choice that best protects their people. Despite the potential consequences externally, a country's needs will always be the State's primary obligation. In order to be effective, water diplomacy has to become about creating shared systems that are entwined. States have to learn to rely on each other when utilizing water, and to be willing to rely on the law to protect them from potential vulnerability. Additional conventions and cooperation can be a key to protecting States and creating a world—and environment—where they are able to cooperate openly, fully, and without reserve. It requires trust, it requires acceptance of and adherence to the rule of law, and it requires smart and dynamic law that can be used to build bridges instead of barriers.

Until then, countries need to take the initiative to review and revise their water laws. Where they do not have a water law—which many countries do not—they must write them. Where they have water laws and they are insufficient to guarantee water security, they must rewrite them. Rules are the foundation of any effort to achieve water security and universal access to water and sanitation. The rules established by countries to govern the actions and activities within their own borders set a tone for international commitments. Where countries adopt clear rules that effectively limit the release of pollution, that fairly, equitably, and flexibly allocate water resources, that create a system of accountability for those who do not comply with the rules, and that requires greater

monitoring and transparency, we will see a shift in international commitments. With the intensifying threats to water availability and access, countries must take the initiative to develop strong water law frameworks that also support and enable the development of transboundary agreements.

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# 32

# GROUNDWATER DIPLOMACY

## Addressing unseen but essential water resources

*Alice Aureli and Karen G. Villholth*

**Key takeaways**

- Groundwater, which comprises 98.7% of Earth's unfrozen freshwater, is critically important for water security and climate resilience but has been historically overlooked in water diplomacy efforts compared to visible water bodies like rivers and lakes.
- There are 468 identified transboundary aquifers globally that require cooperative management, but diplomatic frameworks for groundwater are still in their infancy, with only limited agreements in place despite growing exploitation and potential conflicts.
- The international community has made significant progress through initiatives like the Draft Articles on the Law of Transboundary Aquifers and regional cooperation mechanisms, but countries need more science-based, proactive, and adaptive diplomacy approaches to prevent resource degradation and ensure equitable sharing.

### Introduction

This chapter highlights the growing significance of unseen water resources, especially groundwater, for water security, resilience, and economic development planning. It discusses the emerging field of water diplomacy concerning transboundary groundwater and aquifers, which has been historically overshadowed by visible freshwaters like rivers and lakes.

While conflicts and disputes over groundwater are currently limited, the chapter emphasizes the need for science- and evidence-based, proactive, and adaptive diplomacy in dealing with this resource due to incomplete knowledge and uncertainties. Countries are urged to engage in proactive assessments and transboundary cooperation to prevent overexploitation and resource degradation.

The chapter also stresses the integration of transboundary aquifer cooperation with diplomacy on visible waters to maximize solution opportunities and societal benefits. Protecting the rights of marginalized communities dependent on vulnerable groundwater systems is deemed critical.

Furthermore, the international community has made significant strides in supporting transboundary water cooperation, with efforts such as systematic aquifer mapping, assessments, multilateral agreements, and international legal instruments. These initiatives align with the UN's


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2030 Agenda for Sustainable Development, fostering global cooperation and communities of practice around unseen water governance.

Overall, this chapter highlights the growing importance of groundwater diplomacy and the international community's efforts to accelerate progress in sustainable management of unseen water resources.

## Definition of "unseen" water

"Unseen" or "invisible" water (SIWI, 2022) is a term covering freshwater resources often overlooked in water diplomacy and water governance, namely groundwater, soil water, water vapor (or atmospheric water), and virtual water. Water diplomacy has traditionally been dedicated to the visual components of water resources, such as rivers, lakes, and wetlands. We argue in this chapter that the unseen types of waters are in need of increased consideration in water governance, at local to transboundary and international level. The rationale for this is the following: (1) These invisible resources comprise large fractions of the total freshwater on Earth, in combination about 99% of the total freshwater resources (Table 32.1), unequivocally the largest being groundwater; (2) These resources are increasingly relied on for human development; (3) These resources are intricate and interactive components of the natural water cycle; (4) These resources are mostly left out of current water management and governance frameworks, particularly in international, regional, and transboundary frameworks; and (5) Bringing these resources into the "governance mix" holds the potential of immense benefits, in terms of addressing sustainable development goals (SDGs) associated not only with water (SDG 6) but also significantly with aspects of peace and security among nations (SDG 16).

The objective of this chapter is to present an account of the need for, the progress, challenges, and risks, and a way forward on unseen waters in water diplomacy and broader diplomacy efforts. To complement a general synthesis, key lessons from cases around the world are briefly brought forward to illustrate the subject matter and the diversity in contexts. To devise needed recommendations to pressing challenges, the chapter focuses on groundwater (and the underground natural geological reservoirs – aquifers) in a multilateral context.

## Background and need to address diplomacy in groundwater resources

Groundwater is increasingly recognized as a key factor, *and* potential constraint, to human and economic development and climate resilience (UN PGA, 2023; UNESCO and UN-Water, 2022). This apparently contradictory assertion is at the core of groundwater governance, indicating that

*Table 32.1* Volumes of invisible water in the global water balance

| *Invisible water component* | | | *Reference* |
|---|---|---|---|
| *Storage* | Volume ($km^3$) | Fraction of total global unfrozen freshwater (%) | |
| Groundwater | 10,500,000 | 98.7 | USGS (2018) |
| Soil water | 16,500 | 0.15 | USGS (2018) |
| Water vapor | 12,900 | 0.12 | USGS (2018) |
| *Flow* | Flux ($km^3$/yr) | Fraction of total global runoff (%) | |
| Virtual water | 2,720 | 5.8 | D'Odorico et al. (2019) |

groundwater holds a particularly important potential to support resilient, sustainable, and healthy societies, economies, and ecosystems, but at the same time, the way in which it is currently utilized may imperil the long-term sustainable use of the resource, with broader and detrimental ramifications. Today, half of the global population drinks groundwater; a growing share of global food production, currently about half, is grown with groundwater through irrigated agriculture; and industries and mining rely on groundwater at unprecedented levels (UNESCO and UN-Water, 2022). The resource provides fundamental water and food security and climate resilience across the globe, and particularly in arid and semi-arid regions.

It is important to recognize that largely due to its unseen nature and gaps in early technological advances, groundwater was only developed, at any significant measurable scale, relatively recently compared to the seen resources, jeopardizing a commensurate attention in terms of governance (Villholth and Conti, 2018). Compounding this are other critical inherent factors of groundwater, which are incidentally also its key assets in terms of providing widespread and reliable services to both humans and nature, namely:

1. Its distributed and open-source character (providing water to populations across practically any landscape – but being difficult to manage);
2. Its large storage and long residence times (providing stored water in times of drought – but overexploitation and pollution may become apparent only after extended times); and
3. Its intricate connections and interactions with other water and ecosystems (critically maintaining wetlands and river baseflows, especially in droughts – but vulnerable to, for example, seawater intrusion in coastal areas).

What is to be gained from this background and these pervasive facts? Essentially three points, and requirements, are central here:

1. Explicit recognition of the immense benefits, but also potential risks of growing uncontrolled reliance and human impacts on groundwater;
2. Developing the information that builds the case for groundwater attention in water governance, which also helps assembling the facts and figures needed for its management; and
3. Addressing groundwater explicitly in diplomacy, at local/sub-national, national, and indeed transboundary level.

Basically, these are the ingredients of making groundwater "visible," and even more importantly, "seen" as part of the puzzle to achieve sustainable, effective, and equitable water management (UNESCO and UN-Water, 2022).

Beyond emphasizing the need to properly consider groundwater and its aquifers in water governance, it is important to promote *conjunctive* management approaches that integrate surface water, groundwater, and other water sources. Most nations, regions, and communities rely on multiple water resources either simultaneously or sequentially (Bisht, 2023; UNESCO, 2020; Lautze et al., 2018).

The benefits of bringing groundwater on board water diplomacy, at par with surface water and looking at conjunctive management, are the following:

1. Water conflicts that entail groundwater and aquifers can be preempted and avoided.
2. The basket of opportunities for addressing water scarcity, degradation, and water-related disasters is expanded when all water resources (visible and invisible) are brought into the

solution space, providing more win–win options to water quality and water-quality issues for the implicated stakeholders. This is particularly the case, when surface water and groundwater can be used in planned ways so that water demands are addressed from a broader, conjunctively managed pool of water resources.
3. A better accounting system for all water resources, and avoiding double accounting of connected water resources (Evans and Evans, 2013), enables a more sustainable and fairer utilization and distribution of benefits of the resources.
4. Climate change impacts on water resources, both short term, in terms of floods and droughts, and longer-term climatic shifts, can better be addressed as part of adaptation and resilience building.
5. Population growth and urbanization, often associated with increasing populations in coastal and other fragile environments, can better be addressed. Targeting marginalized communities, often relying on shallow and vulnerable groundwater resources, needs to attract specific attention.
6. Transboundary frameworks (legal and institutional) for water management that incorporate groundwater can support multilateral water security, peace, and stability across shared aquifer and river basins. Identifying the possible options and shared benefits, as part of broader water diplomacy, is key.

Conversely, not integrating unseen waters into the solution mix for sustainable and resilient development carries significant risks, in terms of undermining various resources simultaneously, often disproportionately affecting the environment and the more vulnerable and poor communities (Schaider et al., 2019; Hoogesteger, 2022), which could spark social unrest and diplomatic crises.

In the following section, the current global, regional, and transboundary initiatives and supportive frameworks and tools related to diplomacy and cooperation on shared groundwater are addressed, while the subsequent section takes us into specific cases from around the world.

## Cooperation on groundwater and the need for diplomacy

### *Transboundary aquifers*

More than three billion people depend on water that crosses national borders. These internationally shared waters, here termed transboundary water, account for 60% of the world's freshwater flows (United Nations Economic Commission for Europe [UNECE], 2022). Most of the transboundary water resources are contained in the aquifer systems that lie invisible beneath our feet.

An aquifer can broadly be defined as an underground geological formation containing groundwater and is considered a transboundary aquifer (TBA) when "parts of it are located in different States" (UNILC, 2008). Transboundary aquifers can extend from a few to over a million square kilometers and from tens to several thousand meters in depth. The specificity of managing these systems is contingent on the institutions in place and of relevance to international law. From a technical point of view, there is no difference in the way in which the characteristics of the aquifer are investigated, whether entirely within national borders or in a transboundary context. The difference lies in the fact that groundwater flowing in transboundary aquifers potentially crosses an international border between two or more countries. Consequently, the dynamics of groundwater flow, direction, and quality need to be monitored and understood carefully, as modifications induced by human activities in one country may affect the aquifer in the other country potentially generating disputes and conflicts (UNESCO, 2001). For example, the top panel in Figure 32.1

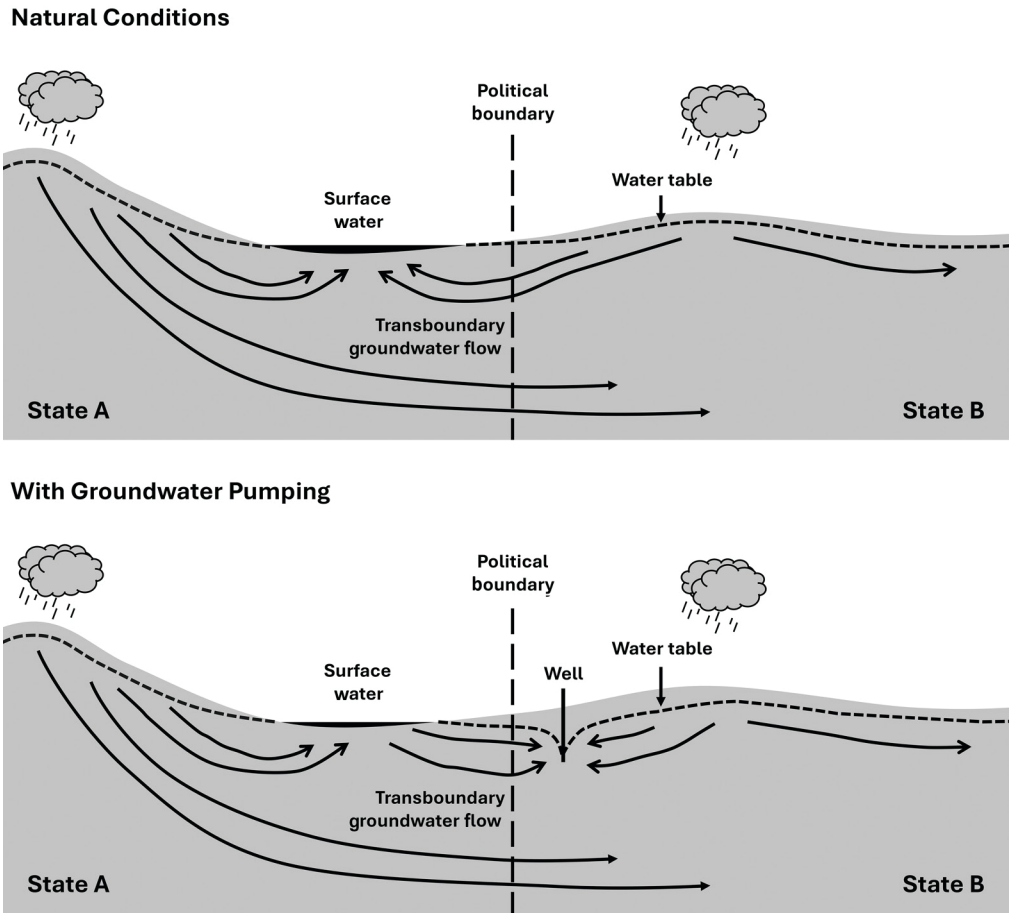



*Figure 32.1* Simple schematic illustration of groundwater flow in a transboundary aquifer and the effects that abstraction of groundwater can have across borders.

shows a schematic illustration of natural conditions where transboundary groundwater flows may occur in different directions at different layers. The bottom panel of Figure 32.1 shows a simple illustration of how the abstraction of groundwater through pumping can lower water tables and reverse flows across political borders.

### *The need for diplomacy*

Recent studies conducted by UNESCO and the International Groundwater Resources Assessment Centre (IGRAC) have identified 468 transboundary aquifers globally (IGRAC, 2021) (Figure 32.2), and this number increases as systematic investigations proceed.[1] Transboundary aquifers lie beneath most nations. The geopolitical importance of these systems is thus evident, even more so considering the growing competition for water resources due to climate change and population growth. As much of the world's freshwater resources are transboundary in nature, transboundary water cooperation will be more and more vital to avoid conflicts and ensure effective and

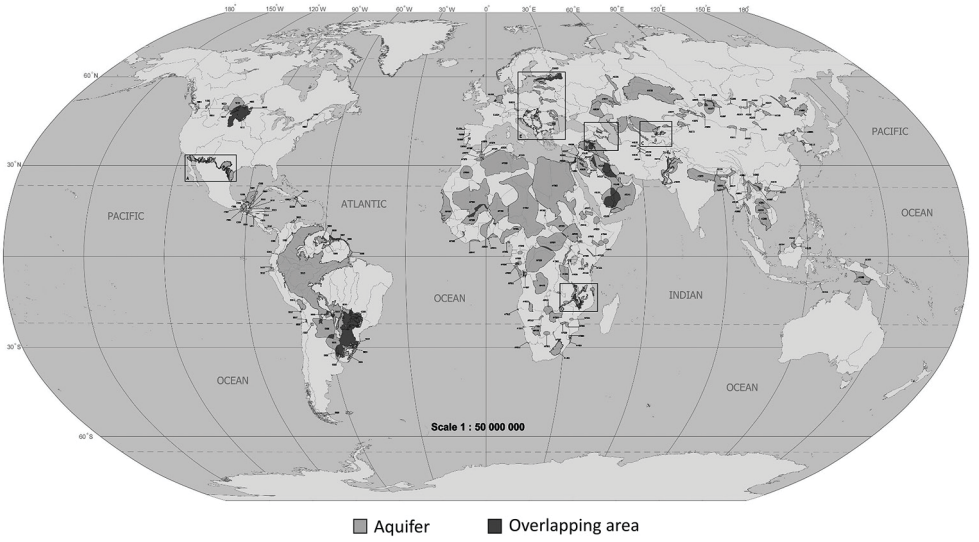



*Figure 32.2* Global map of transboundary aquifers. Derived from (IGRAC, 2021).

sustainable use of shared resources (Puri and Villholth, 2018). So far, there is a lack of experience in conducting diplomacy tailored to shared groundwater systems, and it can thus be argued that transboundary aquifer diplomacy is in its infancy.

If interstate cooperation in international rivers and lakes is necessary, it is even more needed for the aquifers whose characteristics remain invisible at the surface. Compounding this issue, countries often use different geological classification systems for aquifers, different reference systems, and different policies, legal, and institutional structures. Cooperation between aquifer-sharing states is then paramount to collect and harmonize the information available across the countries to understand the nature and dynamics of the whole aquifer system. A proposed first step in building cooperation is to establish a joint team of experts that undertakes data and information collection, fact-finding, and in-situ explorations. Providing a joint diagnosis of the aquifer extent and the groundwater system, including its flow dynamics and boundary conditions, can help build trust.

## Mapping transboundary aquifers and creating the knowledge base

The mapping and assessment of shared groundwater require the identification of the transboundary geological formations and aquifer systems that occur at different depths in the subsurface, as well as gaining an adequate understanding of their characteristics and how they function (UNESCO IHP and UNEP, 2016). Knowledge of transboundary aquifers is still very recent, and it is only in the last 20 years or so, since the turn of the century, that studies have been organized in a systematic way. Until the early 2000s, there was insufficient information on the number, distribution, and importance of transboundary aquifers (Salman, 1999). Furthermore, existing international legal instruments do not cover deep confined transboundary aquifers, defined in legal terms as aquifers that are decoupled hydraulically from fresh surface water systems (Eckstein and Eckstein, 2005).

### *International Shared Aquifer Resources Management initiative*

In response to this, the UNESCO Intergovernmental Hydrological Programme (UNESCO IHP) Council launched in 2000 the International Shared Aquifer Resources Management (ISARM) Initiative. This led to the first-ever structured compilation of regional inventories of transboundary aquifers in collaboration with more than a hundred countries across all regions. Several case studies were initiated, and guiding tools for the management of shared groundwater resources were published (UNESCO, 2001; Puri and Aureli, 2005).

The first successful regional inventory was carried out in the Americas with the participation of experts from 24 countries (UNESCO, 2008; Rivera and Candela, 2018). The experts noted that in most countries, groundwater did not have a clearly defined legal framework. They were also confronted with a critical lack of data and decided to prepare a strategy for the region: the "Regional Strategy for the Assessment and Management of Transboundary Aquifer Systems in the Americas" (Rivera, 2015). The strategy included technical, social, and governance recommendations (UNESCO, 2008).

### *Transboundary Water Assessment Programme*

One of the important achievements of the UNESCO ISARM initiative was the establishment of a worldwide network of groundwater experts. This network formed the backbone of the Transboundary Water Assessment Programme (TWAP) that was supported by the Global Environment Facility (GEF) and launched in 2011 (UNESCO IHP and UNEP, 2016). This program was a major step forward in building knowledge about the status of 199 larger transboundary aquifers globally. It triggered the collaboration of more than 300 experts from 131 countries and collected groundwater data at the national level and built a global Information Management System (IMS) and mapping portal (IGRAC, n.d.). IGRAC has since 2011 compiled a progressive series of maps of transboundary aquifers, the most recent global map published in 2021 (IGRAC, 2021) (Figure 32.2), indicating 106 TBAs in Africa, 135 in the Americas, 130 in Asia and Oceania, and 97 in Europe. However, although the location of significant TBAs at the global scale is known, there is still a lack of detailed data on the extent, characteristics, flow dynamics, and human influences on many of these systems.

Various remote sensing (GRACE – Gravity Recovery and Climate Experiment) and global modeling studies have provided insights into the long-term stress on transboundary aquifers from a depletion perspective. These indicate unanimously that larger TBAs in South Asia, the Middle East, and Northern Africa as well as in the Western North Americas are under pressure (Richey et al., 2015; Wada and Heinrich, 2013; Scanlon et al., 2023).

### *UN-Water Monitoring of water cooperation*

Within the framework of the UN Agenda 2030 for Sustainable Development,[2] UN-Water published in 2021 the second report on the status of cooperation on transboundary water systems, supporting the assessment of SDG Indicator 6.5.2 on "Proportion of transboundary basin area with an operational arrangement for water cooperation" (UNECE, 2021). Data provided by 129 countries out of the 153 countries sharing a river, lake, and/or an aquifer were collected and analyzed by UNESCO and UNECE (Figure 32.3). The report highlights the difficulty of countries to report data on their aquifers. It points out that most existing water cooperation arrangements are tailored to a surface water body and do not include provisions that reflect the specific characteristics of




*Figure 32.3* The proportion of transboundary aquifer area in a country covered by an operational arrangement for water cooperation. Derived from (UNECE, 2021) and available under a CC-BY-SA 3.0 IGO license. License details are available from https://creativecommons.org/licenses/by-sa/3.0/igo/.

aquifers, especially in developing countries. This calls for the need to strengthen efforts to ensure that operational arrangements cover all transboundary aquifers by 2030.

### *Recent regional initiatives*

In addition to global TBA initiatives, a growing number of regional or river-basin-framed initiatives focusing on the integrated management of transboundary aquifers within existing institutional water management structures are being established, for example, the Southern African Development Community (SADC) subsidiary Groundwater Management Institute in Southern Africa,[3] the Niger Basin and the Iullemeden-Taoudeni/Tanezrouft Aquifer System (ITTAS) initiative in West Africa,[4] and the Horn of Africa Groundwater for Resilience Project.[5] These are welcome initiatives advancing the integrated management of transboundary aquifers.

## Building the frameworks, partnerships, and advocacy for coordinated TBA management among multiple stakeholders

### *UNILC Draft Articles on the Law of Transboundary Aquifers*

Until the beginning of this century, international law paid little attention to groundwater and transboundary aquifers. The first attempt to consider groundwater was made by the UN Convention on the Law of Non-navigational Uses of International Watercourses (1997) (UN Watercourses Convention) (UN, 1997). The convention was adopted on May 21, 1997, by the UN General Assembly, and entered into force on August 17, 2014, when it was ratified by 36 states. However, the Watercourses Convention does not cover all kinds of transboundary aquifers, only those in direct hydraulic connection with surface waters and flowing into a common terminus.

Then, given the hydrological and geological diversity of transboundary aquifers, the need for specific regulatory guidance on the matter was felt. In 2002, an important step to provide a legal

regime for the proper management of transboundary aquifers was taken by the UN International Law Commission (UNILC). The UNILC, with the scientific support of UNESCO IHP and other partners, drafted 19 articles on the "Law of Transboundary Aquifers." The UN General Assembly (UNGA) in 2008 adopted a resolution commending the Draft Articles to the attention of Member States, encouraging nations to take the articles into account when entering into bilateral and regional arrangements relating to the management of transboundary aquifers.

Since then, the UNGA has continued the consideration of the Draft Articles and adopted several resolutions. The last one, adopted in 2022, remarked on "*the importance of the subject of the law of transboundary aquifers in the relations of States and the need for reasonable and proper management of transboundary aquifers, a vitally important natural resource, through international cooperation for present and future generations*" (UNGA A/RES/77/112), and again commended to the attention of "*…governments the draft articles on the law of transboundary aquifers annexed to its resolution 68/118 as guidance for bilateral or regional agreements and arrangements for the proper management of transboundary aquifers*." While the possibility for the elaboration of a convention on transboundary aquifers is still remote, the UNGA decided to include the debate about the final form of the Draft Articles in the provisional agenda of its 80-first session in 2026. The Draft Articles, not providing a binding framework, still represent the currently most complete international instrument on transboundary aquifers and can serve as a reference for the states whenever considering entering into cooperation or an agreement (Stephan, 2018). Argentina, Brazil, Paraguay, and Uruguay have already taken inspiration from the Draft Articles for the drafting of the agreement on the Guarani Aquifer, which came into force in November 2020 (Villar, 2020).

### *Water Convention: Model Provisions on Transboundary Groundwaters*

A third international law instrument covering transboundary water resources is the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, adopted in 1992 by the UN Economic Commission for Europe (UNECE Water Convention). Considering the provisions of the Draft Articles of the Law on Transboundary Aquifers, the parties of the Convention decided to develop nine Model Provisions on Transboundary Groundwater, which provide specific non-binding guidance on transboundary groundwater (UNECE, 2014). Since 2013, the UNECE Water Convention is open to all UN Member States and various states outside the UNECE region have acceded or shown interest in becoming party.

### *Transboundary Water Cooperation Coalition*

The Transboundary Water Cooperation Coalition (TWCC) was launched on December 8, 2022, during the UN-Water Groundwater Summit.[6] The coalition is a multistakeholder partnership. It aims at promoting and supporting transboundary water cooperation at all levels worldwide, in the context of the Water Action Agenda and SDG 6. The coalition has encouraged the submission of concrete commitments to advance transboundary water, including transboundary groundwater, cooperation as a contribution to the Water Action Agenda, one of the main outcomes of the United Nations 2023 Water Conference in March 2023.[7]

### *UN-Water Groundwater Summit*

A first-ever Groundwater Summit was held on December 7–8, 2022, at UNESCO Headquarters in Paris, France. The summit concluded with a call for governments and other stakeholders to scale up

efforts to better manage groundwater and address transboundary cooperation on aquifer resources management as a catalyst for regional integration, peace, and stability. In the Joint Message and Call for Action,[8] governments, the donor community, the private sector, and civil society were called upon to accelerate action toward sustainable groundwater management, development, and use; collection and sharing of data and information; strengthening human and institutional capacity; leveraging and scaling up innovations for groundwater management; and financing for groundwater governance. This call to action informed discussions at the UN 2023 Water Conference.

### *UN 2023 Water Conference*

The UN 2023 Conference on Water, organized in March 2023 in New York, represented a significant step forward in recognizing the urgency of promoting water cooperation. The conference's summary of proceedings by the President of the UNGA states that "*cooperation on groundwaters is especially lagging behind*." It highlights the "*importance of groundwater to tackle growing water scarcity and sustain biodiversity*" and underlines that "*establishing cooperation mechanisms or expanding existing ones to groundwater is crucial*" (UNPGA, 2023). During the debate of the conference, interactive dialogues on "Water for Cooperation: Transboundary and International Water Cooperation, Cross-sectoral Cooperation, Including Scientific Cooperation, and Water across the 2030 Agenda for Sustainable Development (SDG targets 6.5 and 6.b and Goals 16 and 17)" stressed that "*While educating water managers on new technologies has improved, education on the skills needed to foster cooperation, such as negotiation, diplomacy, conflict resolution, governance and law, should be upscaled*" (UNS, 2023). The role of education and capacity development was also highlighted. The President's report states that "*advancing cooperation and water diplomacy requires increased capacity at all levels, including to negotiate new agreements*" (UNPGA, 2023).

### *UN-Water Expert Group on Groundwater*

UN-Water has established an Expert Group on Groundwater in August 2023. The group's program will build on UN-Water's 2022 campaign on "Groundwater: Making the Invisible Visible" and the main outcomes of the UN 2023 Water Conference. It will provide a platform to cross-fertilize the activities of individual UN agencies, avoiding duplication and ensuring that groundwater is considered in decision-making at international and national levels. It also aims to provide a platform for the exchange of information, knowledge, and experience and to contribute to informing policy processes, addressing emerging issues related to groundwater, and inspiring people to act.

## Experience from the ground

While diplomacy on transboundary aquifers is still incipient, some pointers summarizing early and important lessons, as exemplified by cases around the world, are provided in Table 32.2, partly building on recent stocktaking on international collaboration on transboundary aquifers (UNESCO, 2022).

## Discussion

### *Challenges and the way forward*

Water diplomacy is critical, as it fosters dialogue and may contribute to limiting unilateral actions and helping open access to the negotiation table to non-state actors. States remain the main actors

*Table 32.2* Lessons learned from cooperation and diplomacy on transboundary aquifers

| *Transboundary aquifer/aquifer system* | *Countries sharing* | *Key lessons learned* | *Reference* |
|---|---|---|---|
| Genevese Aquifer | France, Switzerland | The need for addressing and adapting to climate change, aquifer contamination, and growing water demands in a long-standing agreement | de los Cobos (2023), de los Cobos and Galeazzi (2021) |
| Stampriet Aquifer | Botswana, Namibia, South Africa | Taking advantage of a well-functioning river basin organization in which to embed the TBA cooperation | UNESCO (2016a) |
| Diktas Aquifer | Albania, Bosnia and Herzegovina, Croatia, Montenegro | Building cooperation and generating joint knowledge in a post-conflict area (Western Balkans) is possible | UNESCO (2016b) |
| Guarani Aquifer | Argentina, Brazil, Paraguay, Uruguay | One of the first treaties signed in a precautionary context. And the need to identify and invest in local "hot spot" transboundary areas for focused management and cooperation in a large TBA | Villar (2020), OAS (2005) |
| Saq-Ram Aquifer System | Jordan, Saudi Arabia | Progressive cooperation on a fossil aquifer, moving from a gentleman agreement on pumping zoning near the border to the establishment of an agreement for the management and utilization of the groundwaters of the TBA | UNESCWA (2022) |
| Northwest Saharan Aquifer System | Algeria, Libya, Tunisia | Long-term structured technical cooperation, through a formalized consultation mechanism since 2006, is facilitating trust building and expanded data and information sharing | UNECE (2024) |
| Ramotswa Aquifer | Botswana, South Africa | The facilitating role of joint field monitoring, airborne geophysics, and database development. And the role model of good TBA cooperation in one TBA to spark basin-wide attention to all shared aquifers (Limpopo River Basin) | IWMI (2021) |
| Pretashkent Aquifer | Kazakhstan, Uzbekistan | Initiating TBA assessment unilaterally may backfire, but in the Pretashkent case, eventually both aquifer states joined forces to create a roadmap for onward cooperation | UNESCO (2016c) |
| Kabul River Basin and transboundary groundwater resources | Afghanistan, Pakistan | The growing importance of lowering political resistance toward cooperation | Shabbir (2022) |

*Table 32.2* (Continued)

| *Transboundary aquifer/aquifer system* | *Countries sharing* | *Key lessons learned* | *Reference* |
|---|---|---|---|
| Mountain Aquifer | Israel, Palestine | Engrained political deadlock on several fronts and unequal capabilities impede effective water cooperation | Dai (2021) |
| Malawi transboundary aquifers | Malawi and neighboring countries | The need for a country to map and prioritize investments in its transboundary aquifer assessment and cooperation | Fraser et al. (2020) |

in water diplomacy at the highest level, but there is a new emphasis on broad-based water diplomacy involving all stakeholders, from governments to civil society.

The Draft Articles on Transboundary Aquifers and the UNECE Water Convention are aquifer-specific multilateral instruments that have fostered political awareness and will and have strengthened water diplomacy. They have contributed to the acceptance of the sharing of transboundary waters, including groundwater. In their provisions, these instruments seek to lessen the focus on territorial sovereignty and pave the way for broader water diplomacy.

Cooperation may still be lacking because, faced with other basic social priorities, some countries may not be able to invest in detailed transboundary aquifer studies. The role played in this context by multilateral organizations and initiatives focusing on transboundary waters, such as the TWCC and the UN-Water Expert Group on Groundwater, is proving to be key to fostering successful TBA cooperation and helping countries to enter negotiations. Most of the existing projects and programs on transboundary aquifers are financially supported by multilateral agencies and cooperation organizations.

Even if, since 2002, the understanding of the hydrogeology of transboundary aquifer resources has improved considerably, there remain many weaknesses in governance and diplomacy. The results of the monitoring of SDG Indicator 6.5.2 of SDG 6 undertaken since 2017 by UNECE and UNESCO under UN-Water indicate the insufficient progress made by countries in the assessment and governance of their transboundary aquifers. It is important to use this reporting tool as a vehicle for further interaction with UN Member States while advocating for a stronger emphasis on transboundary water governance and diplomacy.

Referring to the summary report of the UN President of the General Assembly of the UN 2023 Water Conference, efforts should focus on a number of key acceleration areas, including addressing data gaps, scaling up capacity development (UNESCO and GCI, 2002), leveraging global water conventions (including the Draft Articles on the Law of Transboundary Aquifers), mobilizing political will, mainstreaming transboundary cooperation in national Integrated Water Resources Management (IWRM), and improving financing. Our analysis, in addition, points to the importance of continued focus on integrated and conjunctive approaches, addressing land and land use management, addressing cross-sectoral needs, and working with civil society and non-state actors, including less empowered groups such as women, youth, and Indigenous people, ensuring their voice in negotiations over transboundary aquifers.

## Conclusion

Groundwater, as well as other unseen water resources, the latter not covered to any fair degree here due to space limitations, is key to future water security, and hence water diplomacy needs to encompass considerations of these resources, which, in conjunction with traditional "seen" resources like surface water and "new" water, such as desalinated water and recycled wastewater, provide a larger menu of options for sustainable development and a larger "negotiation room" for identifying solutions and cooperative frameworks at the transboundary level. While this is complex and challenging for nations that may be only starting to grapple with transboundary aquifer governance, there are now clear trends of moving in this direction. Building the international support and collaboration, in terms of technical assistance and financing to diplomacy training, transboundary aquifer assessment and monitoring, international water law development, and inclusive partnership development across aquifer-sharing states, sectors, and stakeholders, can help move toward accelerated outcomes. The proactive development of cooperation, diplomacy practices, and conflict prevention, resolution, and mitigation strategies is particularly important for transboundary groundwater, confronting the growing reliance on these resources, their long reaction timeframes, and extensive costs of inaction while trending toward and gaining from no-regret multilateral cooperation.

## Notes

1 The map in Figure 32.2 does not include all TBAs in Europe. This is because the EU Water Framework Directive operates on the basis of so-called groundwater bodies, which are operational management units. The number of transboundary groundwater bodies in Europe has been estimated at 226, and while they may or may not overlap with TBAs, this indicates that the number of TBAs globally is larger than 468.

2 The 2030 Agenda for Sustainable Development is a comprehensive plan of action adopted by UN Member States in 2015, featuring 17 Sustainable Development Goals (SDGs) and 169 targets that seek to end poverty, protect the planet, and ensure prosperity for all by 2030, with the central pledge that "no one will be left behind". For the complete agenda text, goals, and targets, see: https://sdgs.un.org/2030agenda

3 The SADC Groundwater Management Institute (SADC-GMI) is a regional Centre of Excellence on Groundwater hosted by the University of the Free State in South Africa, established in 2016 to promote sustainable groundwater management and provide solutions to groundwater challenges across the SADC region through capacity building, training, research, and enabling dialogue and information exchange. For more information about their projects, groundwater information portal, and resources, see: https://sadc-gmi.org/

4 The Global Environmental Facility project "Improving IWRM, knowledge-based management and governance of the Niger Basin and the Iullemeden-Taoudeni/Tanezrouft Aquifer System" is a comprehensive initiative aimed at strengthening conjunctive management of surface and groundwater resources across 11 West African countries through scientific assessment, community-based conservation, industrial pollution reduction, and institutional capacity building. For the complete project document including detailed components, budget breakdown, and implementation arrangements, see: https://info.undp.org/docs/pdc/Documents/NER/Prodoc%20ITTAS%20NBA.pdf

5 The Horn of Africa Groundwater for Resilience Project is a World Bank-funded initiative focused on increasing sustainable access and management of groundwater in Kenya's drought-affected ASAL areas, particularly in the NEDI counties bordering Ethiopia and Somalia. For detailed information on project components, implementation strategies, and grievance mechanisms, see: https://wra.go.ke/the-horn-of-africa-groundwater-for-resilience-project/

6 The UN-Water Summit on Groundwater was held on December 7-8, 2022 at UNESCO Headquarters in Paris, France. Summit information can be found online at www.unwater.org/news/un-water-summit-groundwater-2022

7 The UN 2023 Water Conference held on March 22-24, 2023 was the first UN water conference in several decades. It was co-hosted by Tajikistan and the Netherlands in New York and aimed at mobilizing global action through voluntary commitments to create a Water Action Agenda that addresses the alarming off-track progress on water-related Sustainable Development Goals. You can read more about the conference https://sdgs.un.org/conferences/water2023

8 The 2022 UN-Water Summit on Groundwater culminated with a Joint Message and Call for Action on Groundwater, which can be read online at www.unwater.org/news/joint-message-un-water-summit-groundwater-2022

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# 33

# ORGANIZATIONS AS THIRD PARTIES

*Léna Salamé*

**Key takeaways**

- Water diplomacy should aim at reaching agreements that are acceptable to all parties involved, with a high level of commitment, ownership and trust; agreements should be based on equity and not necessarily about equality: it is about what is fair, what is proportional and what is adequate to a particular situation.
- The choice of a third party called upon to support a complex water diplomacy process is a subtle, difficult and impactful one; there is no single guideline or checklist to be followed as a guarantee of a good choice.
- Every case embeds its own particularities that parties must consider when choosing whether an organization or an individual will better serve their process as a third party.
- Parties should choose an organization or an individual that has their trust or at least inspires them to give their vote of confidence to the process, which is critical to commitment and ownership and, hence, the key to success and follow-up.

## Introduction

"Equitable and reasonable utilization and participation" and the "obligation not to cause significant harm" are two key principles of international public law[1] referred to when engineering, discussing or objecting to, the use of international watercourses by two or more states sharing such a resource.

These principles, just like most international public law principles, are relatively generic. They are designed to be as widely accepted as possible, despite the variety of norms, customs and beliefs throughout the globe. It is indeed the essence and role of international law to only set directions and give a general frame for actions; while leaving room for adaptation and adjustments to specific situations, by specific treaties, applicable to specific sets of actors, in specific contexts. What is considered as being equitable and reasonable in a humid region with low population density may not be accepted as such in a highly populated arid zone for example. A whole host of economic, geographic, social, environmental, climatic and other factors (Article 6 of the United Nations Watercourses Convention) come into the equation and influence the interpretation and adaptation of these principles to every case in a unique and appropriate manner.


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Furthermore, their application in a relationship between states sharing the same watercourse is impacted by the level of trust, power balance and political will that animate their relationship. Depending on the technical capacities, interests and objectives on each side of the border, what is perceived as being equitable and reasonable by one party may not be perceived as such by the other one. Similarly, what may be considered to be a significant harm by one State can be rejected as such by another one.

The assessment of what is equitable, reasonable or significantly harmful in a given case (Wouters et al. 2005; Allan 2009) has to be done on the basis of data related to the case at hand. When actors involved are political rivals, their game often blocks the smooth application of the law and constitutes an obstacle to the development, interpretation, revision of, or compliance with, an agreement. In such cases, it becomes necessary to rely on the intervention of a third party that can play a judicial or diplomatic role.

## Organizations' involvement in water diplomacy processes

### *The limits of the judicial role and the need for diplomatic third parties*

Judicial institutions, in a strict sense, refer to all established judiciary bodies in a State or at the level of the international society whose objective is to guarantee quality justice while respecting essential rights of those subjected to the law. They also include the legal professionals who intervene within these same courts. In a broader sense: judicial institutions can also refer to the fundamental principles governing the functioning of the courts, such as, for example, the right to a fair trial (Code de l'organisation judiciaire n.d.; Douence et Azavant 2021).[2]

It may, however, be difficult for a judicial third party to bring a conflict to a successful conclusion and engage parties to comply with it, when these are plunged into a complex web of issues and, at the same time, struggling with a lack of trust, varying levels of knowledge of facts, various emotional, perceptual or communication challenges. It is indeed not the role of judicial institutions to work on relationship mending or the diffusion of misunderstandings. Whether it is the International Court of Justice or a national system court, their role is mainly to apply the law to cases under their jurisdictions (Shamir 2003) while interpreting it or developing it when and if necessary.

Furthermore, judiciary bodies are ill-equipped to evaluate and incorporate data and technical matters into their decisions. This makes it laborious for them to interpret precisely what is an equitable and reasonable or a significantly harmful use in cases with scientific complexities and diplomatic sensitivities. Professionals of the judicial system are indeed experts in the interpretation and application of the law. They are not engineers, biologists, geographers or geologists, to name only a few expert areas needed in the decipherment of an aggregated water system.

It is sometimes, therefore, necessary and more efficient to have recourse to processes that aim at improving the relationship between the parties and enhancing their respective understandings of each other's interests and needs, trust and communication. A judicial institution's role is not quite aligned with such objectives. It is actually the role of a diplomatic third party who enjoys the confidence of the other parties.

A diplomatic third party can be an individual person or an organization, that is, a group of people working together toward the same purpose (Cambridge Dictionary) (Shamir 2003; Ganoulis et al. 2007).

When organizations are involved in a water diplomacy process, they can take a variety of forms. They can be intergovernmental organizations, non-governmental organizations, advocacy

groups, think tanks or research institutions (Knoop 2014), to name a few. And they intervene in order to improve relations among other parties.

The involvement of trusted organizations can add immense value at different stages of a water diplomacy process. They can initiate the process, support its development and/or help parties implement the output of the process (Priscolli 1996). They have the resources, expertise and credibility to do so.

## *Third-party organizations in diplomacy*

### *Advantages*

First, organizations can offer the infrastructure to help facilitate a process and bring much-needed financial resources to the process. Regular and robust funding is needed throughout the process to support its development and the implementation of each of its elements, such as convening parties, remunerating expertise, supporting research, collecting data, modeling data and analyzing data to aid decision-making, among others.

Organizations also have access to large networks of stakeholders that enable the involvement and information of a wide variety of stakeholders concerned or impacted by the process beyond the parties themselves. They can also mobilize varied and encompassing technical expertise, which is absolutely necessary when dealing with complex issues such as transboundary water governance. Their teams can include specialists in various pertinent topics (Salamé & van der Zaag 2010; Salamé et al. 2009), and when needed they can further mobilize experts whose knowledge and advice are adapted to the specificity of a given case. This collective and varied perspective on the issues at stake provides different viewpoints and allows for the development of potentially acceptable directions to the process.

They can also play the role of educators by developing and providing educational material (Barua et al. 2019; Marshall et al. 2017), facilitating knowledge sharing and supporting parties in understanding the case and its various facets. They can use the expertise at their disposal to identify best practices and help adapt and implement them to the process in question. They can create outreach initiatives to build capacities and level the playing field among parties to the process and enhance the understanding of the issues by concerned actors and populations at various geographical scales.

All these actions help steer the process toward a fruitful conclusion. Thanks to their stature and reputation, organizations can indeed bring legitimacy to the process and improve communication, collaboration and, most importantly, level of trust among parties. They may also be able to provide clear boundaries for parties involved in the process about their roles, competencies, rights and obligations.

They can act as facilitators or mediators and support the process by providing a neutral and impartial forum for dialogue in their own premises. They can also act as actual negotiators and advocates for common interests on various sides of the process. They can then develop their own strategies to bring the process to closure by offering options, alternatives, as well as possible actions to be complied with. And finally, they can be advocates, by lobbying on behalf of particular stakeholders in the process and/or their own agenda in the process.[3] Such is the case of World Wildlife Fund, Green Cross International, International Union for Conservation of Nature (IUCN) and the Northumbria University, for example, in the process of getting the United Nations' 1997 Watercourses Convention ratified by new States.

### *Drawbacks*

The involvement of organizations in a water diplomacy process has, however, a number of actual drawbacks. In some cases, organizations may not be transparent and accountable in their decision-making processes and how they use the public funds they receive. This can lead to the misallocation of resources and a lack of trust in the process.

Organizations working at an intergovernmental level may also suffer from an issue of poor representation: they may not be in touch with local communities and marginalized groups who often bear the brunt of bad water management. This can lead to decisions that ignore their needs that can, in turn, weaken the output of the process and constitute an obstacle for its implementation.

Furthermore, organizations involved in a water diplomacy process may face significant political resistance from governments, corporations or other powerful actors who may not be in agreement with the direction a process is taking, and who are either members of the organization or influencing its functioning. This limits the effectiveness of the diplomacy process and reduces the potential for fair and lasting solutions.

Finally, organizations may focus on symptom-level solutions rather than tackling the root causes of a dispute. This may prevent deeper changes from being made to the political, institutional and environmental conditions that drive the water conflict. They may also lack the flexibility needed to react quickly to events or shift as necessary and required by the reality on the ground.

## ***Ideal involvement***

Consequently, organizations must understand that their work varies from country to country depending on the legal, political and cultural landscape. They must be aware that their role is to provide support and advice and not to dictate outcomes or take sides. They should be conscious of their role in the entire process and ensure that their participation does not create an imbalance of influence or power between parties. And most importantly they should place human rights and equity at the center of water diplomacy.

### *The use of leverage power*

In order to achieve such a sensitive role, it is essential for organizations that want to intervene in a water diplomacy process to understand when to intervene and how to do it in order to guarantee that the interests of all sides are considered. They should also make sure to recognize the importance of leveraging their collective capacity to engage with a wide range of stakeholders in a constructive and collaborative manner. The process they lead should include strategic identification and engagement of key actors and figures from relevant institutions concerned or impacted by the process, such as governmental and non-governmental organizations, civil society, academia, private sectors and local communities. Advance design and investment in participatory approaches including social learning processes and stakeholders' platforms ensure the meaningful participation of all parties involved in the decision-making process.

The International Commission for the Protection of the Danube River (ICPDR) implements the Danube River Protection Convention. It is empowered by the Danube countries to organize data collection, process it and support them in their decision-making processes, providing open access information to national authorities, the scientific community and the public. This type of intervention nurtures collective action, builds trust and harmonizes water monitoring practices in accordance with the EU Water Framework Directive (WFD).[4]

### The use of objective standards

Organizations should develop and support data-driven decision-making, foster the use of innovative solutions to improve the governance of the shared resource and ensure that all stakeholders have equitable access to knowledge and information relevant to the process. They should also promote the reference to, and reliance on, legal and institutional frameworks to guarantee compliance with the rule of international law.

### The adaptation to specific contexts

Furthermore, it is essential for organizations to invest in understanding the social, political and economic context on the ground before they become involved and able to assess options and solutions that are proposed. To enable an effective process, they should take into account the local/regional complexities, needs and interests in addition to global and regional realities. Prioritizing local knowledge and contextualizing solutions ensure higher commitment of stakeholders to the process and better compliance rate with its output.

Lake Titicaca shared by Peru and Bolivia has gone through a phase of unprecedented development over the past couple of decades. The national and bi-national institutions handling the lake's governance needed to be reviewed and adapted to the new reality. IUCN's BRIDGE program initiated a process of multi-level water diplomacy that capitalizes on the involvement of stakeholders and their knowledge across local, provincial, national and regional levels (MacQuarrie 2013).

One of the primary learnings from this intervention was that a successful water diplomacy process relies on the wide-ranging participation of stakeholders. It has to be accepted and driven by the needs of water users at all levels (MacQuarrie 2013).

In a video illustrating the case, a lady living on the shores of the lake tells the story of her experience from the process[5]:

> We used to be one unique country […]. So we have always felt we were brothers. Culture and language unite us […]. So all our actions should be taken in a joint manner […]. Thanks to those workshops (organized through IUCN's water diplomacy intervention) we, women, have also participated in meetings of various municipalities, native authorities, […] councils, and could therefore organize ourselves. And we are today identified as the United Women for the Defense of Water […]. I believe, that we have now leaders who can transfer their knowledge to others and in turn these people can also transfer the knowledge and expand the circle of knowledgeable to yet a bigger circle of people. […] This process, promoting local empowerment is part of our path to increase cooperation among countries sharing resources as important as water.

### The investment in trust

Organizations involved in a water diplomacy process should work on building, maintaining and improving the trust they inspire to the parties as well as the trust among the parties themselves.

Hence, they are expected to commit to:

- Open communication and transparent management of resources at their disposal,
- Regular consultations with relevant actors with feedback and evaluation loops and

- Investment in the creation of opportunities for mutual benefits while respecting local cultures and norms.

This requires regular and continuous efforts and should ideally be completed with the:

- Provision of capacities and skills' development opportunities to increase stakeholders' self-determination and autonomy as well as
- Use of strategic communication and public awareness mechanisms to improve the understanding of issues at hand by the widest possible array of actors.

Last but not least, organizations should be willing to continuously learn and adapt their strategies to the dynamic context of the diplomacy process.

### *The comparison with individuals' involvement*

Individuals can and have long played the role of a third party in water diplomacy processes as well. They can be researchers, academics, practitioners, religious or community leaders, current or previous politicians who embody fairness, trustworthiness, impartiality and the ability to understand the interests and perspectives of all parties in the process.

The Sulha, for example, (i.e., reconciliation in Arabic) is a dispute resolution system implemented in the Muslim world, outside of judicial walls. Its objective, just as its name hints, is to reconcile parties in a dispute according to local communities' customs and traditions (Fares et al. 2006). This process consists of mediating among parties and reaching a settlement through negotiations supported by a private individual, usually a respected figure from within the community. Decisions reached through a Sulha process are not enforceable in court. They have however high moral and traditional weights – with which community members identify. According to Y. Shamir (personal communication, May 2006) who worked on implementing this system on water disputes in the Jordan basin, these values constitute the key ingredients that incentivize parties and create for them the moral obligation to comply with the processes' outputs. Following the procedure and the declaration of the resolution, parties forgive each other and are encouraged to look forward toward the future rather than holding grudges against each other (Wolf 2008).

The individual should ideally have expertise in water resources management, diplomacy and international relations to be effective. She or he should have excellent communication and interpersonal skills to serve in this vital role.

When involved in a water diplomacy process an individual third party brings their personal touch. She or he would have a particular approach to the conflict, and this allows them to build a direct and genuine relationship with the parties on either side of the table. This can be especially useful when the commitment of parties to the process needs to be boosted, and their trust nurtured.

As compared to an organization who plays the same role, individuals may be more familiar with the history of the parties involved and able to act in a sympathetic manner which is essential for meaningful dialogue. An individual third party can indeed be chosen specifically because she or he has a better knowledge and greater experience in the issues at stake. On the other hand, an organization chosen because of its institutional reputation may in some cases mobilize individuals – among its personnel – to serve the process because of their position or stature and not necessarily thanks to their specific expertise or personality.

A physical person acting as a third party can also be relatively flexible and creative. She or he can adapt quickly and efficiently to the realities on the ground and the dynamics of the issues

at stake. They can adapt the process in real-time if parties' involvement in, and commitment to, the process require modifications. Individuals indeed enjoy freedom in their actions as compared to organizations that are restricted in their techniques and processes. They are able to tailor approaches to the nature of the conflict, the needs of the parties and adapt them as the process moves forward.

Engaging an individual person as a third party can be more cost-effective as compared to mobilizing the complex mechanism of an organization. They can even be more efficient in reaching a resolution since they can base their decisions on their own flair and experience, and they are not burdened with institutional procedures. Their decisions may hence be taken and implemented more quickly.

Individual third parties may remain neutral throughout the process because they do not have institutional objectives, policies and interests to follow. They can also, though, become biased because of their personal history, beliefs and backgrounds. This could lead to an unfortunate advantage being given to one of the parties at the expense of the other one. The identification of the individual should therefore be done very carefully by the parties.

## Conclusion

A water diplomacy process, however it is defined (Sehring et al. 2022), aims at reaching agreements that are acceptable to all parties involved, with a high level of commitment, ownership and trust. This should in turn allow for compliance and follow-up diplomacy if and when needed. Water diplomacy is therefore about equity and not necessarily about equality. It is about the delicate and contextual quantitative evaluation of the level of harm that may or may not be acceptable in the relationship between parties sharing a resource. It is about what is fair, what is proportional and what is adequate to a special situation.

The choice of a third party called upon to support such a complex process is a subtle, difficult and determining one. There is no single guideline or checklist to be followed as a guarantee of a good choice. Every case embeds its own particularities. Parties have to consider these in order to choose whether an organization or an individual will better serve their process. Furthermore, in either case, whether they choose an organization or an individual, they have to identify the one that is most suited for their case, the one that has the characteristics needed to help them address their interests, and most importantly the one that has their trust or at least inspires them to give their vote of confidence to the process.

## Notes

1 See Chapter 27 on International Law and Chapter 31 on the Watercourses Convention in particular.
2 Translated from French.
3 An online User's Guide for the UN Watercourses Convention is available at www.unwatercoursesconvention.org. This guide includes analysis of each of the Convention's articles, case, multimedia resources, and fact sheets. As described on www.unwatercoursesconvention.org/about/, this User's Guide was a collaborative effort by multiple organizations in an effort to promote understanding and adoption of the Convention.
4 More information about the structure, function, and recent work of the ICPDR can be found online at www.icpdr.org.
5 Video accessed through personal communication with IUCN staff.

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# 34

# THE HUMAN RIGHT TO WATER AND ITS RELEVANCE IN TRANSBOUNDARY CONTEXTS

*Mara Tignino, Tadesse Kebebew, and Christian Bréthaut*

**Key takeaways**

- Despite the enormous progress made in recognizing and defining the scope and nature of the human rights to water and sanitation, there is still a long way to go in terms of ensuring universal access to water services as envisioned in the SDG Goal 6.
- The recognition of the human right to water (HR2W) could open opportunities for international cooperation and assistance, contribute to structuring transboundary water cooperation and become a guiding principle at the basin level.
- There are challenges in the implementation of the right to water at the domestic and international levels.
- At the international level, the general concept of 'progressive realization' may represent a challenge; at the domestic level, the lack of sufficient human and financial resources and weak laws, policies and strategies may hamper the implementation of the HR2W.

## Introduction

In the last two decades, the HR2W has gained increasing visibility. Such evolution is illustrated in multiple ways, with impacts at the domestic and international levels but also with the implementation of new institutional arrangements. In other words, the HR2W evolved dramatically and substantially from being an implicit responsibility of states to an independent right that can be implemented at any level of reference. Evidently, such a crystallization process of the HR2W as an operational principle brings different challenges and possible impacts on the evolution of water-related negotiation and arbitration of interests. A process of clarification is taking shape with domestic levels of intervention that allows, in an iterative manner, to gradually inform the very nature of HR2W in practice.

As a result, one can observe different mechanisms being implemented to support the realization of HR2W. For instance, at the global level, the nomination of a special rapporteur on the rights to water and sanitation provided a powerful champion for the recognition and integration of HR2W


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in existing normative frameworks. Furthermore, HR2W has been clarified by regional human rights mechanisms (including the European, Inter-American and African systems) and national legislation.

The HR2W may raise some specific challenges in the use and management of transboundary water resources. The implications of the right to water at the transboundary level are not yet tested in practice, and, as we will see, we currently see the first instances of frameworks that include HR2W in transboundary contexts (one can cite Basin Water Charters [the Senegal or Niger basins] or agreements on specific transboundary rivers [the Dniester] that have been in force for only a few years). Dealing with HR2W at the transboundary level entails some challenges related to the definition of roles and responsibilities within but also beyond national territories. The consideration of HR2W can potentially have an impact on how transboundary frameworks are defined, how priorities are set and, by doing so, on existing negotiations, not only considering state-to-state interactions but also a wide range of potential stakeholders.

This chapter examines the evolution and crystallization of HR2W and its possible effects on transboundary water cooperation. To do so, we structure the chapter as follows. First, we highlight the emergence of a human rights discourse on water and identify the key milestones and steps of such a process. Then, we analyze the manifold legal dimensions of the HR2W and the intersections between human rights law and international water law. Third, we explore the key features of the right in the transboundary contexts and, as we will see, some innovative frameworks allow to include this right as part of transboundary water cooperation frameworks. Fourth, we identify some key challenges for the effective implementation of the HR2W.

## The emergence and consolidation of a human rights discourse on water

The right to water emerged as an international agenda in the 1970s via various conferences, social movements and non-governmental organizations for different practical (climate change and scarcity of water resources) and ideological reasons (Langford and Russell 2017, p. 11, Fantini 2020). In 1972, the UN Conference on the Human Environment, held in Stockholm, identified water as one of the natural resources that needed to be safeguarded (Principle 2). The 1977 Conference on Water in Mar del Plata was devoted to discussing water issues and under Resolution II declared for the first time that ‘all peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs’ and ‘it is universally recognised that the availability to man of that [water] resource is essential both for life and his full development, both as an individual and as an integral part of the society’ (United Nations 1977, pp. 66–67). These early UN conferences could be seen as the genesis of the human right to access safe drinking water.

This section illustrates how the right to water is included, either implicitly or explicitly, in human rights treaties that are binding on states parties. It also discusses how the monitoring mechanisms established by these instruments identified the lack of compliance by states parties concerning this right. While the recommendations by the human rights treaty bodies are not binding on the states, they influence the behavior of states, indicate ways to improve domestic laws and provide information to the civil society on the status of implementation of the right to water.

## The role of the United Nations in the recognition of the right to water

During the 1990s, the evolution of the human rights to water and sanitation (RTWS) was accelerated. In 1997, the UN Sub-Commission on the Promotion and Protection of Human

Rights drafted a working paper on promoting the realization of the right of access of everyone to drinking water and sanitation services (Misiedjan and Obani 2021, p. 168). This formed the basis for linking HR2W to the UN bodies, and in 2002, the UN Committee on Economic, Social and Cultural Rights (CESCR) through its General Comment No. 15 clearly formulated it. The General Comment does not represent a binding text for states but reflects an authoritative interpretation of the 1966 International Covenant on Economic, Social and Cultural Rights (ICESCR) (McCaffrey 2016, p. 229). The CESCR indicated that the HR2W has its legal basis on the human right to an adequate standard of living and the human right to health respectively enshrined under Articles 11 and 12 of the ICESCR (these provisions do not explicitly mention the right to water). Even before 2002, states were submitting information on their domestic legislations dealing with the right to water in their reports to the CESCR, based on which the CESCR adopted concluding observations and recommended to states to improve their legislations that may have impact on the realization of the right to water.

Besides, the HR2W is *explicitly* mentioned in a number of global and regional human rights instruments such as the 1979 Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the 1989 Convention on the Rights of the Child, the 2006 Convention on the Rights of Persons with Disabilities and the 1990 African Charter on the Rights and Welfare of the Child. Furthermore, in the area of international water law, there are regional and basin-specific instruments addressing the right to water (OAS 1988, OAU 1990, UNECE 1999, OMVS 2002, African Union 2003, Niger Basin Authority 2008, Dniester Commission 2012, Lake Chad Basin Commission 2012). These treaties are binding on states that have ratified them and should be considered in the negotiations and implementation of agreements on transboundary waters. Accordingly, states parties to ICESCR, CEDAW and Convention on the Rights of the Child (CRC) are required to report on the implementation of these agreements and have to indicate progress they have made in that regard, including the HR2W.

The CESCR and the Committee on the Rights of the Child (CRC Committee) have dealt with the right to water in some of their concluding observations to states' reports. They could point out violations of the right to water by states and request them to take immediate steps in order to redress them. For instance, in its 2003 concluding observations on Israel's report, the CESCR noted the limitations on the access to water resources suffered by Palestinians and requested Israel to take immediate steps to ensure equitable access to and distribution of water to all populations living in the occupied territories and to ensure that all parties concerned participate fully and equally in the process of water management, extraction and distribution (CRC 2002, para. 51, CESCR 2003a, para. 41). In 2017, in its concluding observations to Colombia, the CESCR considers that the state party should 'intensify its efforts to ensure that its water resources are duly protected and that it takes the necessary measures to ensure that the use of water by the mining industry does not jeopardize access to safe drinking water, particularly for the communities that may be affected' (CESCR 2017, para. 60). While not legally binding as such, the Committee referred to its General Comment No. 15 on the right to water in both concluding observations.

Moreover, in its concluding observations on the report of Uganda, the CRC Committee noted its concerns that 'increasingly that large numbers of children (…) do not enjoy the right to an adequate standard of living, including access to food, clean drinking water, adequate housing and latrines' and recommended that Uganda 'reinforce its efforts to provide support and material assistance, with a particular focus on the most marginalized and disadvantaged families, and to guarantee the right of children to an adequate standard of living' (CRC 2005, para. 58). In a similar way, the 2006 CRC Committee's country report on Peru indicated that lack of access to water posed problems in attaining an adequate standard of living (CRC 2006, para. 59). The CRC

Committee also expressed concern 'about environmental health problems arising from a lack of access to safe drinking water, inadequate sanitation, and contamination by extractive industries', and it recommended an increased effort by the State to provide 'sanitation and safe drinking water to all the population' (CRC 2006, paras 51–52). The practices of these treaty bodies illustrate the role such mechanisms can play in the recognition and national implementation of the right to water.

In addition to the international agreements containing explicitly or implicitly the HR2W, in 2010, the UN General Assembly (by a vote of 122 in favor to none against and with 41 abstentions) (UNGA 2010a) and the Human Rights Council adopted two resolutions signaling the recognition of the RTWS in international law (UNGA 2010b, UNHRC 2010). In 2015, the UN General Assembly adopted the 2030 Agenda for Sustainable Development and under its Goal 6, it indicated the need to achieve 'universal and equitable access to safe and affordable drinking water for all' (UNGA 2015, p. 18). Since 2010 (and until 2021), the UN General Assembly and the Human Rights Council adopted 14 resolutions without the need for a formal procedure of voting (UNHRC 2011a, 2011b, 2012, 2013, 2014, 2016, 2018, 2019, 2020, UNGA 2014, 2016, 2018, 2020, 2022). The resolutions show the increasing support of states to the RTWS.

The other effort at the UN level that enhanced the crystallization of the HR2W was the decision of the Human Rights Council in 2008 to appoint an independent expert on the issue of human rights relating to access to drinking water and sanitation who became in 2011 the Special Rapporteur on the right to safe drinking water and sanitation. As evidenced in the works of the former and current Special Rapporteur on the human rights to safe drinking water and sanitation, the effective realization of the HR2W also corresponds with the need to address different challenges such as climate change, justice and equity and ensuring accountability (Langford and Russell 2017, p. 11).

## The HR2W in the jurisprudence of international and domestic courts

International and domestic courts play a significant role in identifying, clarifying and enforcing the HR2W (de Chazournes 2021, pp. 195–198). For instance, the Inter-American bodies on human rights have rendered important decisions in this regard, in particular concerning Indigenous populations. In its decision in *Xákmok Kásek Indigenous Community v. Paraguay*, the Inter-American Court discussed the right to access to water as part of the right to a decent existence (Inter-American Court of Human Rights 2010, para. 174). In other cases, the Court has acknowledged the importance of natural resources, such as freshwater, for preserving the identity and survival of Indigenous populations (Inter-American Court of Human Rights 2007, para. 122). The African Commission of Human and Peoples' Rights has also contributed to the recognition of the HR2W. In the *Centre for Minority Rights Development* case, it linked the right of access to sources of water with respect for freedom of religion and the right to development (African Commission on Human and Peoples' Rights 2010, para. 173). In the case of Indigenous populations, their access to water and involvement in water management issues have been taken very seriously, with the result that these groups have often been endowed with specific rights in this respect. In 2015, the Commission adopted a resolution on 'the right to water obligations' (African Commission on Human and Peoples' Rights 2015), which urges the African Union member states to meet their obligations in providing clean drinking water for all their populations, recognize, protect and develop traditional and local water management systems for Indigenous populations on their ancestral lands as well as local communities and protect water resources from abusive use and pollution.

The European Court of Human Rights has recognized the right to access clean water under Article 8 of the European Convention on Human Rights. Article 8 is concerned with the right

to respect for private and family life. In the cases *Tătar v. Romania*, *Dubetska and Others v. Ukraine* and *Dzemyuk v. Ukraine*, and *Solyanik v. Russia* (European Court of Human Rights 2009, paras 97, 124–125, 2011, paras 155–156, 2014, para. 92, 2022, paras 37, 43), the European Court of Human Rights has found violations of Article 8 for pollution of water and has held in these cases that such pollution interfered with a person's private and family life by harming their well-being.

At the domestic level, for instance, the Court of Appeal of Botswana has not hesitated to refer to the Committee's General Comment as well as the resolution adopted by the UN General Assembly in 2010 to justify the applicants' right to access to water sources for their personal use (Dinokopila 2011, pp. 289–292). In the *Narmada Bachao Andolan* case, the Indian Supreme Court decided that 'water is the basic need for survival of human beings and is part of the right to life and human rights as enshrined in Article 21 of the Constitution of India' and that there is a positive obligation for the state to provide a source of water where there is none (Supreme Court of India 2000, p. 72).

The above cases demonstrate that the right to water included in international instruments is applicable at the domestic level and is enforceable before national and regional courts. Besides these cases, constitutional and legislative acts that provide for the recognition of an explicit right to water have increased in number.[1] These practices further solidify the legal status of this right at the domestic level.

## The multiple legal dimensions of the HR2W: Intersections between human rights law and international water law

The economic, social and cultural rights are still often considered as having a programmatic nature and lacking a coherent and precise content and are often wrongly considered as social policy issues without a legal standing (UN Office of the High Commissioner for Human Rights 1996, p. 2). This is partly because of the manner in which Article 2 is formulated regarding how states parties should approach the implementation of substantive rights. Such a view not only ignores the fundamental tenets of international human rights law that civil and political rights and economic, social and cultural rights are indivisible and interdependent (UNGA 1977) but also undermines the 'minimum core obligations' under the ICESCR. Regarding the latter, the CESCR indicated that 'a minimum core obligation to ensure the satisfaction of, at the very least, minimum essential levels of each of the rights is incumbent upon every State party' (CESCR 1990, para. 10). The fact that states parties are required to take steps to the maximum of their available resources with a view to achieving *progressively* the full realization of ICESCR rights, as the immediate 'full realization' of all the rights is materially impossible for most states due to the limits of available resources, does not deprive the legally binding nature of the convention. That is, states parties have the responsibility to implement and maintain the rights guaranteed in the convention as expeditiously and effectively as possible and avoid deliberate retrogressive measures (CESCR 1990, paras 2, 9). In relation to HR2W, states assume various obligations that are of immediate effect including making water available on a non-discriminatory basis, refrain from actively depriving the HR2W or withdrawing legal and other protection relating to the right.

The right has multiple dimensions – an individual right, a collective right (the right to development, to participation in cultural life, or to Indigenous people's rights) and an environmental right (Fantini 2020). This makes determining the scope and core content of the HR2W a delicate exercise (Cahill 2005, p. 389). Yet, defining these elements is vital for the effective implementation

of the right at the domestic and transboundary levels. The CESCR has specified the normative content of the right to water (Keller and Hefti 2022, p. 50). The right 'entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses. An adequate amount of safe water is necessary to prevent death from dehydration, to reduce the risk of water-related disease and to provide for consumption, cooking, personal and domestic hygienic requirements' (CESCR 2003b, para. 2). This scope is relatively modest as it is framed primarily within the constraints of personal and domestic uses (Kiefer and Brolmann 2005, pp. 183, 199–202, Langford and Russell 2017, p. 21). Moreover, the CESCR demonstrated uses of water protected by other human rights, including water necessary to produce food (right to food), to ensure environmental hygiene (right to health) and to secure one's livelihood (right to gain a living by work) (Langford and Russell 2017, p. 6).

Besides, states parties to the ICESCR have obligations toward third countries. Financial and technical resources should be made available to developing countries through bilateral or multilateral assistance in order to implement the right to water (CESCR 1990, para. 10, 2003b, para. 38). According to the ICESCR, 'international assistance and co-operation' is to be ensured in order to implement Covenant rights including the right to water (Articles 2 (1) and 23). The Committee's General Comment No. 15 explicitly called for international cooperation: '[T]o comply with their international obligations in relation to the right to water, States parties have to respect the enjoyment of the right in other countries. International cooperation requires States parties to refrain from actions that interfere, directly or indirectly, with the enjoyment of the right to water in other countries' (CESCR 2003b, para. 31).

Moreover, although the UN General Assembly and Human Rights Council have recognized that the right to water should not be viewed by states as having impacts on the law of transboundary water resources, it is difficult to operate a separation between these two areas of international law. There can be cases where riparian states have ratified human rights agreements and freshwater agreements, which both contain the HR2W. Moreover, the Committee's General Comment No. 15 does not make a distinction between waters that cross state boundaries and those that do not. It is argued that the minimum core obligations of the HR2W apply both to national and transboundary water resources.

Furthermore, there is an emerging international practice calling for the inclusion of HR2W in transboundary water agreements. For example, the Guidelines on the HR2W in Africa adopted by the African Commission on Human and Peoples' Rights in 2020 encourage states to 'explicitly recognise the right to water in transboundary water agreements' and considers the right to water as 'as one of the relevant factors that determine whether the use of the resource is equitable and reasonable' (African Commission on Human and Peoples' Rights 2020, para. 35).

### *The normative content of the right to water*

As underscored by the CESCR, the right to water contains both freedoms (the right to maintain access to existing water supplies necessary for the right to water and the right to be free from interference, such as the right to be free from arbitrary disconnections or contamination of water supplies) and entitlements (the right to a system of water supply and management that provides equality of opportunity for people to enjoy the right to water) (CESCR 2003b, para. 10). The elements of the right to water must be adequate for human dignity, life and health, in accordance with articles 11 (1) and 12 of ICESCR, and the adequacy of water required for the right to water is framed under the broad three substantive standards – availability (sufficient quantity and continuous for personal and domestic uses), quality (safe and acceptable color, odor and taste) and

accessibility (physical, economic (affordable), non-discrimination and information) (CESCR 2003b, para. 12).

### *Availability*

States parties to the ICESCR are required to ensure that the 'water supply for each person must be sufficient and continuous for personal and domestic uses', that is, the right to equal and non-discriminatory access to water (physical availability) for drinking, personal sanitation, washing of clothes, food preparation and personal and household hygiene – to sustain life and health (CESCR 2003b, para. 12). There is no specific amount of water set in law, but the World Health Organization guidelines specify the quantity of water that must be made available for each person and could serve as the basis for national water standards. This obligation applies to both domestic and transboundary water resources. For instance, the Niger Water Charter clearly affirms the fundamental human right to sufficient water for everyone in order to cover personal and domestic uses (Niger Basin Authority 2008, Article 1). These uses include water for drinking, personal sanitation, washing clothes, food preparation, personal and household hygiene. It should be noted that a deviation of an international watercourse that would deprive a local community of the quantity of water necessary to cover its personal and domestic uses would be not only against the HR2W but also the principle of equitable and reasonable use under customary international water law. This principle includes the duty to take into account the 'social and economic needs of the watercourse States concerned' and 'the needs of the population dependent on the watercourse in each watercourse State' (UNGA 1997, Article 6).

### *Quality*

The right to water requires that the water used for personal and domestic uses must be *safe* ('free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person's health') and should be of an *acceptable* color, odor and taste (CESCR 2003b, para. 12). The water for personal and domestic uses must be safe, water facilities and services must be of sufficient quality and states must prevent, control and treat water-related diseases (polluted water resources may have an impact not only on the HR2W but also on the human right to health). Also, water facilities and services must be culturally appropriate and sensitive to gender and privacy requirements.

There are transboundary water agreements that emphasize the duty of riparian states to safeguard the human health of riparian communities. For example, the Niger Water Charter establishes that everyone has the right to safe water (Article 1 (11)), and the Senegal Water Charter considers that pollution also covers risks to human health (Article 1 (15)). The provisions of freshwater agreements regarding the prevention of pollution may contribute to the implementation of the right to water by riparian countries. For example, the UN Watercourses Convention under Article 21 provides that riparian countries must individually or jointly 'prevent, reduce and control the pollution of an international watercourse that may cause significant harm to other watercourse States or to their environment, including *harm to human health or safety*'. The obligation not to cause significant harm includes the prevention of negative impacts on human health. In this manner, the no-harm rule may indirectly contribute to the realization of the right to water ensuring the quality of water resources. Moreover, under the United Nations Economic Commission for Europe (UNECE) Water Convention, the term 'transboundary impact' includes any significant adverse impact on human health (UNECE 1992, Article 1 (2)).

### *Accessibility*

The concept of accessibility covers various aspects: physical accessibility, economic accessibility, non-discrimination and information accessibility (CESCR 2003b, para. 12). This means that water must be physically accessible – within safe physical reach for all in immediate vicinity, physical security must not be threatened during access, and affordable for all, including the most vulnerable groups. Water should also be economically accessible, that is, water services must be affordable for all, and both direct and indirect costs must not threaten the realization of other covenant rights or basic needs. The non-discrimination component indicates that access to all, including the most vulnerable or marginalized, in law and in fact must be ensured. Finally, information accessibility relates to the right to seek, receive and impart information concerning water issues and participate in decision-making processes concerning water.

Some freshwater agreements include the principle of non-discrimination. For example, Article 32 of the UN Watercourses Convention ensures equality of access to remedies which means that where domestic remedies are already available, these remedies should be used by both national and transboundary claimants. Article 32 sets out the basic principle that watercourse states are to grant access to their judicial and other procedures without discrimination on the basis of nationality. Another aspect of the concept of accessibility included in freshwater agreements is related to public information. The main aim of Article 16 of the UNECE Water Convention is to raise the citizens' awareness of – the conditions of transboundary waters; the measures taken or planned to be taken to prevent, control and reduce transboundary impact and the effectiveness of those measures. No similar provision on access to information is provided for in the UN Watercourses Convention, although it could be argued that public participation is an important means by which states sharing transboundary waters fulfill their commitment under the Convention to take 'all appropriate measures' to prevent significant harm. In this context, the 2012 Dniester Treaty which stipulates that 'each Contracting Party shall … ensure public access to information on the status of the Dniester River Basin and public participation in decision-making related to protection and sustainable development of the Dniester basin, as well as projects likely to have significant impact on the status of water and other natural resources and ecosystems' (Dniester Commission 2012, Article 21).

## ***The nature of obligations under the HR2W***

As stated above, states parties have a continuing duty to move as expeditiously and effectively as possible toward the full realization of the right to water. Also, states are obligated to give an immediate effect to the minimum core obligations in relation to the right to water, such as the guarantee that the right will be exercised without discrimination of any kind (Article 2 (2) of ICESCR). This section reflects on the general legal obligations of states and the minimum core obligations pertaining to the right to water.

### *General legal obligations*

Like any other human right, the HR2W imposes three types of obligations on states: the obligations to respect, obligations to protect and obligations to fulfill (Salman 2012). The obligation to respect requires states to refrain from interfering directly or indirectly with the enjoyment of the right to water. For instance, states should refrain from arbitrarily interfering with customary or existing water allocation, denying or limiting equal access to adequate water, unlawfully diminishing or

polluting water or destroying water services and infrastructure (CESCR 2003b, para. 21). The obligations to protect refer to preventing third parties (e.g., individuals, groups, corporations and other entities) from interfering in any way with the enjoyment of the right to water. To that end, states should take the necessary and effective legislative and other measures to ensure that third parties, including when they operate or control water supply services, do not interfere with equal access to adequate water, affordability, and inequitably extracting from water resources (CESCR 2003b, paras 23–24). And, the obligations to fulfill the right require states to facilitate, promote and provide the right and take positive measures to assist individuals and communities to enjoy the right without discrimination and with equitable distribution (CESCR 2003b, para. 25). According to the CESCR, states should also 'adopt comprehensive and integrated strategies and programmes to ensure that there is sufficient and safe water for present and future generations' (CESCR 2003b, para. 28).

### *The minimum core obligations*

As indicated earlier, it is 'incumbent' upon every state party to ensure, at the very least, the minimum essential levels of each of the rights included in the ICESCR. In this regard, the CESCR has specified the minimum core obligations relating to the right to water that are of immediate effect. Among others, states should ensure access to the minimum essential amount of water sufficient and safe for personal and domestic uses to prevent disease, ensure the right of access to water and water facilities and services on a non-discriminatory basis, adopt and implement a national water strategy and plan of action addressing the whole population, monitor the extent of the (non) realization of the right, adopt relatively low-cost targeted water programs to protect vulnerable and marginalized groups and take measures to prevent, treat and control diseases linked to water (CESCR 2003b, para. 37).

The CESCR underscored that states cannot justify their non-compliance with these core obligations, which are non-derogable (one whose infringement is not justified under any circumstances) (CESCR 2003b, para. 40). This assertion makes it clear that there is a minimum standard that must be achieved by states parties and that states cannot attribute failure to meet their minimum core obligations to a lack of availability. The CESCR further stressed that states parties, and other actors in a position to assist, need to provide international assistance and cooperation, especially economic and technical, which enables developing countries to fulfill these minimum core obligations (CESCR 2003b, para. 38).

## *The HR2W as a means to reinforce the diversity of actors involved in negotiations and implementation of treaties on transboundary waters*

The right to water confers special protection to groups who are more exposed to the risks of the lack of water. These groups include women, children, minority groups, Indigenous peoples, refugees, asylum seekers, internally displaced persons, migrant workers, prisoners, detainees and persons with disabilities. The right of Indigenous peoples to participate in decision-making, including in water resources, is enshrined in the 2007 UN Declaration on the Rights of Indigenous Peoples, which requires states to consult and cooperate in good faith with Indigenous peoples to obtain 'free, prior and informed consent' before adopting and implementing activities that may affect them.

The right to water requires that the formulation and implementation of national water strategies and plans of action should respect the principles of non-discrimination and public participation.

Individuals and groups should participate in decision-making processes that may affect their exercise of the right to water. Moreover, they should also be given full and equal access to information concerning water held by public authorities or third parties (CESCR 2003b, para. 48). Some freshwater agreements contain provisions that are relevant to ensure diversity in the stakeholders participating in the management of transboundary water resources. For example, the Niger Water Charter requires riparian parties to define the procedures for the participation of water users in decision-making processes regarding basin-water resources management (Niger Basin Authority 2008, Articles 2, 26). The public should be informed about a project at the beginning of a procedure, and the results of the public participation process should be duly taken into account.

## The extraterritoriality of the HR2W

The HR2W applies first and foremost in the relationship between individuals and states. Human rights law obligations are owed by states to the individuals in their territory and under their jurisdiction. However, the obligations under human rights agreements may also arise in extraterritorial contexts. In the section below, we highlight the key features of the HR2W in a transboundary context and some gray areas.

The human rights obligations, including those related to water, that are enshrined in ICESCR and CRC apply not only to individuals within the territory of a state but also to individuals who are outside a state's territory but under its effective control. This was confirmed by the International Court of Justice (ICJ) in its advisory opinion on the *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory* (International Court of Justice 2004, p. 136, para. 111). Thus, a state should ensure that the right to water is protected and respected toward the individuals who are outside its territory but under its effective control.

There could also be a transboundary dimension related to the right to water when this right is included in agreements on transboundary water resources. This is the case of the Senegal, Niger and Lake Chad Basin Charters as well as the Dniester agreement. This is especially important since transboundary water resources, including rivers, lakes and aquifers, supply drinking water to communities living in different states. The uses of water by one state may have a direct impact on the quantity and quality of water available to the individuals and local communities of other riparian states. The question is therefore whether a state is bound not only by the obligation to ensure access to safe drinking water supplies to individuals and communities living in its territory and under its jurisdiction but also to take into account the right to water of the communities living in other riparian states. If that is the case, a state would have two kinds of obligations: vertical obligations toward its population and horizontal obligations toward other states sharing a transboundary water resource in relation to the water demands of their population (Leb 2012, p. 640).

A first key feature of the integration of the HR2W in transboundary water agreements is the establishment of legal standards in the relationship between riparian states concerning the right to water (Bluemel 2004, pp. 972–977, Salman and McInerney-Lankford 2004, pp. 65–83, UNHRC 2011b, para. 7, Tiboris 2019, pp. 920–921). This recognition may empower vulnerable and marginalized groups to combat exclusion and discrimination in states sharing a water resource. Second, the entitlement to safe drinking water supplies implies a change in the dynamic of negotiations and allocation choices (Bluemel 2004). This is the case of the Water Charters in West Africa. These treaties, recognizing expressly the right to water, go beyond the protection of 'vital human needs' through general principles of international water law. These instruments establish positive obligations to provide water for the satisfaction of vital human needs in a transboundary

context and also cover specific elements of the HR2W. In particular, the Niger Basin Charter affirms that the right to water is a principle guiding the cooperation between riparian states in managing the shared resources (Preamble). The right is defined as the fundamental right to sufficient physically accessible water at affordable cost and of a quality that is acceptable for personal and domestic use by everyone (Article 1). Similarly, the Senegal Water Charter recognizes the enjoyment of the right to water as an explicit objective of any repartition of the water of the river. Furthermore, the Water Charter for the Lake Chad Basin considers the right to water as one of the factors to be taken into account in implementing the obligation of equitable and sustainable use of the Lake Chad Basin (Article 13 (o)). In addition, a specific provision in this Charter ensures that states parties recognize, for the benefit of populations, the right to water and sanitation as a fundamental right of the human person and necessary to ensure its dignity. This article also adds that states parties to the Charter take the normative, institutional and operational measures necessary to ensure the effective implementation of this right (Article 72). In another region of the world, the agreement on the Dniester river between Ukraine and Moldova recognizes the right to water as a key principle of cooperation between the two countries (Article 5 (2)). In addition to these aspects, which are specific to the Water Charters, Article 2 of the ICESCR requires all member states 'to take steps, individually and through international assistance and cooperation, especially economic and technical' for the full realization of the Convention rights. Hence, the recognition of the HR2W does trigger this aspect of international cooperation and development assistance (Matthews 2017, p. 8).

Generally, such transboundary water agreements are becoming a concrete tool for ensuring the effectiveness of the HR2W both at the domestic and transboundary levels. The right to water is viewed by the riparian states as an area of cooperation and not as an instrument of potential tensions between the various uses of a transboundary water resource. The basin organizations, such as the *Organisation pour la mise en valeur du fleuve Sénégal*, the Niger Basin Authority, the Lake Chad Basin Commission and the Dniester Commission monitor the implementation of this right, providing additional institutional protection.

## Challenges in the effective implementation of the HR2W

Despite the progress observed so far, there remain considerable challenges to ensure the effective implementation of the HR2W. The challenges could be seen at two levels – domestic and international. At the international level, the first point that should be mentioned relates to the nature of the obligation – 'progressive realization' and 'core obligation' debate (Salman 2012, Villanueva and García 2016, pp. 343–345). In the CESCR's view, there are core obligations related to the right to water, requiring immediate implementation (CESCR 2003b, para. 37). The other issue relates to the vertical nature of human rights obligations (human rights protect individuals against their government, not against actions of governments of other countries per se) (Russell and McCaffrey 2017, p. 1). This has significant implications on the potential obligations of states in relation to the rights of individuals living in other states where conduct attributable to it affected the HR2W of individuals. Under General Comment No. 15, it is indicated that '[a]ny activities undertaken within the State party's jurisdiction should not deprive another country of the ability to realize the right to water for persons in its jurisdiction' and that they 'should refrain at all times from imposing embargoes or similar measures, that prevent the supply of water ... for securing the right to water' (CESCR 2003b, paras 31–32). Though not yet entirely accepted, some argued that, at least concerning the duty to respect and protect the HR2W, there is a strong case for the existence of an obligation that has a transboundary dimension (Russell and McCaffrey 2017).

The observable challenges at the domestic level include lack of sufficient human and financial resources; lack of appropriate laws, policies and strategies to institutionalize and implement the HR2W; lack of a sustainable and human rights-based approach to water management; insufficient technical capacity; corrupted system and challenges relating to water scarcity compounded by climate change and steady population growth (Salman 2012, Meier *et al.* 2013, p. 14, Nanda 2018, p. 31, UNHRC 2021, para. 6). It is also mentioned that challenges relating to competing demands of the different uses and users and how to guarantee access for all adversely impact realizing the HR2W (Salman 2012, pp. 44–46).

Furthermore, at the conceptual level, there is a claim that the introduction of 'rights' or 'human rights' discourse in the management and protection of transboundary water resources might not deliver the desired outcomes and could potentially derail the efforts for water justice (Donoho 2012, p. 91). First, the scope of the HR2W seems limited to personal and domestic uses, and the recognition also opens Pandora's box about how to address such uses vis-à-vis other uses, particularly when a transboundary dimension is involved. For instance, in relation to water use from transboundary sources, does the HR2W possibly require upstream countries to address the human rights claims from residents in downstream countries (McCaffrey 1992, p. 24, Donoho 2012, pp. 107–108)?[2] Second, ensuring access to safe drinking water requires empowering and supporting public authorities and local actors and the 'rights' approach might not suit the cause, particularly in situations where enforcing rights is not a priority (McCaffrey and Neville 2009, p. 679, Mirosa and Harris 2012, pp. 923, 934). Third, introducing the rights approach might promote inappropriate governance, that is, it might secure increased power to specific groups at the expense of others and make negotiations on water sharing and management more delicate.

## Conclusion

The objective of this chapter was to examine the evolution of the HR2W, its ongoing processes of crystallization and its possible effects on transboundary water cooperation. Despite the enormous progress made in recognizing and defining the scope and nature of HR2W, there is still a long way to go in terms of ensuring universal access to water services as envisioned in the SDG Goal 6 (Spijkers 2020, p. 18, Tignino *et al.* 2022). Today, the HR2W is already recognized as a distinct human right; nevertheless, as we saw, its nature and scope continue to get gradually crystallized. Such recognition has positive impacts on the realization of access to safe drinking water, obliges states to respect, protect and fulfill the right and entitles individuals to claim such a right. In addition, the recognition of the right could also open opportunities for international cooperation and assistance. The examples provided in this chapter illustrate how HR2W can contribute to structure transboundary water cooperation and become a guiding principle at the basin level. In the cases of the Niger, Senegal and Lake Chad basins, the Water Charters take into consideration the HR2W to ensure inclusion and avoid discrimination, to frame how allocation decisions are made and to define equitable and sustainable use of water.

Our contribution opens up new research avenues on how HR2W can contribute to transboundary water management. It notably demonstrates the added value of HR2W for structuring up-front the way countries collaborate at the transboundary level. In this sense, HR2W can contribute as a guiding principle and prerequisite for developments being implemented at the basin level. This being said, the focus on the right should be carefully implemented. In fact, one should also consider the potential impacts that such an entry point might have on existing power relations. Decisions related to HR2W will redefine priorities at the basin level. It will empower certain groups with new capacities, reshuffling the existing balance of power. Such evolution will have to

be accommodated with possible needed readjustment regarding water sharing and management. As a result, legal recognition alone is certainly not sufficient for its realization. States, international organizations, regional organizations such as river basin commissions and stakeholders should strive together to address these challenges that might impact the effective institutionalization and operationalization of the HR2W and ensure that everyone enjoys it, within and across administrative borders.

## Notes

1 See The Constitution of the Republic of South Africa, as last amended by Amendment Act No. 3 of 2003, Article 27; The Constitution of the Republic of Kenya 2010, Article 43 (1) (d) and Uruguay's Constitution of 1966, Reinstated in 1985, with Amendments through 2004, Article 47.
2 McCaffrey argues such duty exists in international law because 'human life and even health should take precedence over economic development'.

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# 35

# REGIONAL PERSPECTIVES ON WATER AND DIPLOMACY

*Saule Ospanova and Sogol Jafarzadeh*

### Key Takeaways

- The OSCE treats water as a strategic resource critical to national and regional security, supporting numerous regional river basin agreements and bilateral management bodies across its 57 participating states to prevent conflicts.
- The OSCE promotes inclusive water governance through regional initiatives like the Women in Water Management Mentoring Network in Central Asia and Afghanistan, recognizing that effective water diplomacy requires engaging civil society beyond just national authorities.
- Establishing frameworks for transboundary water cooperation requires sustained political will, with the OSCE implementing innovative capacity building to maintain dialogue even during conflicts like the war against Ukraine.

### Overview

This chapter explores practical tools and entry points used by the Organization for Security and Co-operation in Europe (OSCE) to advance water diplomacy and institutionalize progress toward transboundary water cooperation in the current political context, with ongoing security challenges in the OSCE area, including the war against Ukraine. Establishing institutions for joint management of water resources requires long-term commitment, engagement, and investment to ensure continued dialogue and ongoing implementation of water agreements.

### Introduction

Transboundary water cooperation allows us to manage shared waters in an integrated and sustainable way through the development of different legal and institutional frameworks (United Nations Economic Commission for Europe, 2015a). Agreements and institutional arrangements, such as river basin organizations, serve as important instruments for sustainable management of transboundary waters, supporting prosperity, and maintaining peace and security (United Nations, 2018). Usually, it takes a long period of dialogue and negotiations before such agreements are

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reached and relevant institutions are established. This chapter explores various tools and entry points that can facilitate such agreements or can be used as informal structures while establishing a formal governance body.

Establishing and maintaining the institutional capacity to ensure sustainable cooperation takes time, resources, and political will. Water diplomacy involves both political engagement and effective water management, in turn requiring strong institutions, technical capabilities, and knowledge base. As the list of mentioned tools and entry points demonstrates, successful water diplomacy is not just a technical challenge but also an organizational and political one. There are, at times, inherent contradictions between the development world and the security agenda, which increase the complexity of transboundary water arrangements and the overall context. Therefore, consistency, perseverance, and discretion constitute important factors in dealing with water diplomacy in times of political tensions and armed conflicts. Water diplomacy tools can be used to de-escalate tensions and to bring parties to the table during the conflict cycle. Flexibility and agility are essential in the process itself but even more important when it comes to financial mechanisms and resources. The tools have to be adaptable to geographic/climate, political, socio-economic, and cultural contexts of the riparian parties at any given time.

At the OSCE, water is regarded as a strategic resource and an essential element of national and regional security. For more information on the OSCE, see Box 35.1. Water scarcity, lack of access, pollution, and deteriorating water quality can threaten socio-economic development and political stability, exacerbating tensions and conflicts. Management of transboundary waters is becoming more challenging, particularly within an increasingly complex context of socio-economic and environmental changes. Population growth will increase pressure on already scarce resources (United Nations Economic Commission for Europe, 2015b), and climate change is further amplifying these pressures, making it more difficult to manage water across borders (Sanchez and Roberts, 2014). To address these challenges, we will need new and innovative approaches to advance water diplomacy and cooperation. The new approaches may include a combination of existing tools or altogether new strategies to address such complexities. The main aim is to facilitate the creation of new institutions that can support participatory and inclusive governance in a transboundary setting.

According to the OECD Principles on Water Governance, endorsed by the OSCE Secretariat, effectiveness, efficiency, trust, and engagement are needed for good water governance (Organization for Economic Co-operation and Development, 2015). Furthermore, legitimate, transparent, accountable, inclusive, and adaptable institutions with adequate capacities and resources are required to develop and manage water resources and the delivery of water services at local, national, and transboundary levels (United Nations Economic Commission for Europe, 2015b).

**Box 35.1 Overview of OSCE**

The OSCE – the world's largest regional security and cooperation organization – offers a valuable platform for collaboration among its 57 participating States (Organization for Security and Co-operation in Europe, 2014). The *OSCE's concept of comprehensive security* covers the politico-military, the economic and environmental, and the human dimensions. The OSCE's comprehensive approach to

security is closely tied to the concept of early warning, conflict prevention, crisis management, and post-conflict rehabilitation, also named the "conflict cycle." OSCE's mandate on water management dates to the Helsinki Final Act of 1975. Since then, the 2003 Maastricht Strategy Document, the 2007 Madrid Declaration on Environment and Security, and the 2014 Ministerial Council Decision on Enhancing Disaster Risk Reduction have all committed OSCE participating states to strengthen the sustainable management of their water resources (Organization for Security and Co-operation in Europe, 2015). Furthermore, the 2021 MC Decision on Strengthening Co-operation to Address the Challenges Caused by Climate Change solidified OSCE political commitments on climate change. Meanwhile, sustainable water management has become a regular focus of the discussions at the OSCE's annual Economic and Environmental Forum (EEF).[1]

The OSCE has promoted water cooperation in several river basins: development and signing of transboundary water treaties, establishment and support to the bilateral management bodies, cooperation at technical level fostering data sharing, developing capacity, and encouraging greater participation in water management (Organization for Security and Co-operation in Europe, 2014).

The OSCE has supported a number of bilateral and basin-level agreements, several pioneering river basin organizations, and common national legislation applying integrated water resource management (IWRM) and integrated river basin management (IRBM) standards. One of the examples is the Sava River Treaty, signed in 2002, which brought together several countries of the former Yugoslavia, some of whom were involved in armed conflicts of the 1990s, and continues to demonstrate the transformative potential of water diplomacy (Salamé et al., 2021) and Chapter 42 of this book.

Since 2003, the OSCE, together with United Nations Economic Commission for Europe (UNECE), has supported the establishment and operation of a bilateral water commission, contributing to the cooperation between Kazakhstan and Kyrgyzstan in the basins of the Chu and Talas Rivers in Central Asia. The initial process culminated with the establishment of the Chu-Talas Commission in July 2006 and was followed by activities to foster stakeholder participation and ensure appropriate institutional arrangements.

The Organization continues to support transboundary cooperation in the Dniester River Basin between Ukraine and Moldova, including the preparation of the 2012 *Dniester Treaty* and the establishment of the *Dniester River Basin Commission* in 2018. The Strategic Action Programme for the basin, developed within the framework of the GEF-funded project and implemented by OSCE in partnership with United Nations Development Programme (UNDP) and UNECE, was endorsed by the two riparian countries in 2021. The partner organizations, as well as both riparian states, are committed to addressing the Programme implementation despite multiple challenges posed by the ongoing war against Ukraine.

In part, this progress has been built on the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, also known as the Water Convention, which currently counts 38 OSCE participating States and the European Union among its Parties. Countries outside the UNECE region have been able to join the Convention since 2013. Most OSCE participating States have also ratified other relevant environmental conventions, such as the Convention on Environmental Impact Assessment in a Transboundary Context (the Espoo Convention).

## Water Diplomacy Tools and Entry Points

### *Multi-stakeholder Inclusive Approach*

Water management involves reconciling multiple different groups and users of water at many different scales – from local to national, regional, and international. The different uses of water require collaboration at many levels and across different sectors (water, energy, agriculture, navigation, health, transportation, among others). Historically, the focus of water diplomacy tended to be on the adequate representation of national authorities (United Nations Economic Commission for Europe, 2018). This is important but not sufficient: it is also important to foster bottom-up participation that complements top-down engagement.

Through its projects and activities, the OSCE has been working to promote the active engagement of women in water diplomacy in Central Asia. In September 2021, the OSCE launched the Women in Water Management Mentoring Network in Central Asia and Afghanistan, developed in partnership with the Regional Environmental Centre for Central Asia (CAREC) and the Stockholm International Water Institute (SIWI). The Network unites a community of practice for women water experts engaged in different aspects of transboundary water cooperation processes. The Network started its activities online during the COVID pandemic and now conducts both online and in-person meetings and workshops, including many regional and international events. For instance, the Network co-organized and was featured in the Women Water Forum at the 2022 Dushanbe Water Conference (Stockholm International Water Institute, 2022a), a number of events at the 2022 World Water Week in Stockholm (Stockholm International Water Institute, 2022b), as well as the 2023 UN Water Conference (Koch and Patel, 2023).

### *Civil Society Engagement and Representation*

Local-level civil society groups, with some of them participating in the water user associations' dialogues, can act as facilitators in water-based conflict resolution. For instance, in the case of the Kura-Aras rivers shared by Georgia, Armenia, and Azerbaijan, public participation in the 1990s allowed for the development and support of informal water diplomacy mechanisms, paving the way for the future transboundary water sharing arrangements (Nicol et al., 2001). Another good example is the Dniester River Commission where consistent pressure from civil society and their strong engagement in the process ensure institutional response, accountability, and the ongoing evolution of negotiated arrangements between riparians.

The OSCE has also proactively engaged women and youth groups in water governance with the aim to strengthen the dialogues with civil society, including through the Aarhus Centres.[2]

### *Innovative and Interactive Capacity Building*

Many successful agreements have evolved over time to enable trust-building among participating stakeholders. Water diplomacy itself can be seen as a series of confidence-building measures paving the way for closer cooperation and more effective water management. The innovative and interactive capacity building constitutes one of the best entry points for continued progress in cooperation and institutional effectiveness.

The OSCE provides various opportunities for capacity building for a wide range of stakeholders. This includes the development of the published guidance document on mainstreaming gender in water governance (Organization for Security and Co-operation in Europe, 2020), as well as a corresponding e-learning course (Organization for Security and Co-operation in Europe, 2021).

The Organization continues to support capacity-building initiatives on water diplomacy and gender-sensitive negotiation and mediation skills to ensure increasing engagement and technical competencies among relevant stakeholders. In addition, further support for the development and application of digitalization tools in the water sector, as well as broader youth engagement approaches, is integrated into this process. Many of such activities can be used as milestones and opportunities to monitor and evaluate the progress of institutional arrangements in order to adjust the approaches and methodologies, as needed.

### *Generating Political Will to Support Institutional Progress in Participatory Water Governance*

To ensure institutional progress in the existing water governance arrangements, any innovative practices and their applications require political support and adequate resourcing, which can be achieved through high-level political engagement, as well as the development of effective partnerships. The OSCE has been able to bring attention to the progressive trends in water diplomacy through the development and application of participatory tools in water governance, such as strong use of networking and knowledge-sharing platforms, data and information exchange, and inclusive engagement. Some of these tools are particularly relevant in the present challenging context, with an ongoing war against Ukraine and other political tensions across the OSCE area. Participatory engagement of diverse stakeholders, cross-regional development of professional networks, and building gender-sensitive capacity in negotiation and mediation in the water sector help increase the effectiveness of institutional mechanisms for transboundary water cooperation, thus contributing to peace and security.

By raising awareness and promoting water diplomacy tools and applications, we can aim to increase political will, advance participatory frameworks, and attract much-needed resources to this field.

## Conclusion

The importance of transboundary water cooperation for sustainable management, peace, and security highlights the need for comprehensive legal and institutional frameworks. The OSCE recognizes water as a strategic resource linked to both national and regional security. The security-related challenges posed by climate change, population growth, and technological development further emphasize the urgency of innovative approaches in advancing water diplomacy and cooperation. The OSCE's support for the implementation of the UNECE Water Convention, including the facilitation of transboundary river basin agreements, bilateral management bodies, and relevant capacity-building initiatives, reflects a commitment to advancing the water, peace, and security agenda. By advocating a multi-stakeholder approach, civil society engagement, innovative capacity building, and the generation of political will, the OSCE actively promotes water cooperation and good governance.

As the global community faces unprecedented challenges in water resource management, the outlined tools and entry points for effective water diplomacy become increasingly crucial. The protracted nature of negotiations and the necessity for sustained dialogue underscore the complexities involved in transboundary water cooperation. The establishment of new institutions that support transboundary water cooperation and the adoption of inclusive governance structures and policies are more important than ever. Parties and stakeholders involved need to address the existing challenges as well as proactively prepare for emerging issues, demonstrating their

commitment to building climate-resilient and sustainable mechanisms for the integrated management of shared waters. There is a clear need for increased international and regional cooperation in the face of evolving threats to water security, and the OSCE can play a vital role in shaping a more secure future in transboundary water cooperation.

## Notes

1 Water was a theme at the EEF in 2002, 2007, 2008, 2014, and 2015.
2 See https://aarhus.osce.org/

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# 36

# PRINCIPLED, PRAGMATIC, AND POSSIBLE

## Water Diplomacy in the Great Bay Estuary

*Kevin M. Smith and Shafiqul Islam*

**Key Takeaways**

- The "urgency-certainty trap" arises in confronting complex water challenges when stakeholders either rush to action without adequate understanding or become paralyzed seeking certainty.
- Water diplomacy can help practitioners be effective in everyday governance and management settings by giving them the tools to find a principled and pragmatic middle path forward.
- This middle path leverages adaptive governance and management as a pragmatic means of ensuring that our actions remain effective and aligned with our principles in a continuously changing world.

### A Middle Path Between Short-Sighted Action and Indefinite Delay

As a reader of this book, there's a good chance you are looking for actionable ideas to improve water outcomes—whether for individuals, communities, or the social and ecological systems that sustain them. It is also likely you've encountered your fair share of roadblocks along the way. Even in those fortunate situations where nearly everyone agrees that *something is wrong*, it's rare to find *scientific* or *political* agreement on what to do about it. This is frustrating but expected. After all, the challenges we face are complex, making the consequences of our actions difficult to anticipate. Even the most well-intentioned interventions risk wasting limited resources or even causing unanticipated harm. Still, divergence of opinions about what to do need not be used as a convenient excuse to go with the status quo. Inaction carries its own consequences, and waiting for scientific certainty or the convergence of opinions to achieve *the best course of action* usually means indefinite delay. Desirable water outcomes are in jeopardy at both extremes of this, what we call the urgency-certainty trap (see Table 36.1).

Fortunately, there is an actionable middle ground between rushing to action and endlessly chasing certainty and convergence of opinions. This is the space of plausible interventions—actions that are *scientifically defensible* and *politically feasible*. When framed as experiments in learning by doing, these interventions provide a structured way to test credible hypotheses while maintaining socially acceptable and culturally appropriate levels of engagement for desirable outcomes. This shifts the focus from finding agreement on *what will work* to finding agreement

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*Table 36.1* Characterizing the urgency-certainty trap and the middle path through principled pragmatism

| | *Urgency trap* | *Principled pragmatism* | *Certainty trap* |
|---|---|---|---|
| Central Question | What seems obvious? | What is worth trying? | What will definitely work? |
| Pattern | Reactive unilateralism/ "doing before learning" | Collaborative experimentalism/ "learning by doing" | Cooperative paralysis/ "learning before doing" |
| Risk | Inaction is perceived as the greatest risk; the risk of unanticipated or harmful consequences is underappreciated | The risks of inaction and imperfect action are managed through collectively vetted, structured experiments | Action without certainty is perceived as the greatest risk, even though the consequences of inaction may be irreversible |

on *what is worth trying*. The outcome of such experiments is a portfolio of options that can be tested, refined, scaled, or outright replaced based on what is learned along the way. Assembling and testing this portfolio allows us to act with both urgency and care, recognizing, respecting, and navigating complexity and ongoing disagreement through an intentional process of learning by doing and *adaptation*.

Prior chapters explored how the concepts, tools, and language of water diplomacy can be useful in *addressing water as a source of conflict* (Chapter 6) and *recognizing water as a source of cooperation* (Chapter 7). This chapter will explore how water diplomacy can serve as a framework for enhancing collaboration and adaptation in everyday water governance and management. Collaboration and adaptation are critical in addressing water challenges that are overshadowed by scientific uncertainties and interpretational ambiguities. In the face of acute water challenges, action is always tempting. However, a rush to action can be short-sighted and often means working alone, either of which may increase the likelihood of ineffective or harmful outcomes. A commitment to collaboration helps us avoid the dangers of reactive modes of unilateral action and helps ensure we carefully consider and respond to the problem at the appropriate scale.

At the same time, if we (or those we are collaborating with) are unwilling to question existing positions and practices, our conversations are unlikely to advance toward effective action. A commitment to "being adaptive" allows us to avoid the "certainty" trap of indefinite discussion and delay. It acknowledges the need to openly question the efficacy of the status quo and explore incremental changes to govern and manage water that are intentional and well-considered. We should not invite change for the sake of change, nor should we propose or pursue adaptations that compromise our values. Rather, adaptive governance and management are appropriate when they allow us to align our actions (and the uncertainty or risk of their outcomes) with our principles.

## Principled Pragmatism: A Framework for Adaptive Action

While all water governance and management systems are *adaptive* to some degree, few are eager to take an experimental approach to their pursuit of better water outcomes. This reluctance is understandable because there are many aspects of water governance and management where stability and consistency are essential. Livelihoods depend on reliable access to clean and affordable water. Ecosystem health requires the steady enforcement of hard-won environmental protections. Local governments rely on predictable regulatory schedules to plan and execute capital investments, and

so on. However, we must not confuse rigid procedural execution with desirable outcomes. In a changing world, we must remain open to the reality that repeating what we did yesterday may not lead to desirable outcomes tomorrow.

Despite the tension between *consistency* and *adaptation*, these two notions need not conflict. The key is to distinguish the *principled consistency* of an unwavering commitment to shared values—such as equity, sustainability, and accountability—from the *dogmatic consistency* of strict adherence to entrenched positions and established practices. When examined closely, this dogmatic form of consistency (e.g., the letter of the law) is often at odds with serving the values it claims to protect (e.g., the spirit of the law). Indeed, achieving outcomes consistent with our principles often requires *pragmatism*—an openness to the adaptation of tightly held positions and practices in response to changing circumstances. This form of adaptation is not a departure from consistency. In fact, this notion of *principled consistency* ensures that our actions remain effective and aligned with our principles in a world that is continuously changing.

So, to achieve a consistent application of principles over time, we must be open to pragmatic adaptation of how we govern and manage water. However, this does not mean we should invite arbitrary changes or those that are simply more convenient. Rather, we should justify changes to our positions and practices only when there is a credible basis that those changes will better align our actions and their outcomes with our guiding principles. Progress often suffers when there is confusion on these points. When *being principled* is misinterpreted as demanding rigid adherence to established policies, we miss out on adjacent opportunities for improving outcomes. When *being pragmatic* is conflated with compromising the integrity of our intentions, we risk the paralysis of an unending search for perfect solutions. However, when we recognize that pragmatic adaptation is justified precisely because it allows our actions and their outcomes to be consistent with our guiding principles, we open the door to meaningful progress. This *principled pragmatism* allows us to maintain a firm and consistent commitment to core values while remaining flexible in our positions and practices, creating space for the continuous learning by doing and adaptation needed to achieve desirable outcomes in the face of complex water challenges (Smith and Islam 2019, Smith *et al.* 2021).

In this chapter, we explore how water diplomacy can help address these challenges even during the ordinary, everyday practice of water governance and management. In these sometimes-informal spaces, water diplomacy offers the actors involved in governance and management—e.g., operators, planners, regulators, civic groups, Indigenous communities, local residents, farmers, environmental organizations, and so on—the language, tools, and techniques to "be diplomatic" in ways that help them achieve their goals, especially when those goals depend on the actions of others. In such cases, *principled pragmatism* can provide a framework for reaching an agreement on an adaptive path forward that does not require a compromise of values. This shared understanding helps avoid a short-sighted rush to action, on the one hand, and getting stuck in an indefinite search for a perfect solution on the other.

As a motivating example, we will focus on a decade-long regulatory effort to address nitrogen pollution in the Great Bay Estuary (GBE) in the United States. For years, the process was caught in the urgency-certainty trap. First, it was trapped seeking certainty, as technical experts struggled to reach scientific agreement on what to do. Then, it was trapped by urgency, as an advocacy organization pressured regulatory authorities to take immediate action. This led to legal and political backlash, diverting resources that could have been invested in pollution reduction. In the aftermath of these events, the parties sought to reset their relationships. In the aftermath, a coalition of regulated communities sought to build political will for future regulatory cooperation through voluntary regulatory concessions and contributions to estuary monitoring activities. Eventually, all

parties coalesced in an informally negotiated problem-solving process that exemplified principled pragmatism by acknowledging that the desired level of pollution control would not be possible without both adaptive governance and adaptive management.

This is not a simple story of regulatory avoidance or unprincipled bargaining, but an example of water diplomacy in action. As we will explore, the parties escaped the urgency-certainty trap by leveraging concepts central to water diplomacy. They actively built political will for cooperation, sought an informal process of negotiated problem-solving, confronted scientific uncertainties through joint fact-finding and participatory modeling, and sought assistance from reputable third parties. Collectively, these actions created space for a principled and pragmatic middle path toward addressing nitrogen pollution in a complex, coupled social-ecological system. Regulators demonstrated adaptive governance by restraining the full force of their authority in exchange for voluntary actions from regulated communities that would better serve environmental goals. In turn, these communities embraced adaptive management by forming a coalition jointly invested in experimental approaches to address the complex challenge of unregulated non-point sources of nitrogen pollution. As you continue through this chapter, please take note of the key water diplomacy concepts and tools as they appear in the remainder of this chapter and are summarized in Table 36.2.

## The GBE: A Complex, Coupled Social-Ecological System

The GBE is a dynamic tidal system located between New Hampshire and Maine on the Atlantic coast of the United States. The GBE consists of Great Bay (the estuary's namesake), Little Bay, and the Piscataqua River, which forms a boundary between the states. Eight major rivers drain its 2,651 $km^2$ watershed and collect runoff from more than 50 municipalities. The Lamprey, Squamscott, and Winnicut rivers flow directly into Great Bay, while the Bellamy and Oyster rivers empty into Little Bay. The Cocheco River and Salmon Falls River—fed by its major tributary, the Great Works River—converge to form the Piscataqua River, which mixes with inflows from the Gulf of Maine twice daily (Odell *et al.* 2006, Trowbridge 2007). The GBE is a tidally dominated system (Bricker *et al.* 2020). About 55% of the watershed's annual precipitation reaches the estuary through stream flow, but these freshwater inputs represent only about 2% of the water entering the estuary annually through tidal exchanges (Trowbridge 2007).

During mean high water conditions, the GBE has a water surface of about 54 $km^2$ (Trowbridge 2007). Tidal effects vary within the estuary. Within the Great Bay itself, more than 50% of its high-tide surface area is exposed as eelgrass beds or mudflats at low tide. Eelgrass and mudflats provide the two largest habitat types in the estuary (Short 1992). Intertidal salt marsh habitats are the third most extensive, with high marsh varieties found at the mouths of the river and low marsh varieties found scattered along the estuary's periphery along the high-tide line (Short 1992). In addition to providing essential habitat for hundreds of estuarine species, salt marsh and eelgrass, along with flat diatoms and phytoplankton, form the base of the estuary's food web, supporting a wide variety of estuarine birds, fish, and invertebrates. This biological diversity provides ecosystem services, ranging from erosion control and nutrient removal to supporting culturally and economically significant recreational and commercial activities such as fishing, oyster harvesting, and lobstering (Odell *et al.* 2006, Bricker *et al.* 2020, Goldstein *et al.* 2025).

In addition to its rich ecology, the region's waterways, clay deposits, and forests made it an attractive site for industrial development following European colonization. By the 18th century, over 90 sawmills operated in the watershed, supporting an active shipbuilding industry. Sawdust from the mills choked the waterways, while extensive logging increased erosion and caused

*Table 36.2* Water diplomacy concepts and tools relevant to the Great Bay Estuary

| *Water diplomacy concepts* | *Relevance to the Great Bay Estuary* |
|---|---|
| Watershed-Scale Organizations | The National Estuary Program established a regional, non-regulatory organization to engage stakeholders and support water governance and management activities across the estuary. This organization helped build political will for a collaborative approach and offered a level of technical implementation support that made the approach feasible. |
| Scientific Uncertainties | The complexity of the estuary complicates science-based justifications for specific regulatory actions. |
| Joint Fact-Finding and Collaborative Modeling | Regulatory authorities countered scientific uncertainties by appealing to joint fact-finding and collaborative modeling, first with technical experts and then directly with the regulated parties. |
| Risks of Unilateral Action | A party to a collaborative process abruptly sidestepped it and took unilateral action, leading to a chain of events that compromised ongoing collaborative efforts. |
| Third-Party Engagement | While not adopting formal arbitration, parties appealed to mutually appointed neutral experts to provide peer review on scientific findings that were the subject of ongoing debate. |
| Building Relationships and Political Will | After the fallout caused by unilateral action, the parties made voluntary commitments and engaged in good faith demonstrations that helped repair relationships and build political will to move forward collaboratively. |
| Managing the Process | Parties elected to adopt informal discussions on the rough outline of a regulatory framework that would be mutually agreeable before proceeding to the required formal public comment period. This helped mitigate the likelihood of appeal. |
| Negotiated Problem-Solving | After spending time on both sides of the urgency-certainty trap, parties eventually recognized that the complexity of the situation warranted a negotiated approach to problem-solving that emphasized principled pragmatism and an adaptive approach to governance and management. All parties made pragmatic departures from their standard operating procedures in pursuit of actionable outcomes aligned with their principles. |

shallow areas of the tributaries and shoreline to fill in. Around this time, fishery stocks in the estuary were visibly in decline, likely due to the combined effects of unmanaged commercial fishing and the impacts of mill dams on anadromous (migratory) fish (Short 1992). By the late 19th century, shipbuilding was in decline, but brickmaking was hitting its peak, with more than 40 brickyards active on the estuary's banks. The demand for kiln fuel continued to drive deforestation until the estuary's clay deposits had been exhausted, leaving its shoreline permanently altered. Many of these bricks were used to construct the textile mills and tanneries that became ubiquitous throughout the region (Audubon Society of New Hampshire 1994). These facilities continued to discharge large volumes of chemical-laden wastewater into the estuary until the industry collapsed during the Great Depression (Short 1992).

Today, anthropogenic threats to the GBE are still present, but their impacts are arguably less visible, tangible, or certain. Airborne pollutants, especially from combustion, are continuously and invisibly deposited on land and water surfaces. Land use changes are increasing the

volume of stormwater runoff and diminishing its quality. Effluent discharged from the estuary's 17 wastewater treatment facilities quietly accounts for more than 1% of its freshwater inflow (Trowbridge 2007, Roseen 2020). Out of sight, leachate from the tens of thousands of aging household septic systems mixes with groundwater and finds its way to nearby streams (Trowbridge *et al.* 2014). Despite all of this, indicators of estuary health do not tell a clear-cut story of total decline and collapse. Reports tracking indicators of the estuary's health over the last two decades have consistently shown a mixed diagnosis, often with more positive trends than negative ones (New Hampshire Estuaries Project 2003, PREP 2006, 2009, 2013, 2017a, Piscataqua Region Estuaries Partnership 2023).

Such indeterminacy is typical of complex, coupled social-ecological systems. Even prior to human influence, the GBE was a dynamic ecosystem shaped by non-linear interactions between physical, chemical, and biological processes. There is no stable historical baseline or ideal state we can point to that exemplifies its health. Indeed, on a modern understanding of ecological systems, periods of stability often naturally precede rapid systemic change, as rigidity in the system gives way to creative destruction and reorganization (Holling 2001). This suggests that the *health of an estuary is in its diversity and its dynamism rather than in the maintenance of any particular state*. While there are no stable conditions we can point to as a historical ideal, there are certainly future stable states we'd like to avoid, such as those that reflect local extinction, irreversible habitat loss, persistent hypoxic zones, or other indicators of ecosystem collapse. Today, the estuary's dynamics reflect an inextricable coupling between ecological and social systems. Measuring the impact of human activities on estuary health requires understanding how these activities either support or undermine the estuary's capacity for adaptation and renewal (Odell *et al.* 2006).

## Distinguishing Water Governance and Management

Recognizing the GBE as a coupled social-ecological system has important management and governance implications. Achieving better outcomes is not a matter of restoring the estuary to some historical conditions but of maintaining the essential functions that both ecological and human communities depend upon—and doing so in the face of changing situations. This vision of dynamic stewardship challenges water governance models that rely heavily on static standards and rigid regulations. It also calls into question the effectiveness of common approaches to water management, especially those characterized by procedural, uncoordinated actions taken by individual communities and jurisdictions. Rather than viewing governance and management as external forces acting on the system, we must recognize them as integral parts of the coupled, dynamic system itself. As such, their effectiveness depends on their ability to account for the adaptability and interconnectedness of the broader system in their own structures and functions (Imperial *et al.* 1993).

Here, we think it becomes important to clarify our distinct usages of water *governance* and *management*. While our definitions of these terms do not fall outside standard interpretations, readers should be aware that others will define them differently, and some will use them interchangeably or without clear intention. We emphasize this distinction in our chapter simply to enhance the clarity of our arguments; we are not trying to make strong theoretical or prescriptive claims.

Our use of water governance refers to the organizations (people), institutions (policies), and interactions (processes) that determine how water is managed (developed, routed, allocated, and protected). Governance encompasses how different stakeholders interact, how priorities are set, and how accountability is maintained and enforced, setting the normative framework for how

water should be managed. Water management, in contrast, involves the concrete actions and operational decisions taken within the framework established through governance—the day-to-day work of implementing projects, monitoring progress, and updating practices based on measured outcomes. Put succinctly: "Management refers to activities of analyzing and monitoring, developing and implementing measures to keep the state of a water resource within desirable bounds," while "governance sets the rules under which management operates" (Pahl-Wostl *et al.* 2012, p. 25). Importantly, governance is not synonymous with government. While governments play important roles in water governance, the idea of governance extends beyond formal political bodies to include universities, non-governmental organizations, businesses, lobbies, community groups, and so on.

There are several benefits to distinguishing between governance and management, even though their activities sometimes overlap. First, it allows us to highlight their distinct operational needs: water management requires sufficient authority to respond quickly to day-to-day concerns, while water governance needs structured spaces for deliberation, stakeholder engagement, due diligence, and oversight. Second, this distinction shows how adaptation differs between these functions. Governance bodies must periodically reassess policies to ensure they align with core principles when facing emerging challenges. Management bodies, on the other hand, must continually adjust implementation plans to achieve desirable outcomes within the constraints of governance policies, available resources, and environmental conditions. Effective governance and management are interdependent and require ongoing communication and realignment. However, while management occurs primarily at the local level (i.e., at the level of management interventions), governance can take place across multiple levels of authority and multiple jurisdictional scales. This is the third reason that the distinction between management and governance is important: it reminds us that the unique and varied aspects of water governance structures are a critical factor in their overall effectiveness.

## Regulatory Primer for the GBE

As we have acknowledged, governance is not synonymous with government. Nevertheless, public agencies often hold the formal regulatory oversight responsibilities and enforcement authority under government statute. In the United States, environmental governance is shaped by distinct authorities distributed across multiple levels (i.e., national/federal, regional, state, municipal). No level has complete authority in all aspects.

At the federal level, the United States Environmental Protection Agency (USEPA) was established in 1970 to rein in the "patchwork of state laws, local ordinances and common law nuisance protections" that were not adequately protecting the environment or public health (Adler 2006, p. 67). However, USEPA's responsibilities and authorities remain limited. For example, the Clean Water Act (CWA) is the source of most of the Agency's authority to protect surface waters, but it only grants USEPA authority to regulate "point source" pollution that is discharged through "discrete conveyances" into the "navigable waters" of the United States (Hepner 2021). These restrictions mean USEPA has limited authority to regulate diffuse sources of pollution, such as those that arise from land-use and development decisions (e.g., agricultural runoff, seepage from septic systems, or atmospheric deposition of combustion by-products). While the CWA stipulated that individual states should retain the rights to make these decisions (Hepner 2021, p. 363), most states delegate development authority to municipalities under "home rule" provisions either by legislative statute or as part of the state's constitution (Stahl 2020). As a consequence, a given watershed often overlaps with many distinct local authorities, each making independent management

decisions about land use that impact the ability to deliver on environmental governance objectives at the national level (Arnold 2005, p. 10166).

Under CWA, each state independently establishes water quality standards for its navigable waters. A water quality standard includes two key components: (1) *designated uses*, which identify the intended purposes of the water body, such as public water supply, fish and wildlife habitat, recreation, or navigation and (2) *water quality criteria*, which define the water quality conditions necessary to attain and protect those designated uses. These standards are subject to approval by USEPA, but states are given wide latitude in determining designated uses and associated water quality criteria. For example, states have the option of choosing whether they want to be regulated based on *numeric* or *narrative* water quality criteria. Numeric criteria specify measurable criteria such as concentrations, temperatures, or turbidity limits. Narrative criteria, on the other hand, are descriptions of water quality that require judgment and interpretation. For example, the surface waters of New Hampshire should be free of substances that "produce odor, color, taste or turbidity that is not naturally occurring and would render the surface water unsuitable for its designated uses."[1]

How such narrative criteria are interpreted has significant regulatory consequences. States must document those water bodies failing to meet water quality standards every two years in a so-called "303(d) listing."[2] Water bodies that receive a 303(d) listing are considered "impaired" and are subject to additional scrutiny and requirements, such as the implementation of Water Quality-Based Effluent Limitations (WQBELs) and a regional pollution budget known as a Total Maximum Daily Load. In the absence of a 303(d) listing, environmental regulators are typically reticent to attempt to impose anything beyond technology-based minimum pollution control measures. These are called "technology-based" because they are established based on available technologies and applied categorically for an identified pollutant (e.g., suspended solids) or pollution source (e.g., wastewater treatment plant). For example, publicly owned treatment works (POTWs) that treat municipal wastewater are required to meet so-called secondary treatment standards applicable to all POTWs in the United States. These standards set common effluent limitations for pH, biological oxygen demand, and total suspended solids but lack requirements for controlling common nutrients found in wastewater, such as nitrogen and phosphorus.

However, when the discharge of any pollutant has a "reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality," then stricter requirements *must* be applied.[3] These additional requirements are typically codified and enforced through pollution permits as part of the National Pollution Discharge Elimination System (NPDES). Under the CWA, any point-source discharge of pollutants to a navigable water body is unlawful without a permit or exception. Regional offices of the USEPA are responsible for issuing these NPDES permits, unless a state applies for and is granted "primacy" and has demonstrated that its requirements would be at least as stringent as the federal program. Today, most states administer their own NPDES programs, with the USEPA retaining an oversight capacity. While primacy brings additional autonomy, administering a compliant program at the state level requires a significant commitment of resources. There is a split in the GBE: Maine manages its own program, while New Hampshire's program is administered by Environmental Protection Agency (EPA) Region 1.

While EPA Region 1 has the sole authority to issue water pollution permits in New Hampshire, the strictness of those permits is effectively limited by the state's designation of which water bodies are "impaired." Since this impairment designation rests on narrative criteria that cannot be measured, the New Hampshire Department of Environmental Services (NHDES) must interpret them and justify those interpretations to EPA Region 1. These interpretational challenges often

make narrative criteria a focal point for both government and non-government actors seeking to evade or enforce stricter pollution control requirements.

## The GBE Confronts the Urgency-Certainty Trap

### *NHEP/PREP: A Reputable Third Party*

In 1995, the GBE was officially recognized as an "estuary of national significance" and brought under the National Estuary Program (NEP) umbrella. The NEP was established by the CWA amendments of 1987 as a non-regulatory program to respond to the unique water quality and ecological challenges faced by individual estuaries. The USEPA oversees the NEP, but each estuary program operates under local administration through a management committee (MC) representing diverse governmental and non-governmental stakeholders. A central focus of the NEP is for each participating estuary to develop and subsequently implement a Comprehensive Conservation and Management Plan (CCMP). The goal of the CCMP is to establish a shared vision for collaborative efforts in the estuary that includes *management objectives* and corresponding *action plans* with tangible *outputs,* desired *outcomes*, and *implementation metrics* to measure progress (PREP 2010). The NEP program in the GBE started as the New Hampshire Estuaries Project (NHEP), but since 2009, it has been operating as the Piscataqua Region Estuaries Partnership (PREP) to reflect its inclusion in some Maine communities.

PREP is funded by the USEPA but locally administered and hosted by the University of New Hampshire (UNH), a public research university. PREP's organizational structure reflects its intention for inclusive collaboration "on a broad, cross-jurisdictional scale" (PREP 2019). Permanent seats on the MC are given to USEPA, NH Fish and Game, NHDES, Maine DEP, UNH, and Great Bay National Estuarine Research Reserve, but the remaining 22 seats are open to "federal, state and local government agencies, non-governmental organizations, user groups, citizen groups, business and industry representatives, and research institutions" on a three-year cycle (PREP 2019). Moreover, "in conjunction with the Director, the MC will ensure a balance among the various viewpoints as new members are added to the committee" (PREP 2019). As a regional and non-regulatory body with no enforcement capabilities, PREP relies on being a strong facilitator to achieve its goals. Its broad stakeholder base lends legitimacy and credibility to its efforts. In this story, it served as a reputable watershed-scale organization supporting key water diplomacy activities, including collaborative modeling, joint fact-finding, and relationship building.

### *TAC: Seeking Scientific Consensus*

From 2005 to 2008, NHDES consulted the Technical Advisory Committee (TAC)[4] of NHEP (which later became PREP) to establish estuary-specific recommendations for numeric water quality criteria for nutrients, such as phosphorus and nitrogen (NHEP 2005, 2006, 2007a, 2007b, 2008a, 2008b). The state's existing narrative criteria simply state that water bodies "shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring" (Trowbridge 2009, pp. 1–2).[5] NHDES was under pressure to propose numeric criteria to eliminate ambiguity in its approach to determining whether the GBE was impaired.

To establish these numeric criteria, TAC sought to clarify the level of anthropogenic nitrogen pollution the estuary could withstand without impairing its *designated use* of supporting aquatic life.[6] The prior decade had seen a notable loss of eelgrass (*Zostera marina*), an important species of submerged aquatic vegetation at the base of the estuary's food web. So, eelgrass was selected

as the primary indicator of the health of aquatic life (Trowbridge 2008, p. 3). The TAC's approach conceptualized the relationship between nitrogen and eelgrass decline using a "pressure-state-response" model (NHEP 2006). This conceptual model relates higher nitrogen loads (pressures) to higher ambient nitrogen concentrations in the estuary (state). These elevated ambient nitrogen concentrations support greater phytoplankton concentrations, which increases light attenuation (primary response). Ultimately, this increased light attenuation inhibits the growth of eelgrass (secondary response). The rationale is that nitrogen is typically the "limiting" nutrient in estuaries and coastal waters. This means that even small increases in nitrogen can lead to increases in algal growth (Bricker *et al.* 2007, p. 13). Algal growth decreases water clarity, which limits the sunlight available to light-dependent submerged aquatic vegetation such as eelgrass (Bricker *et al.* 2007, p. 3). This reflects a plausible, even "textbook" model of cultural eutrophication (i.e., nutrient enrichment as resulting from human activities).

However, the GBE is a complex ecosystem, and the TAC struggled to reach an agreement that the observed data supported the model as a basis for developing numeric criteria for nitrogen. Minutes from 2006 note that the data "show increasing nitrogen concentrations and decreasing eelgrass but do not show a strong linkage between increasing nitrogen and decreasing water clarity." Meeting minutes from 2007 note that "the classic model of eelgrass shading by phytoplankton blooms does not describe the Great Bay Estuary," although "other factors, such as the proliferation of nuisance macroalgae [...] could still relate nitrogen loads to eelgrass loss" (NHEP 2007b).

These notes in the minutes do not necessarily reflect the majority positions of the TAC but nevertheless reveal a multi-year debate focused on scientific precision at the expense of pragmatic action. Despite an admirable commitment to joint fact-finding and collaborative modeling, it appeared TAC had fallen into the *certainty trap*, and those seeking urgent action began to react unilaterally.

### *CLF: Seeking Action*

The Conservation Law Foundation (CLF) is a New England-based environmental advocacy organization that often leverages litigation and petitions to assert legislative and regulatory pressure. CLF representatives regularly attended the TAC meetings and would have been aware of any ongoing scientific controversies or disagreements (NHEP 2005, 2006, 2007a, 2007b, 2008a, 2008b). Nevertheless, CLF sent a letter in March 2008 to the NHDES arguing that the next edition of the 303(d) should list GBE waters as impaired due to eelgrass loss and list nitrogen as the major cause of impairment (Trowbridge 2008, p. 2). CLF's goal with the impairment listing was to trigger EPA Region 1's enforcement of stricter regulations. NHDES made some concessions in the 303(d) list sent to EPA Region 1 for approval, but CLF remained unsatisfied. CLF wrote to EPA Region 1 in October 2008 demanding a more aggressive enforcement schedule (Irwin 2008). Internal NHDES emails dated November 26, 2008, state that "to avoid a potential lawsuit with CLF, EPA has decided that Gt [sic] Bay should be listed for N" (Environmental Appeals Board 2012a). The emails also indicated that although NHDES was still waiting on advice from TAC, they would consider moving forward with amended 303(d) listings before the conclusion of the TAC process if CLF was unwilling to wait until the next listing cycle in 2010 (Environmental Appeals Board 2012a).

Faced with these pressures, NHDES moved forward with finalizing its *Numeric Nutrient Criteria for the Great Bay Estuary*. These criteria were established using the nitrogen-induced light-attenuation model that was still being debated within the TAC (Trowbridge 2009). While not formally adopted, NHDES argued that they could provide an interpretation of the state's existing

narrative criteria and used them to revise their impairment listings. The revised 2008 listings were sent to EPA Region 1 and approved without an additional public comment period in 2009. By February 2010, internal EPA Region 1 emails suggested the criteria be used when "reissuing overdue permits" for POTWs. Critically, the emails revealed that the stringency of WQBELs proposed for the POTWs in the GBE would depend on "CLFs [sic] agreement not to appeal" them (Environmental Appeals Board 2012a). To avoid a potential lawsuit, EPA Region 1 was prepared to pre-emptively impose strict effluent limits of 3 mg/L of total nitrogen (TN), which is generally considered to be the practical limit achievable through current municipal wastewater technologies.

By acting unilaterally during a collaborative process, slow as it was, CLF fell into the *urgency trap*. In doing so, CLF set off a chain of events that undermined the legitimacy of NHDES's recommendations, opened EPA Region 1 and NHDES to accusations of procedural and scientific misconduct, and put the parties on an adversarial footing.

### *GBMC: Seeking Flexibility and Facing Resistance*

Caught off guard by the additional impairment listings and anticipating regulatory action, several New Hampshire municipalities with POTWs in the GBE formed the Great Bay Municipal Coalition (GBMC) in 2010.[7] The GBMC pooled resources and hired outside legal and technical experts to review the "scientific and regulatory bases" of the 303(d) listings (Environmental Appeals Board 2012c, p. 9). Over the next year, the GBMC and its experts met with NHDES to make their case regarding what they considered to be the scientific flaws in the impairment listing methodology, especially the lack of a demonstrable causal link between nitrogen, transparency reduction, and eelgrass loss in the GBE.

The coalition also commissioned an economic analysis to quantify the potential financial burden of upgrading six member POTWs to meet various TN effluent limits. The preliminary findings were published in June 2011. Taken collectively, the report suggested that approximately $74 million in capital investments would be required to reduce effluent concentrations to 8 mg/L, while achieving the more stringent 3 mg/L TN standard would necessitate $160 million. Additionally, annual operating costs were projected at $8 million for maintaining the 8 mg/L standard and $12 million for the 3 mg/L TN requirement (Applied Economic Research 2011). The report showed that the marginal costs of nitrogen removal can grow rapidly at POTWs and suggested to GBMC that funding might be better spent exploring non-point-source reductions through an adaptive management approach.

That same month, June 2011, the NHDES and the GBMC reached a Memorandum of Agreement (MOA) acknowledging that "related to eelgrass loss, there is uncertainty in the line of evidence for eutrophication as a causative factor" and that "an adaptive management approach to water quality improvement is required to reduce impairments to aquatic life use in the Great Bay Estuary" (Environmental Appeals Board 2012b). The Agreement committed the GBMC to invest in additional efforts to model the impacts of nitrogen pollution and to start the process of retrofitting some existing POTWs to achieve a seasonal average of 8 mg/L of TN. It also committed NHDES to ongoing engagement in a collaborative modeling process and supporting a delay in the EPA's issuance of final NPDES permits for the POTWs of the GBMC until the research could be concluded (Environmental Appeals Board 2012b).

In committing to an adaptive management approach that combined immediate action, long-term monitoring, and modeling, GBMC positioned itself to take a middle path of *principled pragmatism*. However, the adaptivity of their management practices was ultimately constrained by inflexible governance institutions.

After a few months of meetings, the terms of the Agreement appeared to be in jeopardy. While the Agreement-driven scientific reconciliation process was ongoing, NHDES continued to work with EPA Region 1 to develop draft TN permits for POTWs in the GBE using the still-unadopted 2009 numeric criteria. By December 2011, EPA Region 1 had issued three draft NPDES POTW permits (Exeter, Newmarket, and Dover) at the limits of technology (3 mg/L TN). On February 7, 2012, GBMC met with the acting EPA Region 1 Administrator to point out what they saw as flaws in the scientific basis for the permits and to highlight their ongoing modeling work in collaboration with NHDES. The Administrator reportedly closed the meeting by recommending that the GBMC communities start researching how they would finance a 3 mg/L TN effluent limit (Environmental Appeals Board 2012c, pp. 15–17).

### *Backlash*

The GBMC responded through a series of legal proceedings and actions, quickly filing a lawsuit against NHDES for illegal rulemaking[8] and a "Science Misconduct" charge with USEPA headquarters against EPA Region 1 for "ignoring the available scientific data, precluding participation, and excluding critical studies" (Environmental Appeals Board 2012c, p. 17). On June 4, 2012, the U.S. House of Representatives Committee on Oversight and Government Reform held a field hearing in New Hampshire titled "EPA Overreach and the Impact on New Hampshire Communities." By December, three GBMC municipalities had filed a civil action, No. 12-1994 (JDB), against the USEPA in the U.S. District Court for the District of Columbia. Simultaneously, two of the GBMC municipalities filed a "Petition to Review" with the EPA Board of Appeals[9] challenging the Town of Newmarket's NPDES permit.

Perhaps the most consequential outcome of these actions came with the settlement of the initial state-level lawsuit. This settlement resulted in NHDES retracting support for the draft 2009 numeric nitrogen criteria (NHDES *et al.* 2014). As the case progressed, GBMC and NHDES reached an agreement on an external peer review process for the draft criteria. Each reviewer gave an independent and nuanced response. However, their findings largely agreed that while the model used by TAC and NHDES was an appropriate initial choice, the data did not support its continued use to estimate nitrogen limits for the GBE (Bierman *et al.* 2014). Upon appeal, the case was pending before the New Hampshire Supreme Court.[10] Given the outcome of the peer review process and the pending case, the parties agreed to settle on the condition of retracting the unadopted 2009 numeric criteria (NHDES *et al.* 2014).

While GBMC arguably adopted an antagonistic stance in pursuing litigation, it remained open to lessons from water diplomacy, such as an appeal to neutral and reputable third parties. While not binding or formally arbitrated, the opinions of the neutral reviewers ultimately became the basis for the settlement. Since EPA Region 1 relied on these criteria for permitting, future NPDES permitting activities would require an alternative basis for deriving numeric interpretations of the state's narrative criteria.

## Resetting and Rebuilding Relationships

In the month following the settlement agreement, representatives from the GBMC, NHDES, and EPA Region 1 met to discuss a way forward, including "possible partnerships between EPA, DES and the Cities to further develop the hydrodynamic model and additional water quality components to be used as important tools in future permitting requirements for the Great Bay municipalities" (Burack 2014). Over the course of the following year, the parties came to an informal agreement

to administratively continue the existing NPDES permit for the City of Rochester's POTW for at least 18 months. The City (a GBMC member) had committed to undertake voluntarily "best efforts" to limit the POTW's effluent concentrations of TN to 8 mg/L on a seasonal basis. The agreement noted that "significant differences remain between the Region and the City regarding the scientific basis for the draft permit's nutrient limits" but that "we hope to use this eighteen month period to reset the relationship, to advance shared interests and to seek opportunities to narrow outstanding differences" (Moraff 2015).

Following this agreement, the GBMC continued its voluntary investments in monitoring and modeling activities. This included the deployment of sondes in the Upper Piscataqua River to gather data on the impact of the voluntary nitrogen reductions taking place at the Dover and Rochester POTWs (GBMC 2018). At the same time, a collaboration between NHDES, the UNH Stormwater Center, and Great Bay municipalities was underway to create a Pollution Tracking and Accounting Program (PTAP). The goal of the PTAP was to provide a standard framework for reporting on non-point pollution reduction activities (Scott 2020).

PREP, likewise, continued to pursue CCMP implementation activities, including TAC efforts to understand nitrogen impacts in the estuary (PREP 2016). Representatives from GBMC participated in TAC activities, including contributing data to an external peer review process (PREP 2017b). PREP's 2018 *State of Our Estuaries* report opened with a letter from its executive director emphasizing the importance of a collaborative approach to governance and management in the GBE. The Director emphasized: "[I]n a system as uniquely dynamic as ours, we will not reestablish estuarine health by focusing on one problem. Nor will we get there by allowing ourselves to be discouraged by what we observe or distracted by our differences. We must work collaboratively to make our estuaries more resilient to the changes they are experiencing now, and those to come" (PREP 2017a, p. 2).

Taken together, EPA Region 1's concessions, the GBMC's voluntary commitments and engagement, and PREP's advocacy helped repair the parties' relationships and build political will to find a collaborative, principled, and pragmatic way forward.

Throughout the spring of 2018, EPA Region 1, NHDES, and the GBMC met several times in closed-door sessions (Stucker 2018a, 2018b). Around that time, the NH State Legislature unanimously approved Senate Bill 450, which authorized the use of state funds to investigate obtaining "primacy" that would allow NHDES to administer the NPDES program directly. The GBMC membership praised the vote as a step toward regulation that considers "both the science available and the local tax implications" (Stucker 2018c). The GBMC had been publicly advocating for an adaptive management approach to nitrogen control since 2010, arguing that imposing the strictest possible effluent limits at POTW was not an economically effective way of addressing nitrogen pollution (GBMC 2010). Ahead of the initial spring 2018 meeting, the EPA Region 1 Administrator wrote to reporters that EPA remains "open to flexible and affordable ways for communities to make progress in Great Bay, including working across the sectors responsible for nutrient contributions, including wastewater, stormwater (runoff and other non-point sources)" (Stucker 2018a). From late 2018 to 2019, the GBMC, EPA, and NHDES continued to work together to establish the basis for a "loading-based adaptive management permitting approach" (Weitzler 2022).

## The Great Bay Total Nitrogen Permit

In January 2020, USEPA Region 1 issued a draft NPDES permit known as the Great Bay Total Nitrogen General Permit. Previous nitrogen permitting attempts in the GBE had focused on updating individual POTW permits to include TN effluent limits alongside other site-specific

requirements. However, this general permit would provide coverage to any of New Hampshire's POTWs discharging into the GBE but would be specific to TN. From EPA Region 1's perspective, this general permit approach offered an alternative that would speed up the timeline of TN regulation at all of the POTWs, allow for the application of consistent requirements and standards and have lower administrative overhead (USEPA 2020a, p. 4). Issuing a general permit also served to unite the GBE POTW communities in a collaborative effort to reduce non-point TN pollution.

USEPA Region 1 acknowledged that, regardless of specific effluent limits enforced at the POTWs, significant non-point-source reductions would be necessary to achieve the desired outcomes in the GBE. It also acknowledged that it did not have the authority to regulate these non-point-source reductions directly. Instead, the draft permit framed this as an "optional pathway" to TN reduction "through collaboration between EPA, NHDES and numerous public, private and commercial stakeholders" in a "long-term, adaptive management approach" (USEPA 2020b, p. 1, Appendix II).

The fact sheet for the draft permit frames adaptive management "as an approach to natural resource management that emphasizes learning through management where knowledge is incomplete, and when, despite inherent uncertainty, managers and policymakers must act" (USEPA 2020a, p. 23). However, the fact sheet also emphasized adaptive management was not about taking action for action's sake: "[U]nlike a traditional trial and error approach, adaptive management has explicit structure, including a careful elucidation of goals, identification of alternative management objectives, and procedures for the collection of data followed by evaluation and reiteration" (USEPA 2020a, p. 23). This framing, alongside the permit's other elements, offers a view of how adaptive governance and management can be a pragmatic answer to uncertainty and change that allows us to remain aligned with unchanged principles.

After a public comment period, the draft permit was revised into a final permit published on November 24, 2020. The following sections will explore the principled pragmatism embodied in program elements based on this final permit and USEPA Region 1's response to public comments.

### *Basis for Nitrogen Regulation*

The previously challenged draft numeric criteria had attempted to establish a maximum ambient TN concentration for the GBE. This proposed maximum was intended to serve as a measurable, numeric interpretation of New Hampshire's narrative water quality criteria. However, the specificity of this concentration became a sticking point that could be scientifically debated indefinitely in good faith. This time, EPA Region 1 adopted a load-based approach, setting an annual budget on the mass of TN added to the estuary from both point and non-point sources. EPA Region 1 cited multiple studies that identified dramatic seagrass loss in estuaries with nitrogen loading rates above 100 kg of TN per hectare of estuary per year and set that threshold as a preliminary nitrogen budget. While some public comments again raised the specter of scientific imprecision in translating these studies given the complex conditions within the GBE, the final permit emphasized that the adaptive management framework would offer an "inclusive and transparent process for comprehensively evaluating any significant scientific and methodological issues relating to the permit, including the choice of a load-based threshold" (USEPA 2020c, p. 7). This load-based approach offered a pragmatic numeric interpretation of New Hampshire's narrative standards that established the "reasonable potential" for nitrogen to impair aquatic life (and therefore legally justify WQBELs), while following through with a principled commitment to ongoing scientific re-evaluation.

### *Nitrogen Allocations*

Rather than setting concentration-based WQBELs, the permit allocated a portion of the annual nitrogen budget to each POTW going forward (i.e., on a mass basis). The permit granted the seven smallest facilities a portion of the nitrogen budget based on TN effluent concentrations and average flows from 2012 to 2016. The six largest POTWs accounted for 85% of the TN discharged from POTWs to the GBE, and the permit considered them a separate category. Since many of these larger facilities were on track to achieve 8 mg/L TN through voluntary commitments or as part of legal settlements with the USEPA, the permit allocated a mass budget based on an assumed effluent concentration of 8 mg/L and average flows from 2012 to 2016. According to USEPA Region 1, establishing nitrogen limits at these levels reflects the least stringent WQBELs that are "legally permissible" based on *antidegradation* principles, prohibiting increased pollution loads to impaired waters (USEPA 2020d, p. 17). By setting WQBELs on a mass basis, the permit effectively mandates that the total quantity of nitrogen pollution released through the POTWs should not increase, even if the POTWs discharge wastewater at higher rates in the future (e.g., due to development). Adopting a load limit aligned with current discharge was a pragmatic choice that deferred the need to precisely calibrate a water quality model while applying a consistent standard and remaining committed to antidegradation principles.

### *Opting In*

The final permit reflected an "opt-in" structure, where communities must apply for coverage under the general permit. EPA Region 1 acknowledged that the success of the permit in achieving water quality outcomes "is predicated on the support of NHDES and the municipalities to carry out nitrogen reductions from nonpoint sources voluntarily, because neither NHDES (nor, obviously, EPA) have sufficient regulatory basis to require such reductions at this time" (USEPA 2020d, p. 8). In a strict regulatory sense, the adaptive management of non-point sources is not an obligation of the permit. However, the spirit of the permit is that when communities opt in, they are affirming a voluntary commitment to make progress on non-point-source TN reductions, because "water quality standards will not be achieved … by means of reductions at POTWs alone" (USEPA 2020d, p. 8), which only account for about one-third of the GBE's nitrogen load (USEPA 2020d, p. 7). For communities that do not opt in or fail to make progress on nitrogen reductions, the alternative is "the immediate imposition of effluent limitations based on the limit of technology, or below" (USEPA 2020d, p. 8). In this way, EPA Region 1 pragmatically restrained the full exercise of its narrow regulatory scope to open the door to voluntary non-point-source reductions that may better serve a principled commitment to maximizing estuarine health. This was not an unprincipled abdication of enforcement: progress on these voluntary reductions must be tracked through standardized accounting and monitoring frameworks, and coverage under the general permit can be revoked for insufficient progress.

### *Adaptive Management: Planning, Accounting, Monitoring, Evaluating, and Deliberating*

As a governance body, EPA Region 1's policies and positions influence the space of possible management interventions available to the municipalities. Noting that any regulatory approach would have "inherent uncertainty" due to "the complex nature of the Great Bay Estuary," EPA Region 1 acknowledged "the most expeditious pathway to achieving water quality standards in Great Bay

is through an adaptive management approach that allows municipalities the flexibility to direct resources to a combination of point source and non-point source nitrogen reduction" (USEPA 2022, pp. 4–5). With the Great Bay Total Nitrogen Permit, EPA Region 1 pragmatically created space for actionable experiments at the municipal level but also provided an "explicit structure" to ensure these experiments went beyond a "traditional trial and error approach" (USEPA 2020a, p. 23).

Municipalities participating in the adaptive management framework were expected to (1) create an explicit plan with actionable experiments to reduce TN; (2) use a standardized accounting program to track hypothesized TN reductions for each experiment as well as TN additions due to development and land use change (e.g., PTAP); (3) undertake long-term ambient water quality monitoring to assess impact; (4) evaluate their results and its implications for the science underlying the permit; and (5) propose a timeline for coalescing these results into a TMDL for TN, ideally using "a consensus-based approach" (USEPA 2020d, p. 65). These program elements showcase a principled approach to experimental management actions by requiring municipalities to (1) have a structured plan and project charter, (2) document each experiment, its hypothesis, and potential confounding factors, (3) monitor outcomes, (4) evaluate hypotheses, and (5) set a timeline for engaging in a deliberative reconciliation process. These commitments were to be formalized in a "voluntary submittal" to EPA Region 1, which could be filed jointly as a means of encouraging municipal collaboration.

## Reconciling Numbers, Narratives, and Nitrogen Regulation

### *CLF: Acknowledging Feasibility and Seeking Assurances*

In 2020, the CLF commissioned a feasibility study for the draft permit. The study concluded that the required 45% reduction in non-point TN to obtain the 100 kg/hectare/year budget "is feasible and can be accomplished over a 20-yr implementation period at costs well within national norms" (Roseen 2020, p. 5). However, CLF maintained that while they were open to this approach, feasibility alone was not convincing. Writing to EPA Region 1 during the comment period, CLF argued for permit changes that would establish "clear accountability for municipalities; expeditious achievement of water quality standards and a healthy estuary; and enforceability" (Trimarco *et al.* 2020, p. 18). With the publication of the final permit, CLF was still not convinced that these conditions were adequately addressed.

In order to avoid a last-minute appeal against the proposed permit, the GBMC and the CLF entered into a facilitated dialogue that led to a legally binding settlement agreement. CLF agreed not to appeal the general permit in exchange for certain commitments from the GBMC communities, including the establishment of a formal intermunicipal agreement (IMA) to pursue adaptive management. The communities were also required to hold regular public meetings, each setting aside speaking time for a CLF-designated representative of an external stakeholder committee. The settlement agreement also bound the municipalities to pursue sustainable funding for the initiative through taxes and grants, work collaboratively on piloting innovative nitrogen reduction approaches, and annually report on their progress (GBMC and CLF 2021). Through this settlement agreement, CLF was able to add legally binding assurances to the municipalities' voluntary commitments. It demonstrated pragmatism in forgoing an appeal in exchange for a binding agreement with the municipalities consistent with its principles (e.g., public oversight and environmental stewardship).

### *MAAM: Implementing Collaborative Adaptive Management*

With the signing of the settlement agreement between GBMC and CLF, GBMC essentially folded into a new partnership known as the Municipal Alliance for Adaptive Management (MAAM). MAAM was formalized by the signing of the IMA by six of the 12 regulated POTW communities. The IMA laid out the framework for other communities to join MAAM, including the financial commitments and anticipated benefits of membership. The IMA was a formal covenant pursuant to NH state laws (e.g., RSA 53-A) regarding municipal agreements (MAAM 2021). The formality of the agreement represented a strong commitment to collaboration. Its legal basis may have played a factor in the other six communities initially deciding to pursue their adaptive management plans independently. Nevertheless, from the perspective of EPA Region 1, even achieving this level of collaboration "provides an exemplary model," and MAAM's public meetings have "proven to be an effective platform to promote communication" between all relevant parties, including public stakeholders (Moraff 2023, p. 3).

While EPA Region 1 demonstrated a principled and pragmatic approach to adaptive governance, the MAAM communities demonstrated a principled and pragmatic commitment to collaborative adaptive management. Compared with the alternatives, this commitment to collaborative adaptive management is a pragmatic way of "resolving significant municipal concerns" and "aligning governmental authorities on near-term actions and investments" (e.g., ensuring a stable regulatory regime for the municipalities), "avoiding disputes and delays" (e.g., avoiding lawsuits), and "cost-effective implementation" (e.g., reduced program overhead through joint collaboration) (MAAM 2021, p. 10). However, it is also principled, in that the IMA retains good faith commitments to "improving and protecting water quality based on sound science" and to "address the scientifically-defensible reasonable interests of [...] stakeholders" while "meeting the needs of the citizens of their communities" (MAAM 2021, p. 10).

As of 2024, MAAM has eight members and has released a revised Joint Adaptive Management Plan every year since 2021. In that time, MAAM provided PREP with $1.3 million in additional funds for monitoring programs and secured $1 million in additional grant funding for future work. According to the accounting program, non-point-source contributions of TN have been reduced by almost 4,500 kg/year through non-structural (e.g., street sweeping) and structural (e.g., green infrastructure) interventions (MAAM 2024). While significant, this represents less than 2% of the current target non-point reductions for the GBE over the 20-year implementation period (Roseen 2020, p. 15). However, while many non-structural interventions are quick to implement, structural interventions can take several years to complete, including siting, design, permitting, and construction. The 2024 Plan shows that many such projects are in progress, which may allow MAAM to catch up with implementation targets. In addition to well-known "best management practices," the 2024 Plan documents several innovative experiments, ranging from evaluating "compost tea" as an alternative to traditional fertilizer for athletic fields to novel treatment technologies for septic systems that are impractical to connect to the sewer system (MAAM 2024).

Heading into the 2026 permit cycle, it may be too early to judge whether non-point-source reductions in the GBE are on track, especially as those targets are subject to move up or down based on the evidence produced through the adaptive management approach. However, the adaptive management approach has allowed forward progress without requiring all questions to be settled and has avoided a regulatory default to less cost-effective effluent reductions at POTWs. This second time around, the communities have avoided the urgency-certainty trap. Compared with the relative inaction during the periods of litigation, the momentum of non-point-source TN reduction in the last few years is evident. The municipalities are moving toward achieving better

*Table 36.3* Timeline of nitrogen regulation in the GBE

| *Year(s)* | *Events* |
|---|---|
| 1995 | GBE was officially recognized as an "estuary of national significance" under the National Estuary Program, leading to the establishment of NHEP (later PREP) as a non-regulatory governance and management body for the estuary. |
| 2005–2008 | NHEP's TAC worked with NHDES to establish estuary-specific numeric water quality criteria. Considering empirical observations and the GBE's complexity, TAC struggled to reach a scientific agreement on an adequate conceptual model. |
| 2008 | CLF sent letters to NHDES and EPA Region 1 pushing for impairment listings with nitrogen as the major cause prior to the conclusion of the TAC process. |
| 2009 | Under threat of lawsuit, NHDES develops draft numeric criteria for nitrogen and uses them to submit revised 2008 303(d) impairment listings to EPA Region 1 without an additional public comment period. |
| 2010 | New Hampshire municipalities with POTWs formed the GBMC to challenge the scientific basis of impairment listings. |
| 2011 | NHDES and GBMC reached an MOA to defer permit action and to pursue collaborative modeling and some voluntary reductions; EPA Region 1 pushes forward with draft permits at the limits of available technology (3 mg/L TN). |
| 2012 | GBMC filed multiple legal challenges against NHDES and EPA; the U.S. House Oversight Committee holds a field hearing. |
| 2014 | GBMC and NHDES reached a settlement after appealing to neutral third parties for peer review. The settlement resulted in NHDES retracting support for the draft 2009 numeric nitrogen criteria. Because of state authority over water quality criteria, EPA Region 1 could no longer regulate using these criteria. |
| 2015–2018 | Some informal agreements on voluntary nitrogen reduction were made while stakeholders collaborated on monitoring, the development of PTAP, and TAC modeling efforts. |
| 2018 | The NH Legislature authorizes investigation of state-level administration of the NPDES program; EPA Region 1 signaled openness to "flexible and affordable ways" to address nutrients. |
| 2018–2019 | Stakeholders informally negotiate a "loading-based adaptive management permitting approach" through a series of closed-door meetings. |
| 2020 | EPA Region 1 issued a draft (January) and final (November) Great Bay Total Nitrogen General Permit. CLF signals concerns and a possible appeal. |
| 2021 | CLF and GBMC reached a legally binding settlement; GBMC reorganized as MAAM after an IMA formalized a collaborative approach. |
| 2021–2024 | MAAM and other Great Bay municipalities with POTWs make progress on their adaptive management plans for non-point-source TN reduction. |
| 2026 | The second Great Bay Total Nitrogen General Permit cycle will begin. |

water outcomes, navigating a complex challenge through a collaborative adaptive management approach. They are taking an experimental approach to management interventions, monitoring outcomes, documenting their progress, and hopefully learning and becoming more effective as they go. Their collaborative commitments have helped build stronger working relationships with other management jurisdictions that share the GBE and with water governance bodies at every level. A timeline summarizing the history of nitrogen regulation in the GBE is shown in Table 36.3.

**Box 36.1 A Note on Transferability**

Adaptive governance and management usually take different forms based on the capacities and constraints of a given context. Compared with many locations worldwide, the GBE context is characterized by strong legal and regulatory enforcement and well-established watershed-scale organizations that provide long-term monitoring and technical expertise. The GBE approach to adaptive governance and management reflects the capacities of this context in its reliance on legally enforceable pollution permits, intermunicipal agreements, settlements, and sophisticated water quality monitoring and modeling efforts. This arrangement is appropriate for the GBE, not only because of its capacities but because of its constraints: it consists of many disparate communities formalized as separate municipal authorities with their own political jurisdictions. This splintering of communities limits the space for a shared sense of obligation out of a common identity. The communities also do not primarily depend on the estuary for their livelihoods or interact with it in their daily lives. Fortunately, what is one context's constraint can be another's capacity. While many contexts lack the GBE's formal monitoring and enforcement capabilities, they may exhibit stronger capacities in terms of informal institutions (e.g., social norms) and deeper ecological connections in their daily lives. In such contexts, a sense of shared heritage and livelihoods that depend more directly on an ecological system can replace the need for formal regulation and sophisticated monitoring in adaptive management and governance (Roux *et al.* 2023). A key lesson highlighted from the GBE case is the need and awareness to understand the capacities and constraints of a particular context before attempting "blind replication" for implementation.

## Toward Water Diplomacy in Everyday Governance and Management

The story of the GBE demonstrates how the concepts, tools, and language of water diplomacy can be useful in establishing and sustaining relationships necessary for collaborative water governance and management in informal and ordinary settings. Following the 2014 settlement, the GBMC, NHDES, and EPA Region 1 moved away from formal legal disputes and adopted what could be considered an informal water diplomacy process. This transition shows how the choice of process type can shape outcomes (Chapter 13). In this case, the process created space for dialogues centered on relationship building rather than strict regulatory enforcement. The parties continue to confront the challenge of scientific uncertainties (Chapter 14) through forms of joint fact-finding (Chapter 20) and participatory modeling (Chapter 21). They have built a cadence of cooperative actions (e.g., making voluntary investments, providing procedural flexibility, entering settlement agreements) to build and sustain political will (Chapter 19). They regularly engaged with and sought the advice of reputable third-party organizations (Chapter 10 and Chapter 33), such as PREP, and continue to do so. A broader recognition and better understanding of water diplomacy in these spaces can only serve to improve outcomes and help parties avoid the urgency-certainty trap common to decision-making on complex water challenges.

Falling into either side of this trap puts better water outcomes in jeopardy. We should not act hastily, but we cannot wait forever. We need to find an actionable middle path to outcomes that reflect our values. When confronting complex water challenges, a certain degree of "learning while doing" is often needed. While this requires us to be open to pragmatic adaptation of our positions and practices, we should always remember that this is not pragmatism for pragmatism's

sake. Rather, it is pragmatic adaptation justified on the basis that it keeps our actions and outcomes aligned with our unchanging principles. In practice, an effective adaptive approach often requires strong collaborative relationships across water management jurisdictions and with governance bodies at multiple levels. Water diplomacy can play a strong role in building and nurturing these relationships. Moreover, the GBE demonstrates how these relationships, coupled with a joint commitment to principled pragmatism, can enable forward progress on complex water challenges despite persistent uncertainties.

Regulators in the GBE are demonstrating collaborative adaptive governance by moderating their point-source regulatory authority in favor of voluntary commitments targeting non-point-source reductions with potentially greater ecological benefits. Meanwhile, the regulated communities are demonstrating collaborative adaptive management through a cross-jurisdictional coalition, pooling resources and implementing experimental strategies to address the complex challenge of non-point nitrogen pollution sources. All parties have demonstrated pragmatism in their willingness to re-evaluate their previous positions and practices while maintaining principled commitments to environmental protection that emphasized sound science (e.g., through peer review and external evaluation), sustainability (e.g., antidegradation), transparency (e.g., standard accounting through PTAP), and accountability (e.g., regular monitoring and reporting).

As Box 36.1 clarifies, the GBE experience reflects a unique context with strong formal regulatory and monitoring capabilities. Nevertheless, it reveals that the value of water diplomacy transcends formal settings and can be useful in addressing everyday water governance and management challenges, including those that arise in complex, coupled social-ecological systems. Neither the governance nor management bodies in the GBE could proceed with certainty in their actions. However, they have worked together to create space within a principled governance framework for pragmatic management experiments with measurable outcomes. In doing so, they have provided a model of how a principled and pragmatic framework may help other communities avoid the urgency-certainty trap and move forward on a middle path to achieve better water outcomes.

## Notes

1 This is codified in New Hampshire state regulation as N.H. Admin. Code § Env-Wq 1703.03.
2 This refers to section 303(d) of the CWA, which stipulates the reporting requirement.
3 This is codified in federal regulation as 40 C.F.R. § 122.44(d)(1)(i).
4 The TAC was an expert committee composed primarily of researchers from the UNH and members of the NHDES.
5 This is codified as N.H. Admin. Code § Env-Wq 1703.14, which sets standards for Class B waters in New Hampshire, which includes all estuarine waters (Trowbridge 2009, pp. 1–2).
6 The aquatic life designated use is codified as N.H. Admin. Code § Env-Wq 1703.19.
7 GBMC membership changed over time, but at one point included Exeter, Dover, Durham, Newmarket, Portsmouth, and Rochester (Environmental Appeals Board 2012b).
8 Docket 217-2012-cv-00212 in Merrimack County Superior Court.
9 Docket No. 12-05.
10 Docket No. 2013-0119.

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# 37

# NEITHER NECESSARY NOR SUFFICIENT

## Roles and Relevance of Enabling Conditions in Resolving Complex Water Problems at Different Scales

*Shafiqul Islam and Enamul Choudhury*

**Key Takeaways**

- For complex water problems, a distinction is made between causes and conditions.
- The chapter asserts that cause–effect relationships can't be ascertained using the traditional notion of necessary and sufficient conditions; instead, one needs to explore the presence (or absence) of enabling conditions to suggest appropriate intervention.
- Any proposed interventions need to carefully examine the capacity and constraints of a given problem context.
- For any intervention, one needs to monitor the evolving nature of the water problem and the changes in the problem phase – from simple to complicated to complex – such that the intervention remains adaptive to the changing nature of the water problem.

### Introduction

Does life cause death? Does oxygen cause a fire? Does rain cause floods?

On the surface – from the philosophical (life and death) to physical (rainfall and flood) – these appear to be simple questions with causal connections. But are these simple questions where cause–effect relationships can be established using necessary and sufficient conditions? Or are they complex questions with interdependent processes and interactions? Can cause and effect be ascertained for questions that are loaded with multiple sources of variability, uncertainty, and ambiguity?

Rainfall may be a necessary condition for certain floods (e.g., think of a flood resulting from a dam failure), but it is neither a sufficient condition nor a causal factor to reliably forecast a flood. If the rain comes after weeks of dry weather, soil can absorb considerable water, limiting runoff. Three moderate rain events over a week could create a substantial flood. However, that isn't always the case: it depends on so many factors, from the intensity and duration of rainfall, soil characteristics, and topographical conditions to the presence of human interventions, such


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as flood prevention ponds and canals. Rain may be a necessary condition to create a flood, but rain is not sufficient to always create a flood. Yet, similar causal reasoning has been and continues to be a primary mode to explain complex phenomena, inform policy decisions, and design interventions.

Problems that include the access, allocation, and use of shared water become complex due to the crossing of many boundaries – political, social, and jurisdictional, as well as physical, ecological, and biogeochemical – and the concurrent interactions of variables, processes, actors, and institutions. For boundary-crossing water management problems, we need to make a distinction between causes and conditions. In such situations, causes differ in meaning from enablement. With a cause, an effect is necessary, whereas, with enablement, effects are not necessary but possible. Many effects are possible that may or may not happen because of contextual interactions (e.g., the presence of oxygen is necessary but will not lead to fire unless there is a trigger). Such interactions for many boundary-crossing water problems cannot be prescribed a priori.

The challenges and opportunities associated with governing and managing boundary-crossing water problems are many. There are multiple schools of scholarship, yet there appears to be a void of actionable ideas on what to do and how to accomplish desired outcomes in a specific and dynamic context. With the risk of being too simplistic, the general approach picks one or more items from this list: if we get the science (hydro-management) or market (hydro-market) or power and participation (hydro-politics), or the process (hydro-diplomacy) right, we can successfully manage our water resources.

The logic and promise of the traditional notion of causality have served us well to understand and manage simple problems (with clear cause–effect relationships; for example, chlorination reduces waterborne diseases). For complex problems (where cause–effect relationships are uncertain), the power and promise of the traditional approach to specifying the causal conditions are losing relevance. Not even a simple question like "What causes floods?" can provide generalizable and predictable answers. Bringing in the human agency to prioritize, for example, the use of water for irrigation versus urban populations or meeting ecosystem needs makes the identification of necessary and sufficient conditions extremely contentious for any conversation related to the use, access, and allocation of water.

The conditions in the past that led to negotiated settlements for a simple or complicated problem may no longer prevail under a new context that is complex. Changing natural (e.g., changing climate) and societal (e.g., changing demography or socio-economic conditions or political dynamics and aspiration) conditions may create new emergent patterns (e.g., the role of non-state actors or non-cooperation) and make governance and management of water problems contentious. Today's constantly changing situations and issue configurations call for water management approaches to adapt to the needs of the changed context based on integrative learning and adaptive action.

Despite repeated calls and efforts to develop a comprehensive approach to resolving water conflicts (Swain 1999; Uitto and Duda 2002; Dinar 2004; De Stefano et al. 2010; Dinar and Dinar 2017), using the conventional notion of causality is yet to yield any reliable theory. Among different modes of cooperation, direct and mediated negotiations have shown resilience in initiating, affecting, and sustaining institutional interactions among competing stakeholders, even when they remain hostile to each other on other issues (Elhance 2000; Biswas 2008; Susskind et al. 2015). Why have some negotiated mechanisms been successful and resilient despite the shortcomings in the agreements reached? A key to such successful outcomes appears to be a set of enabling conditions and not any easily identifiable and replicable causal laws or mechanisms (Choudhury and Islam 2018).

Choudhury and Islam (2018) introduced three enabling conditions and examined seven cases – Indus, Jordan, Nile, Danube, Colorado, Brahmaputra, and Ganges – to illustrate the utility of these conditions for effective transboundary water management problems. These three enabling conditions are: (a) Active Recognition of Interdependence, (b) Mutual Value Creation, and (c) Adaptive Regime and Rules of Governance. These conditions rest on human agency and, hence, actionable in different contingencies. Consequently, in advancing the argument of enabling as opposed to causal conditions, they acknowledged that the presence of these conditions is not a panacea for all water management problems. Yet, the absence of these enabling conditions may lead to non-resilient solutions of complex water problems. They also emphasized that these enabling conditions should not be viewed as prescriptions, as they function like heuristics that need to be evaluated within the capacity and constraints imposed by the given water management context, thus making the function enabling. One may argue that these enabling conditions are already known in terms of cooperation, negotiation, and institution building. Thus, conceptualizing them as enabling is nothing more than another jargon that creates mere semantic variation. Against such an argument, Choudhury and Islam (2018) suggest that the notions of "active recognition," "mutual value," and "adaptive governance" introduce a different framing to the conventional meaning of cooperation as conflict prevention, negotiation as mutual gain strategy, and institution building as flexible organizational arrangement.

To examine the efficacy of these enabling conditions, we extend our earlier work by examining the role and relevance of these three enabling conditions in resolving water conflicts at three different scales: transnational (the Indus water conflicts between India and Pakistan), subnational (the Indus water conflicts between different provinces within Pakistan), and community-scale (the case of Sukhomajri from the foothills of the Himalayas, India). In discussing the cases of water management at different scales and situations, scholars and practitioners have characterized them as challenging in terms of their natural, societal, political, and contextual factors. Our argument of enabling conditions and the contingent nature of enablement goes beyond the discussion that each water dispute is unique and context-dependent. Thus, in our examination of the three cases at different scales, despite their contextual differences, we plan to show how the roles and relevance of enabling conditions have the potential to be generalizable across scales and contexts.

## Enabling Condition 1: Active Recognition of Interdependencies

The acknowledgment of the need to address interdependencies among contending parties is needed to resolve any boundary-crossing water disputes. Active recognition of interdependencies requires both rational and emotional efforts and, hence, is a function of human agency in a specific form of collective action. It forms the basis of initiating and sustaining a water agreement. However, what active recognition entails is contingent on situational conditions. Such recognition can arise from the direct and sustained mediation by an external party – indirectly, through informal meetings and collaborations among contending parties, and directly, by bilateral negotiations between stakeholders or by publicly signing a Declaration of Principles by countries. The forms of active recognition we suggest are not specific prescriptions, because the context of the dispute and changing patterns of nature will form the opportunities of interaction that can be enabling. For example, active recognition can be proactive, reactive, or face-saving. Agreeing to engage in direct negotiation is one such step, as is responding to a crisis created by rhetoric or changes in political leadership, or climate change. Which form of engagement will be enabling will depend on natural-societal-political factors as well as short- and long-term policy goals of the

disputants. We hold that for enablement to endure, active recognition of interdependencies and subsequent criteria for intervention needs to be guided by principles of equity and sustainability. Additionally, we note that when active recognition is absent, to the best of our knowledge, we have not found any resilient water agreement anywhere.

### *Transnational Scale: The Case of Indus between India and Pakistan*

The conflict over sharing the water among provinces in the then British India was addressed by the central government through administrative rulings (Salman and Uprety 2002; Dinar et al. 2007; Hardiman 2008; Gilmartin 2015). The British rule ended in 1947, partitioning the subcontinent into two independent countries: India and Pakistan. The standstill agreement reached in 1947 between the two new countries expired in 1948. In the absence of enforceable rule by a legitimate authority, the change in political boundaries and the emergence of uncertainty over intention and suspicion between the two countries transformed the management of the Indus water into a complex problem.

While Lilienthal initiated the conversation on how to share the Indus between India and Pakistan, it was Eugene Black (the president of the World Bank) who proactively offered his mediation service directly to the political heads of both countries. The purpose of the Bank's representation in the working group was to mediate technical differences and serve as an impartial adviser to both sides. Interdependencies were actively recognized through the clarification of issues, drafting of proposals, searching for areas of agreement between the parties, elaborating provisional arrangements to circumvent or minimize issues on which the parties remain divided, and developing alternative solutions (Salman 2013). Mediation as the means of dispute resolution worked as an enabling condition because the advisement and facilitation process of mediation allowed both parties to remain engaged. The Indus Water Treaty (IWT), signed in 1960, resulted in the partitioning of the rivers between India and Pakistan.

### *Subnational Scale: The Case of Inter-provincial Conflicts in the Indus within Pakistan*

The Indus Basin Irrigation System (IBIS) is the largest contiguous irrigation system in the world.

There are four administrative units in Pakistan called provinces: Punjab, Sindh, Balochistan, and Khyber Pakhtunkhwa (KPK). After the emergence of India and Pakistan as independent nations, the IWT between India and Pakistan was signed in 1960.

The IWT allocated most of Punjab's share of the Indus River (according to the 1945 agreement between Punjab and Sindh) to India. It also provided for the construction of the link canals and storage from the western half of the Indus Basin to the eastern half, which was done to compensate for the water loss to India. The allocation of water and storage provisions created with the IWT was widely perceived by Sindh to be favorable to Punjab. The boundary of Punjab under the IWT treaty included the Punjab of what is now in India. Therefore, this treaty cannot be used as a guide to understand and explain the evolution of inter-provincial water issues within Pakistan. To understand the evolution of inter-provincial water conflicts, we need to identify the nature of interdependencies that are relevant among the provinces within Pakistan (not between India and Pakistan as was done with IWT). To address these inter-provincial water conflicts among the provinces, several commissions and committees were formed. Details about these committees and commissions are available in Mustafa (2010) and Khalid and Begum (2013).

Active recognition of interdependencies means that the parties (four provinces) in the governance process agree to resolve a focal conflict and cooperate on a set of agreed-upon operating rules. This can happen when parties in a conflict recognize their mutual water needs, constraints, and capacity. Although several committees and commissions were formed, none of them played an active role in resolving the inter-provincial water conflict. In 1990, when the Federal Government of Pakistan took the initiative to address inter-provincial water issues, a sense of urgency was created that encouraged the four provinces to engage in a dialog, thereby making the active recognition of interdependence relevant (Khan and Awan 2020). A new institution called the Council of Common Interests (CCI) was formed, which enabled active participation from the provinces related to water management issues. The CCI was the first to initiate a discussion around water disputes among the four provinces. The CCI would hold meetings upon the request of one or more stakeholders (provinces of Pakistan). Its functioning was similar to that of the "Indus Water Commission," which was established as a part of the IWT. However, unlike the IWT, the CCI did not have a legal basis nor a water treaty to refer to. Thus, any water-related issues were addressed by the CCI primarily through negotiation (Paukert 2016). After assuming office in November 1990, the new government of Pakistan took the initiative to address provincial water disputes.

The four chief ministers of the provinces – with the support of CCI and the federal government – agreed on the Water Apportionment Accord (WAA) in March 1991. The WAA protected existing uses of canal water in each province, with the recognition of the need for water for environmental purposes below Kotri and apportionment of the "balance of river supplies," including "flood surpluses" and "additional supplies" from future storage (Garrick et al. 2014). It took over 30 years for this pivotal breakthrough – the WAA of 1991 – to happen. The active mediating role of the Prime Minister was important for this enabling condition to become a reality. One may argue that without the power and authority of the Prime Minister, this breakthrough would not have happened. In our assessment, mediation as the means of dispute resolution functioned here as enabling because the advisement and facilitation process of mediation allows both parties to remain engaged and negotiate their respective needs and concerns. The above set of actions emerged from recognizing that only if the provinces acknowledge their interdependencies, combine their efforts, and address each other's needs, can they achieve the sustainable development of the Indus waters for the benefit of all stakeholders within Pakistan.

### *Community-Scale: The Case of Sukhomajri from the Foothills of the Himalayas, India*

Sukhomajri is a well-studied case of the early success and later failure of participatory natural resource management and inclusive development. This case has been extensively studied from multiple perspectives (Franda 1981; Shahwal and Dahiya 2002; Khurana 2005; Raheem 2006; Lenton and Walkuski 2009; Agarwal and Narain 2010; George and Mathew 2015). More details about this case are provided in Chapter 49.

Sukhomajri is a community at the foothills of the Himalayas located in the district of Haryana State near Punjab in India. Prior to the 1970s, this agricultural community – situated in a semi-arid region with significant climatic variability – primarily relied on rain-fed irrigation. The gradual degradation of agricultural lands was forcing farmers to bring more hill slopes under agriculture and grazing. Their indiscriminate practices of free-grazing and land clearance led to significant land degradation. The continued degradation of land and increase in sedimentation also started to create problems downstream through the silting of the prestigious man-made Sukhna Lake in the city of Chandigarh (Sukhomajri is about 15 kilometers upstream of Chandigarh, a planned city). During the

1970s, it was becoming clear that the fates of Sukhomajri and Chandigarh were intertwined. Though the physical conditions of the two places were always present, it is from recognizing the value of protecting the urban and elite interests that led to the attention to their interdependence. In other words, this required recognizing the causal connection between land degradation in Sukhomajri and the silting of the Sukhna Lake in Chandigarh. The city of Chandigarh was spending over $200,000 per year on dredging operations to keep the Sukhna Lake functional, and this effort was increasing in cost while becoming hydrologically less effective. At this time, active recognition of interdependence between the village of Sukhomajri and the city of Chandigarh created an enabling condition to initiate an intervention. In 1975, the city officials turned to the Central Soil and Water Conservation Research and Training Institute for solutions, and the Sukhomajri Program was born.

## Enabling Condition 2: Mutual Value Creation

The pursuit of mutual value creation forms the basis of negotiation to sustain the active recognition of interdependencies. When benefit identification and sharing rest on the values of equity and sustainability, the possibilities of new and more inclusive options emerge. Here, the meaning of value creation also rests on human agency and extends the meaning of interdependence. The widely used term "mutual gains" focuses on material conditions, whereas, the term "value creation" goes beyond material needs and includes political and symbolic needs of the stakeholders.

### *Transnational Scale: The Case of Indus between India and Pakistan*

An agreement to share a limited resource will require the stakeholders to derive benefits or minimize losses from their engagement. For the Indus case, this involved the benefits of securing water for agriculture and energy development through a series of diversion and storage reservoirs (Alam 2002). The World Bank's proposal helped in establishing the principle of equitable allocation of the flow of the Indus and its tributaries based on both historic flow and planned use (Wolf and Newton 2009; Dinar et al. 2007). The allocation of water also included a pragmatic component: the historic supply of water by India to western rivers to Pakistan was required until the time Pakistan could build the link canals to secure it from its own sources (Wolf and Newton 2009). This pragmatic allocation was not based on optimal use of water at the basin scale but emphasized the principle of international law of causing no harm to the other party while creating a mutually beneficial option (Miner et al. 2009; Sarfraz 2013).

Such suboptimal solutions of allocating water while sidestepping the Kashmir issue are an example of a pragmatic way to create mutual value for both countries. Such an approach was further facilitated by the promise of financial incentives by the Bank to realize mutual benefits (Wolf and Newton 2009; Miner et al. 2009; Salman 2013; Sarfraz 2013). The partitioning of the Indus waters between India and Pakistan was seen by both parties as pragmatic, inclusive, and equitable, as it allowed and enjoined the two countries to cooperate in securing the needed waters for each, as well as secure the Bank's financial assistance to build link canals and storage capacity on both sides – all contributing to the development plans of each country.

Furthermore, the Bank's facilitation to develop accurate technical knowledge and management capacity in order to clearly understand how much one party can secure a value through unilateral action and how much can be gained through negotiation generated confidence in both sides. The Bank also provided additional financial assistance to Pakistan to boost its foreign exchange to shore up its economy (Salman and Uprety 2002). Thus, clear specification of the costs and benefits, allocation of costs to both countries based on the principle of commensurate benefits, and

financial assistance from the Bank to cover some of the additional costs enabled both countries to recognize their immediate and long-term developmental values. This exploration of value creation options paved the way for both sides to move forward and eventually sign the IWT.

### *Subnational Scale: The Case of Inter-provincial Conflicts in the Indus within Pakistan*

One way to explore mutual value creation is to have a professionally facilitated discussion among contending parties to identify and agree on mutual benefits and costs of cooperation (both economic and social), as well as to devise instruments to secure them (organizational arrangement) (Boisson de Chazournes et al. 2013). For the inter-provincial water sharing in Pakistan, this involved exploring the benefits of allocating and sharing water for agriculture and environmental needs. Through the WAA, each of the four provinces achieved more benefits than they originally expected. For example, Punjab received 69 $km^3$ of water per year, Sindh 60.14 $km^3$, KPK 7.12 $km^3$, and Balochistan 4.77 $km^3$. Another 3.7 $km^3$ per year of water from the civil canals above the rim stations was further allocated to the province of KPK. The "balance river supplies," which included future storages and flood flows, were apportioned to Punjab and Sindh at 37% each, Balochistan at 12%, and KPK at 14% (Bhatti and Farooq 2014). Several other mutual-gains options were discussed and included in operationalizing the accord (Janjua et al. 2020).

### *Community-Scale: The Case of Sukhomajri from the Foothills of the Himalayas, India*

To address the increased sedimentation load and silting of the Sukhna Lake in Chandigarh due to land degradation in Sukhomajri and silting, the Conservation Institute treated the situation as a technical problem and implemented an engineering solution by building erosion control structures in upstream Sukhomajri. However, this structure was insufficient to handle the increased sediment load from Sukhomajri. The breakthrough came when the Conservation Institute suggested a small earthen dam to control water and sediment runoff that would also create a reliable source of water for the farmers. In essence, farmers, city officials, and the Conservation Institute found an integrated management option of mutual gain that created flexibility for the existing resources to address contextually grounded needs, which was negotiated to create opportunities for a mutually beneficial solution.

This creative mixture of technical, financial, social, and institutional measures addressed the water problem in terms of satisfying the competing and conflicting needs of multiple stakeholders. More information about other mutual gain options is provided in Chapter 22.

## Enabling Condition 3: Creating and Sustaining Adaptive Governance

This enabling condition highlights the need to create institutional and social mechanisms to monitor the terms of the agreement and develop the adaptive capacity to address new issues as they emerge due to changing conditions. What enables sustained cooperation is familiarity of each other's operation, confidence and improvement in technical competence, and new (often informal) opportunities of cooperation that emerge with changing conditions. Such adaptive evolution of cooperation at the operational level enables the reaching of a solution by preventing the escalation of conflicts through having confidence in each other's intentions and capacities.

### *Transnational Scale: The Case of Indus between India and Pakistan*

In the Indus case, in addition to forming a permanent joint authority (Permanent Indus Commission) representing the water experts from both sides, the World Bank as a third party also was involved in the ten-year transition period in implementing the treaty. The Indus Treaty facilitated the formation of a Permanent Indus Commission. The Commission was composed of two Commissioners, one from each country with engineering expertise. The goal was to oversee and promote cooperative arrangements for the implementation of the treaty, the resolution of conflicts over water issues, and the development of the Indus basin (Dinar et al. 2007; Wolf and Newton 2009; Miner et al. 2009; Sarfraz 2013). A process of referring disagreements to a neutral expert was also established, failing which, a Court of Arbitration was specified to act as the final resort. Here, the Bank also played a facilitative role in its ability to appoint a neutral expert for disputes (Salman 2013). The fact that the Indus Commission is still operational and that it aids both sides in providing updates on the nature of the water problems testifies to the enabling function of institutional learning in sustaining the treaty (Choudhury and Islam 2018). Beyond the institutional mechanisms, informal contacts among officials and the positive coverage of the negotiations in the press also contributed to the public acceptance of the operational processes of the treaty.

### *Subnational Scale: The Case of Inter-provincial Conflicts in the Indus within Pakistan*

This enabling condition deals with developing institutional capacity to monitor the negotiated agreement in adaptive ways. After the WAA was signed between the provinces, an independent entity known as the Indus River System Authority (IRSA) was created. Within 20 months after the signing of the WAA, the IRSA came into being with the IRSA Act as a federal law (XXII, December 6, 1992) passed by the parliament. According to this law, the IRSA would oversee the implementation of the agreement between the provinces. It would also work toward just and equitable allocation of water (Ranjan 2012). A detailed discussion about tasks assigned to IRSA along with implementation and monitoring plans is available in Paukert (2016). IRSA's main task is the distribution of water among the provinces based on the 1991 Accord. The Technical Committee provides the data and support on the operation of reservoirs and the irrigation system, while the Advisory Committee represents the institutional link between the affiliated bodies and IRSA and is composed of the representatives of provinces, federal government, WAPDA, and representatives of IRSA (Ahmad 2009). The implementation of the WAA through the IRSA shows how an adaptive governance regime can act as an enabling condition to resolve contentious transboundary water issues. Janjua et al. (2020) provided a detailed discussion on how adaptive governance helped IRSA to be effective.

### *Community-Scale: The Case of Sukhomajri from the Foothills of the Himalayas, India*

As the Sukhomajri system evolved, more variables came into play to make the system more efficient, either by extending known connections or experimenting with new connections. The reason initial interventions worked was that they were contextually relevant and designed through effective community participation. Such participation also allowed for mutual confidence building among stakeholders and the improvisation of existing tools and their implementation. The initial stages of the implementation transformed the lives of people and enhanced the sustainability of the

watershed and ecosystem. Two evolving situations started affecting some of the early gains: *First*, people started using groundwater as an alternative source, thereby reducing or eliminating their stake in preserving the dam. *Second*, the Forestry Department initially allowed their land to be used for growing two types of grass with no charge to use the land. Then, the Forestry Department began taxing the sale of grass on harvested land. This led to a significant loss in income for the community members. The reduction in income as well as the weakened incentives for tubewell irrigators to participate in watershed conservation was not addressed adaptively. This new situation led the dams to become silted up, and the downstream flow started experiencing increased sedimentation load. These contextual developments changed the dynamics of the water problems. These changes were not anticipated when the well-intentioned interventions were initially made. Twenty-five years later, in 1995, the hope and prosperity of the villagers started fading, in part because the Forestry Department decided to divide the 400-hectare hill tract between Sukhomajri and its neighboring village Dhamala without any consultation with the community. This somewhat arbitrary division of land not only undermined the resource management program but also created social tension in the area. With the top-down imposed demarcation, the notion of community-initiated social fencing (self-restraint by villagers to use forest resources) broke down, and the two villages became competitors for fodder instead of collaborators.

The disconnect in communications and decision-making at different levels (village level and the higher government level) – without any coordinating mechanisms to deal with changing conditions – led to the failure of creating adaptive learning and action. Consequently, the initial success of participatory management started deteriorating in Sukhomajri because the tools, techniques, and interventions that were effective at the initial phase started to become ineffective. After all, the institutional mechanisms failed to address the evolving dynamics of the problem and develop the adaptive capacity to address new issues as they emerged from changing conditions.

## Concluding Remarks

Our evolving understanding of coupled natural and human systems is increasingly prompting us to consider that the dynamic nature of reality cannot be understood or explained in binary categories as either causal or random. However, the question of whether the rational explanation we hold based on causality is the product of the human mind or is built into the patterns of events that the mind can accurately capture is yet to be settled. Without entering the ongoing academic debate, if we hold both notions to be present in our explanations of different outcomes from apparently similar interventions, then there appears to be a space beyond causal determinism to explain the outcomes we observe and the interventions we implement.

This chapter aimed to establish this contrast between deterministic causality and enabling conditions. We have attempted to do so within the context of understanding and addressing a range of complex water problems, where the three cases we included addressed the issue of variety and scales. The cases show that the enabling conditions of active recognition of interdependence, mutual value creation, and adaptive governance, all require human intention and deliberate action. These intentions and actions are not autonomous but relational.

We made a distinction between causes and conditions; causes differ in meaning from enablement. With a cause, an effect is necessary, whereas, with enablement, effects are not necessary but possible. Many effects are possible that may or may not happen because of contextual interactions. Such interactions for complex water problems cannot be prescribed a priori. Consequently,

causality-based reasoning and interventions seldom work in managing complex water management problems. Insights from the detailed analysis of three case studies at three scales suggest that the proposed three enabling conditions are a focal set of conditions to initiate, design, and implement a negotiated process to resolve many emerging water problems. We do not, however, suggest that the presence of these conditions is a panacea to resolve all water problems.

We hasten to add that these enabling conditions should not be viewed as prescriptions, but they are like heuristics that need to be evaluated within the capacity and constraints imposed by the given problem context. The goal is not to search for and satisfy the necessary and sufficient conditions of causality for guaranteeing predictable outcomes, but to look for and identify the situational conditions for effective interventions with trackable outcomes. The identification and implementation of interventions with changing situational conditions is a craft. The effectiveness of this craft is dependent on acknowledging the role of enabling and situational conditions – in contrast to causal conditions – and heuristics within the capacity and constraints imposed by the problem context.

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## SECTION VI

# Case Studies at the Transnational Scale



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# TÜRKIYE'S PERSPECTIVE ON WATER COOPERATION IN THE EUPHRATES-TIGRIS BASIN

*Burcu Çallı and Tuğba Evrim Maden*

**Key Takeaways**

- Evaluate transboundary basins holistically, considering their peculiar circumstances and challenges, including specific hydrological, economic, social, and cultural aspects.
- Riparian states need to cooperate, extending their efforts to share responsibilities amid shared challenges like climate change.
- Seek technical dialogue and cooperation opportunities among riparian countries at appropriate levels, grounded in a strong scientific basis and tailored to each transboundary basin's distinctive characteristics.
- Efficient use of water is crucial for tackling the challenges in transboundary basins and serves as a foundation for fostering water cooperation.

## Introduction

The Euphrates-Tigris Basin, which originates in Türkiye, is one of the major water basins in the Middle East. As shown in Figure 38.1, the Euphrates and Tigris rivers flow through long distances after leaving Türkiye, travelling through Syria and Iraq before meeting in Al-Qurnah, forming the Shatt al-Arab approximately 200 kilometers (km) prior to reaching the Gulf. Tributaries originating from Iran also contribute to the Tigris before it meets the Euphrates and becomes the Shatt al-Arab.

The Euphrates-Tigris Basin provides a precise example of transboundary challenges in an arid and semi-arid region, where the agriculture sector stands as the primary consumer of water. The Euphrates and Tigris rivers have long been at the heart of the social, cultural, and economic life and relations in the region, necessitating the development of effective water management practices. Over time, population growth, urbanization, and economic development needs of the riparian countries have intensified water demands. Meanwhile, climate change and challenging security conditions due to the prolonged armed conflicts in the region have intensified water issues

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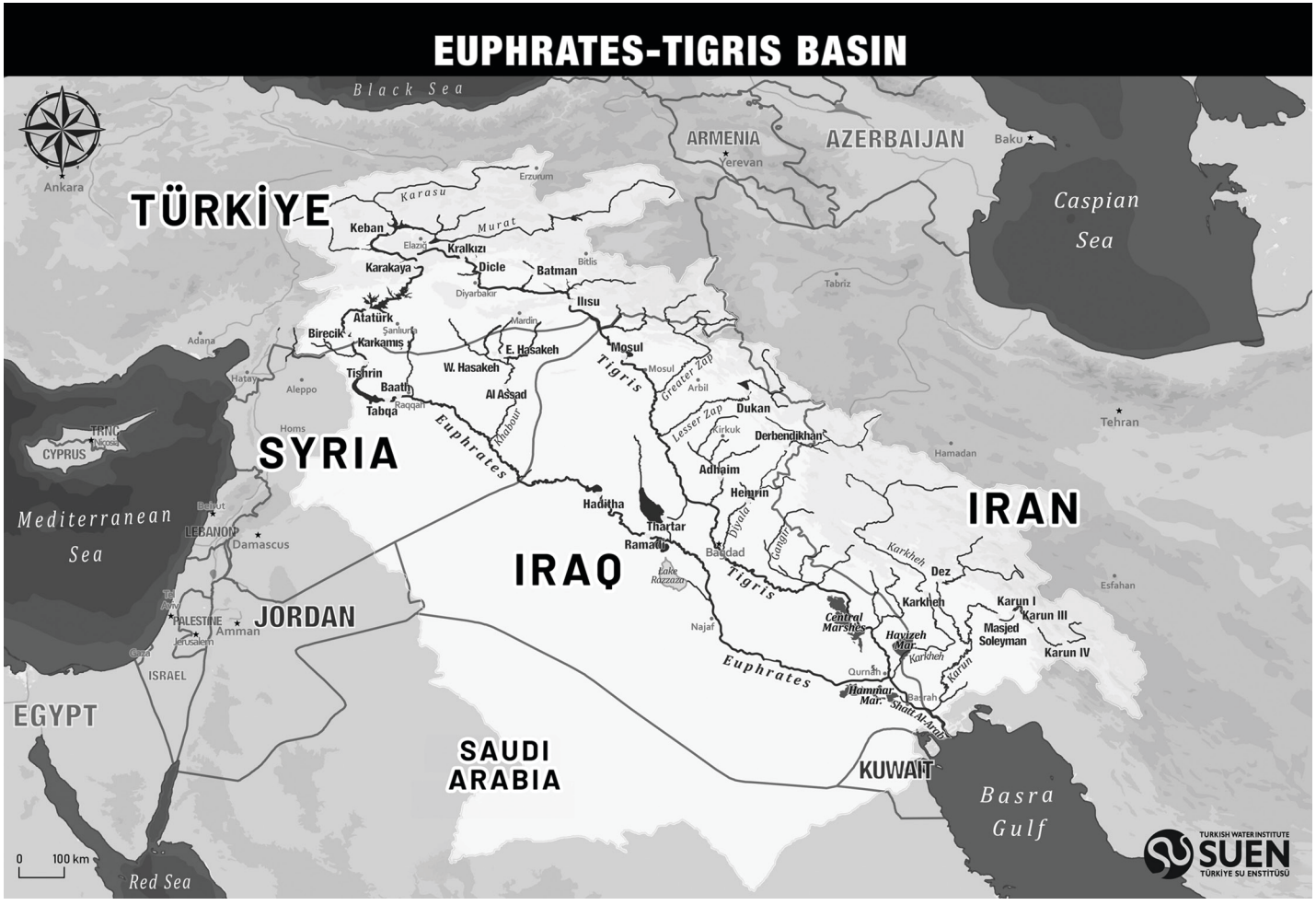



*Figure 38.1* A map of the Euphrates-Tigris Basin.

and created immense challenges in how to best manage and utilize water resources to meet various development goals in the transboundary Euphrates-Tigris Basin.

It is evident that recent years have introduced additional complexities to water resource management in the Basin due to the increasing severity and frequency of climate change-induced events. Nonetheless, climate change, as a shared risk by its nature, also has the potential to catalyze dialogue and cooperation among various stakeholders and the Basin countries. Outweighing the tensions among the riparian countries, climate change impacts on water resources further require the riparians to cooperate and collaborate, rather than focusing on competing individual interests.

This chapter seeks to provide an overview of the hydrometeorological and hydrological situation in the Euphrates-Tigris Basin, significantly impacted by climate change, further reflecting Türkiye's perspective on water cooperation amid the shared threat of climate change in the Basin.

It also aims to build knowledge and foster an understanding of the existing basin-wide situation that extends beyond one-dimensional views, evaluating the entire Euphrates-Tigris Basin in light of the peculiar challenges in the Basin, and reflecting on specific hydrological, economic, social, cultural, and historical aspects.

## Türkiye's Transboundary Basins and Transboundary Water Policy

Türkiye has approximately 574 mm of precipitation on average every year, or 450 billion cubic meters (BCM) of water. Under current technical and financial circumstances, Türkiye's water potential is 112 BCM per year, of which 57 BCM is used (DSİ 2023).

The Mediterranean Basin, where Türkiye is located, is estimated to be significantly affected by the risks and disasters caused by climate change. Reporting by the United Nations Environmental Programme (UNEP) and the Intergovernmental Panel on Climate Change (IPCC) suggests that temperatures in the Mediterranean are predicted to increase by 2°C–4°C, rising 20% faster than the global average (UNEP 2020, IPCC 2022). Climate change-induced events such as droughts, floods, and salinization will threaten food security and pose ecological threats. Water consumption will also increase as a result of population growth alongside rising temperatures. Nevertheless, precipitation is expected to decrease by 30% in the Eastern Mediterranean region, and Türkiye is one of the countries affected most by the situation in the Mediterranean Basin (UNEP 2020).

Türkiye's population is expected to exceed 90 million in 2030, and the amount of water that is readily available per person is expected to drop from 1,346 $m^3$ to 1,244 $m^3$ annually, according to Turkish Statistical Institute (TÜİK) predictions (DSİ 2023). As per these data, Türkiye is classified as "water stressed" by the Falkenmark Index, which ranks nations according to their water potential per person. According to the same scale, Türkiye might face the risk to be classified as having "water scarcity" and would require measures to ensure more effective use of water resources if its annual per-person water potential falls below 1,000 $m^3$ (DSİ 2023, Falkenmark and Lindh 1974).

There are 25 hydrological basins in Türkiye. These river basins feature a variety of annual precipitation, evaporation, and surface runoff factors, as well as varying catchment sizes. River flows are therefore unpredictable. Sixteen rivers originate in the mountains inside Türkiye's boundaries and flow into the seas surrounding Türkiye, namely, the Marmara Sea, the Mediterranean Sea, the Black Sea, and the Aegean Sea. There is no discharge to sea from the Burdur Lakes Basin, Lake Van Basin, Akarçay River Basin, and Konya Closed Basin (SUEN 2017).

Five transboundary river basins are present in Türkiye. The Chorokh (Çoruh) River Basin, the Araks-Kura (Aras-Kura) River Basin, the Euphrates-Tigris (Fırat-Dicle) River Basin, the Orontes (Asi) River Basin, and the Maritza (Meriç) River Basin from north to south. The transboundary

nature of these basins gives them unique significance in Türkiye's water resources, and these basins receive special consideration for their management (DSİ 2023). Türkiye's transboundary water potential constitutes 36% of its overall water potential. Contrary to common belief, Türkiye is not only an upstream country; it is upstream in three and downstream in two of its transboundary basins. This situation gives Türkiye a significant opportunity to understand and evaluate approaches, tendencies, reservations, and water policies of both upstream and downstream countries.

Türkiye's approach to transboundary waters is based on some major principles. First and foremost, Türkiye considers water as a potential source of cooperation among riparian countries. It acknowledges that the transboundary river basins have their own characteristics and peculiarities, reflecting specific regional, economic, social, cultural, and historic aspects. Therefore, Türkiye advocates that transboundary water issues should be addressed only among the riparian countries without external interventions. Moreover, each riparian state of a transboundary river system retains the sovereign right to make use of the water within its territory without giving "significant harm" to other riparian countries. Lastly, Türkiye, through its Ministry of Foreign Affairs (MFA), emphasizes that transboundary waters should be used in an equitable, reasonable, and optimum manner.[1] In light of these major principles, Türkiye engages in technical dialogue and cooperation activities with the riparian countries at appropriate levels. These activities are grounded in a strong scientific basis and tailored in accordance with the distinctive characteristics of each of its five transboundary basins.

## The Euphrates-Tigris Basin

The Euphrates-Tigris Basin is one of the major water basins in the Middle East. Its annual average flow rate, including the contributions by all the tributaries, is 112.7 BCM and exceeds the Nile River's average flow rate. As a source of fresh water, it has a pivotal role in socio-economic life in its riparian countries: Türkiye, Syria, Iraq, and Iran. Türkiye's contribution to the Basin constitutes approximately 50% of the Basin's total water potential (DSİ 2014).

### *Hydrological Features*

The Euphrates and Tigris rivers have their beginnings in Türkiye's eastern provinces and flow through a long distance from where they originate in eastern Türkiye to the Gulf in the south of Iraq. Prior to the climate change impacts that have been strongly experienced in the Basin over the last decades, the Euphrates-Tigris Basin received the most precipitation during the winter months from October to April. A substantial amount of the winter precipitation fell as snow, remained solid on the highlands, and flowed downstream in the spring and early summer. The strong snowmelt peaks have historically been the main sources for the flows of the Euphrates and Tigris rivers, with the Euphrates reaching its peak in May and the Tigris in April.[2] The highlands of Iran and Iraq also contribute to the Tigris flows. The Tigris receives water from significant tributaries in Iraq that originate from Iran (Beaumont 1998, p. 169).

However, the increasing adverse effects of climate change have put great pressure on water quantity, particularly in the Basin. Water resources in the Basin are under pressure due to increases in population, urbanization, agriculture, industrial activity, and climate change-induced disasters. The flow rate in the Euphrates-Tigris Basin varies from year to year. While fluctuations in the Basin's water flow have been observed historically, climate change has escalated the frequency of the extremes that affect the flow rates.

Agriculture is the main consumer of water in the Euphrates-Tigris Basin in all Basin countries, followed by urban water use and industrial use, respectively. The Basin is also a primary source of hydroelectric power for the riparian countries. The majority of installed capacity is located in upstream Türkiye, which relies on water as its primary renewable energy source to meet the national energy demand. Given its mountainous topography, Türkiye is very well positioned for hydropower generation.

### *Historical Background of Development and Cooperation*

Since the 1950s, the riparian states have begun to develop water resources unilaterally within their territory. Türkiye, Syria, and Iraq started launching national water development projects within their territory in the 1950s to use and utilize the waters of the Euphrates-Tigris Basin. In the middle of the 1960s, Türkiye and Syria began building the Keban and Tabqa dams on the Euphrates, respectively. With the financial resources provided by oil profits, Iraq has also begun to develop new irrigation projects (Maden 2019).

The Tabqa Dam of Syria was put into operation in 1973. The Keban Dam's construction began in 1965 and was completed in 1973. Further downstream from Keban, construction of the Karakaya Dam started in 1976. In 1987, Karakaya started its operation. Since the Keban and Karakaya projects were only hydropower projects, the downstream riparians did not suffer any loss of water potential by their operation (Kibaroğlu and Maden 2014).

The Southeastern Anatolia Project (GAP as Turkish acronym) was designed in the 1960s and began in the 1970s as a plan to develop the region's water and land resources, which was the least economically developed part of the country for many decades. It was first envisioned as a set of projects for electricity and irrigation in the Euphrates-Tigris Basin. These projects included the building of dams, hydroelectric power plants (HPPs), and irrigation networks. Later in the late 1980s, in order to reduce regional disparities and support the economic and social development of the whole country, GAP evolved into a regional development project. GAP now includes infrastructure development in industry, transportation, education, health, and urban and rural facilities, also including a social pillar to empower women and youth in the region (SUEN 2017, GAP 2023).

The three countries started to come together and undertake technical conversations on the water issue as water development projects started to be contemplated. Under Türkiye's initiative, the three riparian countries—Türkiye, Iraq, and Syria—met informally and exchanged information on technical issues between 1960 and 1980 (Bagis 1997). When Türkiye and Iraq initially gathered in December 1980 for the Joint Economic and Technical Cooperation meeting, both countries agreed to establish a Joint Technical Committee (JTC) to address water issues. In 1983, Syria also joined the JTC, transforming it into a tripartite committee (Çarkoğlu and Eder 2001).

In 1984, Türkiye presented the Three-Stage Plan to Syria and Iraq in the JTC meeting, which proposed equitable, reasonable, and optimum use of the transboundary waters of the Basin. The Three-Stage Plan, which included conducting joint inventory studies of land and water resources, determining water needs according to sectors, and allocating them accordingly, was rejected by Syria and Iraq. Türkiye's official transboundary waters policy and the generally recognized global norms relating to transboundary waters are consistent with the three-stage strategy (MFA of Türkiye 1996).

Construction of the Atatürk Dam and HPP, a project on the Euphrates that has the largest reservoir volume with an installed electricity-generating capacity of 2,400 megawatts, started in 1983. In 1987, Türkiye and Syria signed a protocol on the Euphrates as part of a series of protocols on economic cooperation and security, which would serve as a temporary legal document until the

*Table 38.1* Water-related MoUs signed between Türkiye and Syria and Türkiye and Iraq

| |
|---|
| MoU between Turkey and the Syrian Arab Republic in the Field of Remediation of Water Quality |
| MoU between Turkey and the Syrian Arab Republic in the Field of Efficient Utilization of Water Resources and Combating of Drought |
| MoU between Turkey and the Syrian Arab Republic on Establishment of a Pumping Station in the Territories of Syrian Arab Republic for Water Withdrawal from the Tigris River |
| MoU between Turkey and the Syrian Arab Republic for the Construction of a Joint Dam on the Orontes River under the name "Friendship Dam" |
| MoU between Turkey and the Syrian Arab Republic in the Fields of Meteorology and Meteorological Research |
| 2009 MoU in the Field of Water Between the Ministry of Forestry and Water Affairs of the Republic of Turkey |
| 2014 MoU in the Field of Water Between the Ministry of Forestry and Water Affairs of the Republic of Turkey |

three riparian nations could come to a final agreement. According to Article 6 of the Protocol, "During the filling up period of the Atatürk Dam reservoir and until the final allocation of the waters of Euphrates among the three riparian countries, the Turkish Side undertakes to release a yearly average of more than 500 $m^3/s$ at the Turkish-Syrian borders and in cases where the monthly flow falls below the level of 500 $m^3/s$, the Turkish Side agrees to make up the difference during the following month" (UN 1987). Atatürk Dam and HPP started hydroelectric generation in 1992 and became fully operational in 1993. Until recently, Türkiye expended every possible effort to fulfill the protocol's conditions. However, it is evident that a fixed amount of water release is increasingly unlikely to be maintained due to the fluctuations in water flows as a result of climate change.

Within the framework of a bilateral agreement signed between Iraq and Syria in 1989, the two countries agreed that 58% of the water released by Türkiye from the Euphrates would be allocated to Iraq proportionally.[3]

In the 2000s, Türkiye, Syria, and Iraq had several bilateral and trilateral meetings as part of continuing JTC Meetings, including bilateral High-Level Strategic Cooperation Council (HSCC) meetings between Türkiye and Iraq as well as Türkiye and Syria, in order to strengthen political and economic ties. These efforts resulted in the signing of a number of memoranda of understanding (MoUs) regarding the Euphrates, Tigris, and Orontes, as listed in Table 38.1.

The crisis that began in Syria in March 2011 has evolved into a major conflict, closely impacting regional security and stability, particularly in Syria. As a result of this conflict, the tripartite JTCs ended. The close dialogue between Türkiye and Iraq has been continuing based on technical cooperation in the absence of Syria.

Forty-eight MoUs were signed between Türkiye and Iraq on October 15, 2009, one of which was in the area of water and made specific mentions of collaboration in water resources management, irrigation system improvement, and exchange of hydrological and meteorological data. Given the pressures of demand and the deteriorating climate, the MoU also recognized the necessity for an urgent assessment of water resources.

Following these steps, Türkiye and Iraq held a second HSCC conference in 2014, during which they created a new MoU revising the 2009 MoU. This document entered into force in 2021 and currently forms the basis for cooperation on water between Türkiye and Iraq.

This document proves to be a significant basis for further cooperation by facilitating the transfer of experience, information, and technology on the basis of equality, reciprocity, and mutual benefit. This cooperation includes collaborating on joint studies on topics such as modernization of current irrigation systems (e.g., use of closed and pressurized systems), preventing the loss of drinking water, the assessment of water resources and trends in water use (agricultural, industrial, municipal, and drinking water), and climate change. The MoU aims to address the importance of a sustainable development approach in the protection, improvement, and utilization of water resources for the health and welfare of both current and future generations (Republic of Türkiye Official Gazette 2021).

## Challenges in the Euphrates and Tigris Basin & Challenges Related to Water Cooperation

Sharing a transboundary water resource also comes with shared threats, risks, and responsibilities. Thus, managing a transboundary basin shared by different countries is a major challenge. Countries in the Euphrates-Tigris Basin share similar challenges and risks, climate change being the first. Yet, the very same challenges also serve as an impetus for cooperation.

### *Climate Change Impacts on Water Resources*

In recent years, climate change has been the primary factor affecting the hydrology of the Basin, and it is predicted to put further strain on the Euphrates-Tigris flows in the coming years. Studies on climate change show that the Basin's surface temperatures are expected to rise significantly. The countries in the Euphrates-Tigris Basin currently are countries with water stress, and their water stress is likely to get worse as a result of climate change's negative impacts on water resources if not managed efficiently.

Moreover, water potential in the Basin is predicted to decline more sharply than the decrease in precipitation. The rise in temperature has already changed the precipitation patterns, resulting in reduced snowfall and earlier snowmelt, subsequently causing changes in the seasonal water flows. Historically beginning in March, the snowmelt in the region has shifted to earlier periods. Runoff into the rivers now is below the long-term average flows in the Basin due to a decrease in the number of snow-covered days, reduced snow-covered areas, a shift of the snow line to higher altitudes, and consequently the decrease in snow-water equivalent. With the decrease in precipitation and the increase in temperatures, evaporation rates also rise. This results in a significant decline in water potential, and it is expected that its severity will increase in the future (MAF of Türkiye 2023). In this regard, regulating the flows by storing water in dam reservoirs is an effective method and strategy to combat the negative effects of climate change. As snowmelt shifts to earlier periods, it becomes even more crucial to store water for the critical summer months when irrigation water is most needed. Additionally, storing water in the south of the Basin is likely to result in greater water loss through evaporation, making it more reasonable to store water in Türkiye, where the evaporation rate is lower.

When the existing situation in Türkiye is examined, heat waves and meteorological droughts are observed especially in the Euphrates-Tigris Basin in parallel with the IPCC reports, and the severity of these disasters is expected to increase in the future (IPCC 2022). Similar to the situation in Türkiye, Iraq has been facing drastic impacts and has been classified as a country with water stress, with about 1,300 $m^3$ per person per year (Ethaib et al. 2022).

### *Water Use Efficiency*

Agriculture is by far the largest consumer of water resources in the Euphrates-Tigris Basin. Overall, more than 75% of the available freshwater resources are being used for agriculture; in some Basin countries, the percentage may even be higher. Notably, the agriculture sector, as both the largest user and a source of pollution, plays a central role in addressing the complex and emerging challenges related to water. The economy, livelihoods, and welfare of the Basin countries all heavily rely on irrigated agriculture. The pressure on water resources due to the adverse effects of climate change and expanding rural and urban populations necessitates better management of water resources, especially in the agriculture sector. Alongside climate change, over-irrigation is an essential factor that strains the Basin's water supplies.

Across the region, water use efficiency and water productivity are low and urgently need improvement to make the best use of available but limited resources. Agricultural production in the whole Basin has been impacted by increasing fluctuations in precipitation and extreme weather events, including severe droughts in the region.

### *Conflicts and Water Management Challenges*

The long history of armed conflicts in the region, mainly in Iraq from the early 1980s until 2017, and in Syria since 2011, has had serious impacts on water management in the Euphrates-Tigris Basin. Urban and agricultural water infrastructure was targeted and destroyed during the Iran–Iraq War (1980–1988), the Gulf War (1990–1991), the Embargo (1990–2003), and the US invasion of Iraq (2003–2011). More recently, the situation deteriorated when DAESH tried to seize, control, and use water resources in both Syria and Iraq in 2014, especially by capturing large dams to accomplish broader political and economic objectives and using water as a weapon (Mazlum 2018).

The effects of conflict in the region are visible in every sector. The prolonged conflict situation in Iraq and Syria has resulted in heavy damage to the water infrastructure and has left social and political institutions in disarray. Lack of financial and technical resources and institutional capacity has intensified the pressure on already limited water resources.

Mass population displacement was another result of the conflicts in the region, which also had impacts on water management. Following the outbreak of the conflict in Syria in 2011, most refugees fleeing Syria sought safety in the countries in the immediate region, including Türkiye and Iraq. The number of registered Syrians living under temporary protection in Türkiye reached 4 million, rapidly increasing in the first few years of the mass inflows, making Türkiye the country hosting the largest number of refugees in the world. Türkiye dedicated over 40 billion USD to address the needs of the Syrian population within its borders, with an estimated allocation of approximately 5% of this funding directed toward Water, Sanitation, and Hygiene (WASH) activities within the first five years of the influx (WWAP 2019).

While the WASH infrastructure and facilities within temporary shelter centers, or camps, were developed with an unwavering commitment to meeting global WASH standards, efforts to manage WASH needs for the millions of Syrians residing outside these temporary shelter centers necessitated comprehensive planning and action, including demographic projections and adjustments to the existing investment plans. The rapidly increasing demand for WASH services required enhanced administrative, technical, financial, and human capacity to both maintain existing water infrastructure and develop new projects. Populations in the primary refugee-receiving cities, predominantly situated near the Syrian border, increased to levels that would typically take 13–15 years to reach. The increased water demand, prompted by the influx of Syrians, unavoidably compounded the

stress on already limited water resources in the region contending with the impacts of climate change.

The urgent response capacities of relevant institutions, both at national and local levels in Türkiye, resulted in effective WASH management during this crisis situation. From the early years of the refugee influx, Türkiye adopted the principle that humanitarian assistance must go hand in hand with infrastructure development and water management capable of addressing the scale, scope, and protracted nature of the refugee influx (WWAP 2019).

Severe droughts or higher floods experienced in recent years due to climate change also overwhelm water management capacity and necessitate further improvement and investment in the riparian countries.

### *Ways to Tackle the Challenges*

National priorities that arise from national needs and demands may pose a barrier for countries to meet on a shared basis for the efficient use of water resources. The key to tackling the challenges is to give specific consideration to the transboundary nature of water resources while meeting national needs and demands. To overcome the conflict potential due to the pressure on water resources fueled by the above-mentioned challenges, hydrodiplomacy processes need to be conducted in parallel with the development of institutional capacity to absorb risks, challenges, and change.

To turn water dispute potential into cooperation, it is essential to create an environment for constructive dialogue and negotiation, where stakeholders trust each other and can exchange interests, needs, and objectives in order to alleviate their differences. A context-specific approach that takes the hydrological and hydrometeorological conditions of the Euphrates-Tigris Basin and the special needs and understandings of riparian states is needed to improve cooperation. To this end, in recent years the countries in the Basin tend toward cooperation over conflict, which can obviously be seen in the developing cooperation between Türkiye and Iraq.

## Türkiye's Water Cooperation Perspective in the Euphrates and Tigris Basin and the Recent Development

### *Water Cooperation and Water Diplomacy Approach*

Water cooperation is not only crucial in the face of risks and crises but also needed for continuous commitment to sustainable water management at all levels. In this context, Türkiye's approach to water is as a resource that unites rather than divides the countries and nations. Türkiye adopts the principle that lasting solutions to transboundary water issues can be reached through cooperation and dialogue, which must be action-oriented.

The continuous communication and constructive dialogue between officials of both countries through a multitrack diplomacy process create a sustainable basis for technical experts to work together and better understand each other.

### *Recent Developments in Water Cooperation*

In 2018, Türkiye completed the construction of the Ilısu Prof. Dr. Veysel Eroğlu Dam (Ilısu Dam) and HPP on the Tigris River. Türkiye informed Iraq about the upcoming filling phase and shared the necessary information before commencing the filling process. Filling at Ilısu

Dam was planned to begin in March 2018. However, Türkiye postponed filling the dam twice to address Iraq's water stress due to drought conditions that seriously affected Iraq. With the decision to postpone, Türkiye has shown that it can put its neighbor's needs ahead of its own, bearing a delay of several months in energy production. Following the severe drought in 2018, the extremely wet winter and spring of 2019 have swollen Iraq's rivers, lakes, and reservoirs and caused flooding and damage in many governorates in Iraq. Ilısu Dam was filled in 2019, upon the request of Iraq facing floods. Türkiye uses Ilısu Dam and HPP to store water to generate hydroelectricity and release water downstream after electricity generation. In the last four consecutive dry years following the operation of the Ilısu Dam and HPP (2020, 2021, 2022, and 2023), Türkiye was able to release more water to Iraq than the natural flow of the Tigris in critical summer months when irrigation water is most needed, thanks to the water stored in the Ilısu Dam.

In 2019, former Minister of Forestry and Water Affairs, Prof. Veysel Eroğlu was appointed as the Special Presidential Envoy to Iraq in the field of water in order to contribute to the solution of Iraq's water-related issues through cooperation and to share Türkiye's experience in this field with Iraq. An action plan covering proposals for the joint technical projects and investments that can be initiated by Türkiye and Iraq in the Euphrates-Tigris Basin was prepared under the chairmanship of Prof. Eroğlu.

The dialogue between both countries in the field of water continues regularly, in line with the vision of action-oriented cooperation through technical visits and meetings in a multitrack diplomacy process. A recent joint step taken to improve technical cooperation is the joint studies conducted by the technical experts of the two countries to build a joint hydrological monitoring station in the Basin.

### *Türkiye's Efforts to Better Manage its Water Resources*

As a country that is not water-rich, Türkiye has long been committed to the responsible and sustainable use of water resources. Over the past few decades, Türkiye has taken significant steps at the national level to manage its water resources and provide safe drinking water and sanitation services to all. Türkiye recognizes the importance of regional, transboundary, and international water cooperation, capacity building, and knowledge exchange, aligned with the targets of Sustainable Development Goal 6: clean water and sanitation for all.

Türkiye has been carrying out its water-related projects in line with the principles of equitable, fair, and reasonable utilization of the waters of the Euphrates-Tigris Basin. It is possible to provide regular water release downstream, even in dry periods, by storing the Euphrates and Tigris waters in high-flow seasons in Türkiye, where evaporation losses are lower than downstream.

Türkiye places a strong emphasis on water management through the implementation of nationwide measures and projects. A convenient source of water to meet the increasing needs is the water that would be saved by avoiding water losses and increasing water use efficiency, specifically in the agriculture sector. Any plan to increase efficiency requires investment. To this end, Türkiye has made investments in the effective management of water including increasing rainwater harvesting and use of gray water, expanding the reuse of irrigation water, analyzing and implementing land consolidation methods, installing water-efficient irrigation systems, disseminating best agricultural practices, and implementing sectoral allocation plans prepared that take water availability into account. One of Türkiye's recent initiatives in this regard is the Water Efficiency Campaign, which aims to prevent water loss in both urban and rural areas and in industry, strengthen the legal

framework, use modern irrigation techniques in agriculture, and raise public awareness.[4] Türkiye's harmonization with the EU Water Framework Directive as a candidate country for EU membership has fueled Türkiye's legislative efforts and investments in all its river basins following the opening of the accession negotiations with the EU on the Environment Chapter in 2009.

Türkiye believes that the water potential of the Euphrates-Tigris Basin can meet the needs of the three riparian countries, provided that it is used efficiently, especially through the adoption of modern irrigation techniques that prioritize the "more crop per drop" principle.

The Basin states that share the same challenges and risks must be committed to share the responsibility of ensuring shared benefits.

## Conclusion

The case of the Euphrates-Tigris Basin gives a vivid example of transboundary challenges in an arid and semi-arid region where the largest consumer of water is the agriculture sector. It is evident that a well-structured and inclusive water dialogue and water diplomacy among the riparians need to be achieved to avoid the conflict-driven nature of transboundary water relations. There is a pressing need to enhance cooperation on transboundary water resources, and sharing of the benefits would encourage and enhance cooperation. Enhanced technical cooperation, along with political will, is the most important tool that has been utilized in the Basin, ultimately leading to the construction of a shared understanding and cooperation.

Challenges and uncertainties also come with opportunities. Increasing climate variability and changing dynamics would ostensibly require more time and resources to be shared for water management in the Basin. Changing conditions also require the Basin countries to reconsider their approach to transboundary water use. The riparians need to cooperate, extending their efforts to share responsibilities amid shared challenges.

A sustained commitment to efficient water management is also needed and should be a basin-wide target. The pivotal element, however, rests in the realm of political will, a driving force that can be achieved only when states are convinced of the mutual benefits derived from cooperation.

A context-specific approach that takes the special needs and understandings of each basin into consideration is also needed in determining the way forward. There are various incremental steps that riparians can take in technical cooperation, as appropriate in line with the peculiarities of the Basin, such as the identification of existing water resources, pollution control, data sharing, calibration of the measurement techniques, harmonization of data, and joint monitoring. The significance of regular meetings and continuous dialogue in a multitrack diplomacy process cannot be overstated. These steps not only contribute to building technical capacity but also foster political trust.

Collaboration among riparian countries provides not only a broader perspective of sustainable growth in the region but also unlocks opportunities for identifying solutions and harnessing joint resources to address the common challenges.

In essence, the Euphrates-Tigris Basin encapsulates both the complexity and the potential of transboundary water cooperation in a region where transboundary waters are essential for socio-economic development and environmental sustainability. Managing the Euphrates-Tigris waters requires a blend of technical proficiency, political determination, and a commitment to shared benefits for collective prosperity. The future of the Basin depends on a harmonious convergence of these factors, with the ultimate goal of ensuring that water unites rather than divides.

## Notes

1 Türkiye's Policy on Water Issues is available on the Ministry of Foreign Affairs website: www.mfa.gov.tr/turkiye_s-policy-on-water-issues.en.mfa
2 More information on how these patterns have changed is provided in the section on climate change impacts.
3 Details concerning this agreement can be found in Law No. 14 of 1990 of the Joint Technical Committee for Territorial Waters, ratifying the Joint Minutes concerning the provisional division of the waters of the Euphrates River, which can be read here: https://faolex.fao.org/docs/pdf/irq15920.pdf
4 The Water Efficiency Campaign (Su Verimliliği) falls under the General Directorate of Water Management within the Turkish Ministry of Agriculture and Forestry. Details can be found at www.suverimliligi.gov.tr/

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# 39

# THE COMPLEXITY OF TRANSBOUNDARY WATER NEGOTIATIONS

## A Case Study of Afghanistan and Iran

*Mohd Faizee*

**Key Takeaways**

- The "package" negotiations approach between Afghanistan and Iran (2016–2021) linked transboundary water issues with security, trade, refugees, and cultural cooperation, demonstrating how water diplomacy becomes entangled with broader geopolitical dynamics.
- While issue linkage created incentives for cooperation on sensitive transboundary waters, premature agreements in the water committee weakened Afghanistan's leverage in other areas, and the complexity of interlinked issues ultimately hindered reaching a comprehensive agreement.
- External geopolitical factors both facilitated and undermined the negotiation process, including sanctions against Iran, U.S.-Taliban peace talks, and ultimately the collapse of the Afghan government in 2021, highlighting how water diplomacy remains vulnerable to broader political developments.

### Introduction

Afghanistan and Iran share two river basins, the Helmand and the Hari Rud,[1] both of which originate in Afghanistan. The Helmand travels south and west, crossing the border into Iran, and terminating in the transboundary wetlands (Najafi and Vatanfada, 2010). The Hari Rud flows to the west and north, forming the border between Afghanistan and Iran at first and then forming the border between Iran and Turkmenistan. Throughout history, the Helmand River has often been subject to disagreement and contestation, even after the signing of the Helmand River Treaty in 1973 (Nagheeby and Warner, 2022). The disagreement over water rights, originating from the lack of treaty implementation, has often resulted in the exchange of accusations and blame between the two. The disagreement intensified in the wake of the construction of the Kamal Khan Dam in the lower reaches of the river in Afghanistan, which Iran claimed would reduce the water flow across the border, impact downstream communities, and worsen the ecological situation of the transboundary wetlands. Conversely, Afghanistan views the environmental degradation of transboundary wetlands as a result of Iran's overutilization and agricultural expansion in the Sistan

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region, as well as the diversion of the river flow toward man-made artificial lakes and continued abstraction of water out of transboundary wetlands.

On the other hand, the Hari Rud has been contested more recently when Iran and Turkmenistan jointly built the Doosti Dam on the lower portion of the river in 2004, and Afghanistan completed the construction of the Salma Dam on the upstream part of the basin in 2016. These and other unilateral water infrastructures have been and continue to instigate tensions in these highly water-scarce regions in both countries.

As a later developing country, Afghanistan argues that its development rights in these basins have been foreclosed by Iran's unilateral development. Afghanistan was also fearing that negotiations with Iran would only hinder and delay its development projects. In addition, the presence of the U.S. and NATO forces in Afghanistan had a significant impact on the bilateral relations between the two while increasing suspicion and mistrust of the Iranian government over such projects on the shared rivers.

In 2016, both Iran and Afghanistan agreed to address the issue of shared waters within a broader set of issues that were strategically important for both. Cooperation in the areas of security, trade and transit, the situation of Afghan refugees in Iran, and cultural exchange formed a package negotiation that included cooperation over shared waters. The aim was to elevate bilateral relations to a strategic partnership through the signing of the Strategic Cooperation Comprehensive Agreement (SCCA). The process was incentivized by a range of internal factors, such as Afghanistan's increasing concerns about Iran's support to the Taliban in destabilizing the western part of the country and Iran's efforts to hinder water infrastructure projects and political changes in both countries; the election of a new reformist government in Iran that was more open to international cooperation, and the creation of a new coalition government in Afghanistan in 2014 with support and influence of Iran. Broader regional and international geopolitical factors also played an important part. Withdrawal of the international forces from Afghanistan and transfer of security responsibilities to Afghan forces in 2014, easing of international sanctions against Iran following the signing of the Iran nuclear deal in 2016, and the emergence of regional and global dynamics surrounding peace and reconciliation in Afghanistan. Negotiation over shared waters, a strong incentive for Iran and the main leverage of Afghanistan, was a prominent feature of this negotiation process. The process began in 2016 and continued until the collapse of the Afghan government in August 2021. The lengthy and complex negotiation process constituted the most concerted effort to date by both countries to address the issue of shared waters. Nevertheless, despite intensified efforts, the process did not conclude successfully due to a wide range of factors, some of which were beyond the control of either country. This chapter provides insights and lessons learned with the aim of contributing to a better understanding of the complexity of water negotiation processes.

## Bilateral Relations

Afghanistan and Iran share an approximately 925-kilometer border, as well as other commonalities such as language, culture, and religion. They also share two rivers: the Helmand, which flows from Afghanistan directly into Iran, and the Hari Rud, which flows along the border between the two countries. Iran has hosted millions of Afghan refugees fleeing conflict and instability for nearly four decades. Afghanistan, as a landlocked country, is largely dependent on imports from Iran and Pakistan. Cross-border movement, including legal trade and transit between the two nations, has been challenging and costly due to threats of terrorism, drug trafficking, and illegal migration. Despite its support of the U.S. intervention in Afghanistan in 2001 (Rubin, 2020), Iran's strategy toward and relations with Afghanistan have been largely viewed within the

broader regional and international politics and rivalry with the United States. This has not only offset the full potential for enhancing bilateral relations but also resulted in high securitizations of the bilateral relations between the two during two decades of U.S. and international forces' presence in Afghanistan. Chronic water scarcity and high dependence of eastern regions of Iran on water flowing from Afghanistan, growing impacts of climate change, and lack of cooperation on transboundary waters have often led to strained relations and contributed to the existing atmosphere of mistrust while further securitizing the management of transboundary waters between the two countries. Construction of water management infrastructure projects on transboundary rivers within Afghanistan was often viewed in Tehran with high suspicions of foreign intervention. The Iranian government perceived such development efforts as efforts aimed at undermining national security. For instance, a decrease in the flow of the Helmand River to Sistan, which is highly dependent on the flow of the Helmand River, could exacerbate the existing grievances at the local level among the Baloch communities, an extremely marginalized ethnoreligious minority in Iran. The decline in the flow of the Hari Rud would affect the urban water supply to Iran's second-largest and religiously important city of Mashhad. However, despite water scarcity, poor water management and increased agricultural expansion were the driving factors of water insecurity in these regions. Nevertheless, suspicion around the involvement of foreign powers behind the construction of dams in Afghanistan often instigated tensions, and at times, this was used by the Iranian government to also mitigate public pressure and shift the blame toward Afghanistan (Mohd Faizee, 2022).

In Afghanistan, the development of water infrastructure comes with the promise of prosperity and improved livelihoods for a population long marginalized and affected by conflict and poverty. Thus, dams and other water infrastructure projects have been prioritized for economic development that would foster stability through the creation of jobs and the provision of electricity and water for agriculture, the main source of livelihood for the majority of Afghans. By portraying these projects as symbols of national pride, progress, and prosperity, national governments and ruling elites can use dams to shape national identities and gain legitimacy and public consent (Menga 2015, 2016). Dam projects particularly have been leveraged to gain public support and prevent extremism at a time when the Afghan government was grappling with national legitimacy amid Taliban military advancement and declining foreign military and development aid.

However, due to its transboundary nature, the development of Afghanistan's surface waters often led to tensions with riparian countries and, in the case of Iran, entailed security implications for the fragile and landlocked country. Such implications with Iran ranged from strained political relations, mass deportation of Afghan refugees, closure of the border, and disruption of trade and transit to increased instability in bordering regions, as well as frequent attacks on water infrastructure projects through insurgents and proxy elements. Nevertheless, the importance of these rivers for both countries and the lack of meaningful transboundary water cooperation often resulted in frequent exchanges of negative statements, threats, and blame. At times, these tensions went beyond rhetoric and resulted in physical actions such as the closure of the border, mass deportation of Afghan refugees, and even instances of armed incursions. The two subsections below briefly describe the river basins and their hydropolitics, and the next section elaborates on the package negotiations between the two countries.

## Helmand River Basin

Originating in the high mountains west of Kabul, the Helmand River is a long river that covers 40 percent of the territory of Afghanistan. Figure 39.1 provides an overview of the Helmand River

basin. According to UNEP, 89 percent of the Helmand basin is within Afghanistan, 9 percent is in Iran, and 2 percent of the basin is located in Pakistan[2] (Ettehad, 2010; Malyar, 2016). The Arghandab River is the main tributary of the Helmand River, but there are also some other rivers, namely, the Adreskan Rud, Farah Rud, and Khash Rud, which are hydrologically regarded as part of the Helmand River basin. The river flows in a southwesterly direction toward the border with Iran, where it then bifurcates, with the western tributary called the Sistan River entering Iranian territory and the eastern tributary, called the joint Parian or shared Parian, re-entering Afghan territory after forming a nearly 40-kilometer stretch of the border between the two countries (Meelad, 2016). This makes both Afghanistan and Iran upstream and downstream of the same river. Both branches of the Helmand River terminate at four transboundary wetlands – Hamun-i-Saberi, Hamun-i-Puzak, Hamun-i-Helmand, and Goud-e-Zere that historically formed one larger wetland at times of high floods (Favre & Kamal, 2004). Once a unique freshwater wetland ecosystem and an important source of livelihood for the residents of the historical Sistan region, these transboundary wetlands have now almost completely disappeared.

The Helmand River is highly dependent on snowfall and seasonal rainfall events. Early snowmelt and variations in rainfall cause frequent flooding and severe droughts throughout the year (Helmand River Delta Commission 1951). The challenge is exacerbated by rising temperatures and the impacts of climate change, as well as Afghanistan's inability to regulate the flow of the river. The existing storage capacity in Afghanistan represents less than 15 percent of the annual river flow. The Kajaki and Dahla dams on the Helmand and Arghandab rivers, respectively, were built as part of the Helmand and Arghandab Valley Project in 1950. The aim of the project was to increase hydroelectric power, increase agricultural productivity through irrigation, help control seasonal flooding, and release water into the river during seasonally dry periods (Thomas & Varzi, 2015).

However, these developments raised conflict between the two countries, which led to the signing of the 1973 Helmand River Treaty.[3] Since then, Afghanistan has been contending with decades of civil war, foreign invasion, and conflict, leaving it with little opportunity to develop water resources in the basin. The Helmand River Treaty allocates on average 26 $m^3$/sec or 820 million $m^3$ per year (mcm/y) total to Iran in both normal and above-normal years. In below-normal years, Iran's water rights will be decreased proportionally. The normal years are based on an average flow of 5,600 million $m^3$ annually and are determined based on the data from the Dehrawud meteorological station in the upstream part of the river. The delivery of Iran's water rights after joint measurement shall be done at three points along the border as per the text of the treaty.

Due to the ensuing turmoil and decades-long instability following the Soviet invasion of Afghanistan and the coup in Iran in 1979, the Dehrawud Station – designated as the only indicator of normal years – was destroyed, and the three points for water rights delivery were never built, and the treaty remained on paper only. It was not until 2004 that the Helmand River Commission, the implementing body of the treaty, met for the first time (Mahmoudi, 2017). Despite the continued annual and biannual meetings of the commissioners, at the time of writing, an agreement over the annual water flow and volume of water delivered to Iran has not been reached. The construction of Dehrawud Station was difficult due to insecurity in Afghanistan. Iran was not ready to jointly build the delivery points, fearing that it would require altering its existing irrigation network and intake points, none of which are in compliance with the terms of the treaty. In addition, Iran feared that forcing local populations to stop the abstraction of waters from the main river could cause social upheaval. The residents of Sistan have been abstracting waters from the river along the joint border through hundreds of water pumps installed on the bank of the river. Above all, the lack of development in the upstream part of the basin and Afghanistan's inability to make use of its water

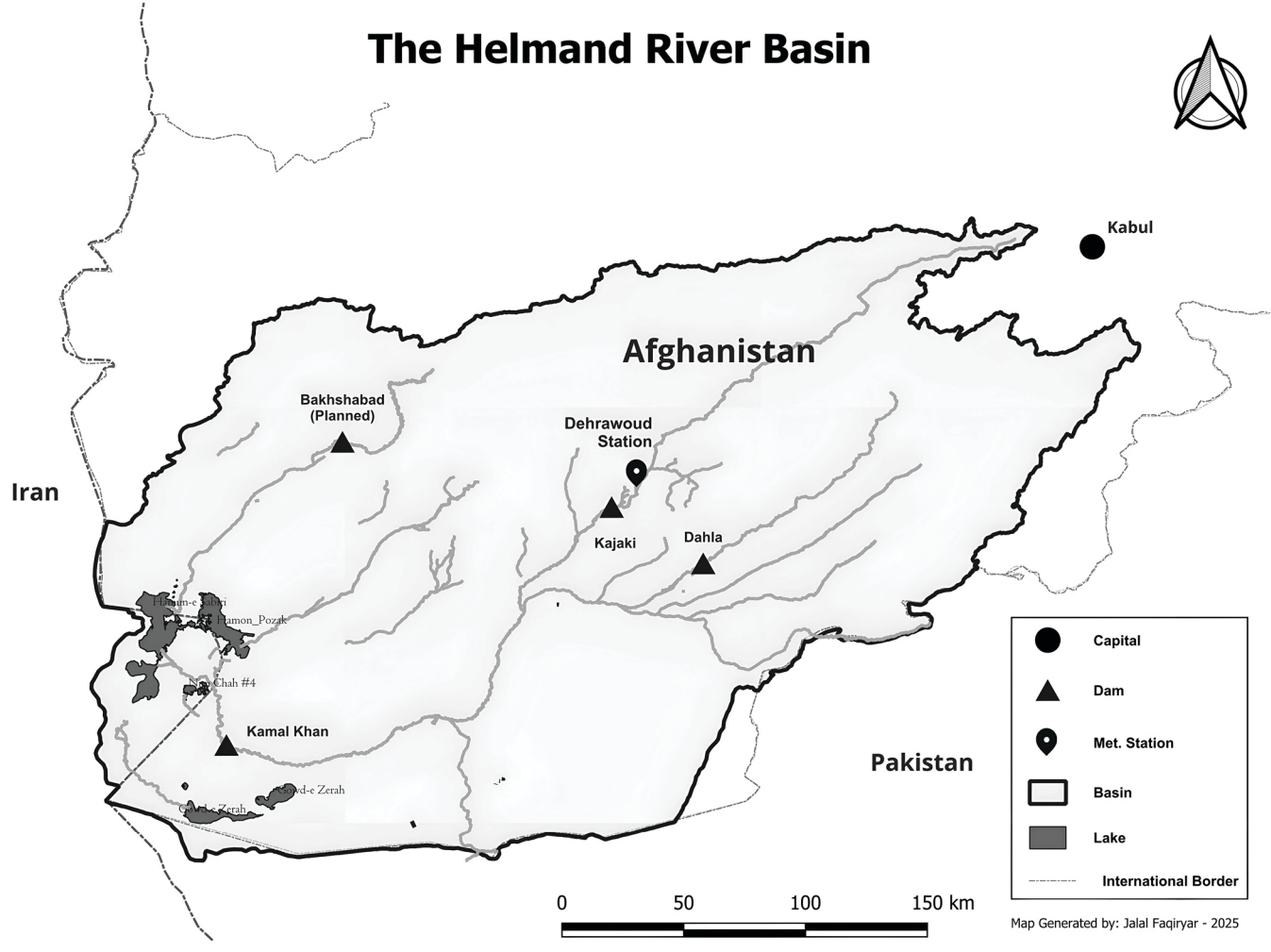



*Figure 39.1* Map of the Helmand River Basin. Map created by Jalal Faqiryar for this work.

share resulted in excessive water flowing to Iran each year, although often occurring in the form of floods. In the absence of clear data from Dehrawud Station and a lack of joint monitoring and measurement stations in the border region, frequent blame and allegations have been frequently traded between the two commissioners. Consequently, the discussions within the joint commission became "a dialogue of the deaf" (Thomas et al., 2017).

In addition, each country holds a different perspective on the reasons for the current state of the transboundary wetlands called Hamouns. Afghanistan considers as the main causes for the disappearance of wetlands and environmental degradation in the region: the expansion of agriculture on the Iranian side of the Sistan region, the construction of *Chah e Nimas*, or artificial lakes built near the border and the diversion of river flow toward these artificial lakes, and the transfer of water outside of the basin to Zahedan and other cities in Iran. With a live capacity of 1,500 mcm (Irna News, 2007), the artificial lake reservoirs on the Iranian side store twice as much as Iran's annual water rights under the treaty. However, Iran considers these artificial reservoirs important for mitigating the impacts of floods as well as for storing water for use throughout the year when the riverbed is completely dry. Iran, on the other hand, claimed that the overutilization of water and the construction of dams in Afghanistan were the main reasons for the environmental degradation in the Sistan region.

Various efforts aimed at implementing the treaty have failed due to security and political reasons. Such efforts became particularly intensified with the near completion of the Kamal Khan Dam on the lower reaches of the Helmand River. With a capacity of 52 mcm, completed in 2021, the dam diverts the river flow toward the Goud-e-Zere wetland. The dam mitigates the impacts of floods in downstream regions and only allows regulated flow toward Iran. The dam aims to provide an urban water supply to Zaranj City in Afghanistan and irrigate 170,000 hectares of land in the Nimrooz province in Afghanistan. Before the dam's completion, however, Iran raised concerns that the dam would deprive it of its water rights since it would divert the river from flowing toward its border. Iran also expressed concerns that the dam would decrease the flow to transboundary wetlands, further degrading the environmental situation in the Sistan region. Nevertheless, the Kamal Khan Dam provides Afghanistan with complete control over the river flow, thus putting Iran in a disadvantageous position. Iran is mainly concerned that the reduction in the river flow would contribute to the insecurity and fragility of its highly marginalized and underdeveloped Sistan and Baluchistan region (Mohd Faizee, 2022; Sudha Ramachandran, 2022).

## Hari Rud

The Hari Rud, called Tejen in Turkmenistan, originates in western Afghanistan. The river forms the border between Afghanistan and Iran and then between Iran and Turkmenistan, as seen in Figure 39.2. Three main tributaries, the Kashf Rud, Roos Rud, and Jam Rud on the Iranian side, and the Karukh and Kabgan rivers on the Afghan side, join the Hari Rud through its journey. The Hari Rud is an ephemeral river whose flow is highly dependent on precipitation and snowmelt. With high inter-seasonal variability, the river completely dries for most of the year. Due to the lack of available data and data-sharing mechanisms between the riparians, the annual flow of the river is estimated to be between 1 billion $m^3$ and 1.5 billion $m^3$.

There is no cooperation in the basin between the three riparian countries. However, there is cooperation between Iran and Turkmenistan, equally sharing the stored water behind the jointly built Doosti Dam. With a storage capacity of 1,250 million $m^3$, the dam was built without consultation with Afghanistan and despite its objection (Nagheeby & Warner, 2018). In the 1999 agreement between Iran and newly independent Turkmenistan, both sides agreed to share water

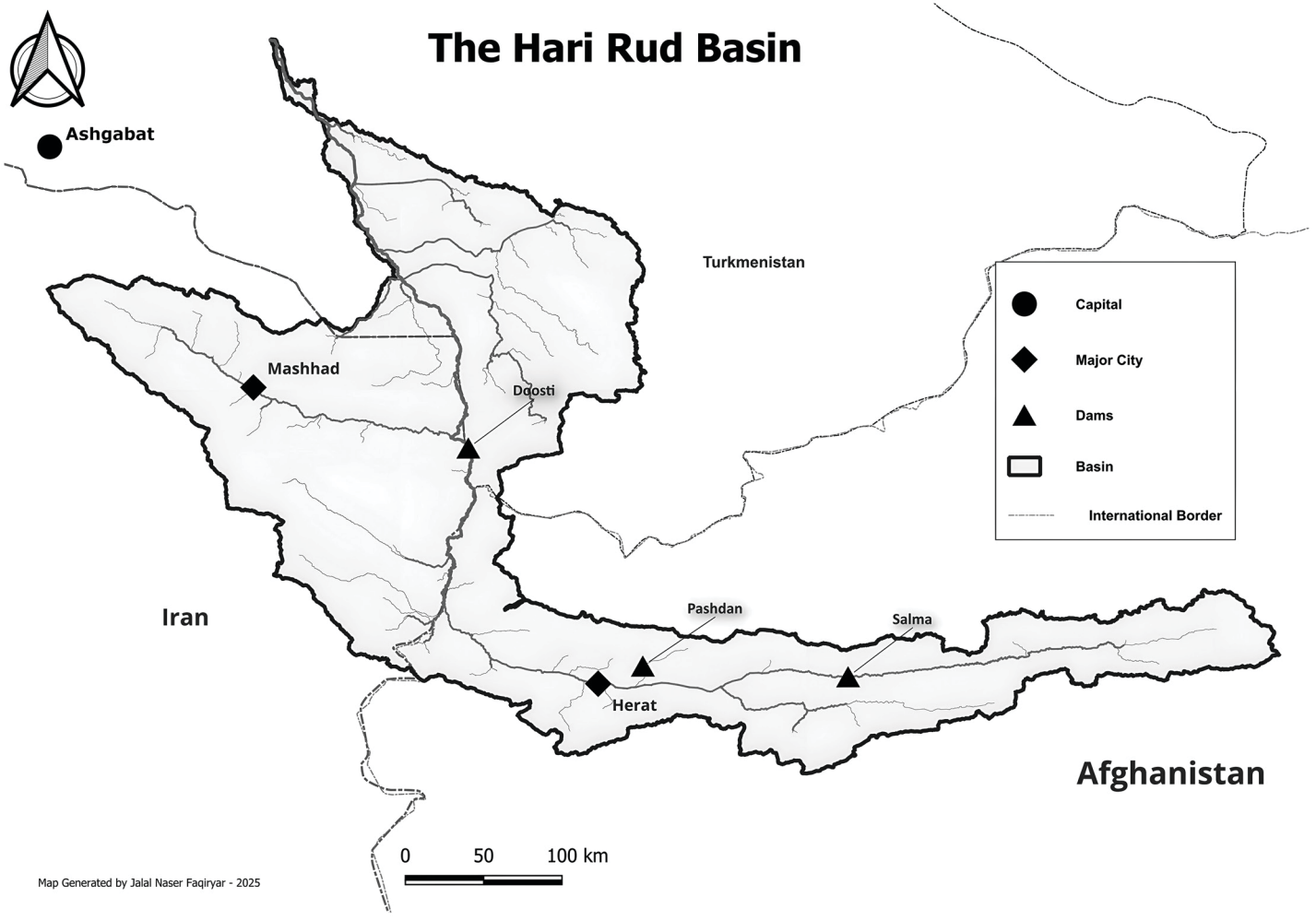



*Figure 39.2* Map of the Hari Rud Basin. Map created by Jalal Faqiryar for this work.

from the dam equally. Doosti Dam is located on the shared border of Iran and Turkmenistan, just before the Kashf Rud joins the Hari Rud from the Iranian side. The water stored behind the Doosti Dam is used for irrigation in the Sarakhs region, in the northern part of Khurasan e Razavi province in Iran. One hundred and fifty million cubic meters is transferred annually via a 180-kilometer pipeline to provide urban water supply to Mashhad city (Nagheeby et al. 2019). Mashhad is the second-largest city in Iran and a significant religious center, hosting tens of millions of pilgrims from across Iran and abroad each year. Mashhad is also host to hundreds of thousands of Afghan refugees and is a pilgrimage site for many Afghans. The urban water supply of Mashhad is heavily dependent on the water supply from the Doosti Dam and Hari Rud.

With financial support from India, Afghanistan constructed the Salma Dam with a storage capacity of 633 million $m^3$ on the upper reaches of the Hari Rud. The dam was initially planned in 1976 but was only completed in June 2016. More dams, such as the Pashdan dam, with a storage capacity of 55 million $m^3$, and the Kabgan dam, with a storage capacity of 150 million $m^3$, are under construction in Afghanistan. Concerns were raised by Iran over the upstream development in Afghanistan, particularly over the impacts of the Salma Dam on the downstream regions and water flow to the Doosti Dam (Tasnim News, 2016; DW, 2017; Jahan-e-Eghtesad, 2017). Iran's primary goal was to ensure that the level of water flowing to Doosti Dam was not significantly altered. Therefore, it emphasized its historical use from the Hari Rud and the vital human needs of the inhabitants of Mashhad city, including Afghan refugees and those visiting pilgrims.

Given the high seasonal variability and high scarcity in the Hari Rud basin, Afghanistan considered the Salma Dam essential for economic development, mitigating the impacts of climate change, and improving water availability. Furthermore, as a later developing country, Afghanistan argued that downstream countries failed to consider its demand for water in the basin when unilaterally constructing the Doosti Dam. Afghanistan was, therefore, unwilling to discuss the possible impacts of its development efforts on the Doosti Dam. Additionally, Afghanistan argued that the Iranian tributaries of the Hari Rud, such as the Kashf Rud, which flows in the vicinity of Mashhad city, could alternatively address the vital human needs of the population in Mashhad city. Given that millions of pilgrims visit Mashhad each year, bringing considerable economic benefits, the water supply of Mashhad city could be greatly improved by increasing water use efficiency and wastewater treatment. However, because of its religiously sensitive nature, this issue was not subject to extensive discussion. Mashhad is a strategic city in Iran and home to hundreds of thousands of Afghan refugees, whose situation will likely be impacted by any shortage in the urban water supply of the metropolitan.

Iran's proposal for the creation of a trilateral cooperation platform involving all three riparian countries was not accepted by Afghanistan. As an important neighbor and exporter of gas and electricity to Afghanistan, as well as a transit route connecting Afghanistan to Azerbaijan, Turkey, and Eastern Europe through the Lapis Lazuli corridor, Turkmenistan has considerable leverage over Afghanistan. In addition, the ongoing regional Turkmenistan, Afghanistan, Pakistan, and India (TAPI) gas pipeline megaproject is of significant interest to both Afghanistan and Turkmenistan. Given the shared interests of both Iran and Turkmenistan and their joint investment in the Doosti Dam, Afghanistan resisted the trilateral framework, fearing the potential leverage that the two riparians could jointly exert against its national priorities. Since Turkmenistan is also downstream and highly dependent on the waters of the Amu Darya and Murghab rivers, both of which flow from Afghanistan, the Afghan initiated bilateral talks with Turkmenistan to encourage Turkmenistan to explore cooperation potential over those rivers and shift its focus from the water-scarce Hari Rud basin.

Nevertheless, the Salma Dam came at a considerable economic and security expense for Afghanistan. Construction was disrupted several times for security reasons, including attacks on the construction site and sabotage of the access road by the Taliban and other insurgent groups. There was growing suspicion of Iran's support behind these attacks. At one point, the increasing costs associated with the worsening security situation caused the Indian government to reconsider its financing of the dam (Dikshit, 2012; Ahlers *et al.*, 2014). The lack of a mutually agreed understanding of water availability in the basin, unilateral development, and Afghanistan's reservation to negotiate over the Hari Rud contributed to the frictions in bilateral relations, particularly after the dam was inaugurated by the Afghanistan president and Indian prime minister in June 2016. By that time, the security situation in Herat and adjacent provinces had significantly deteriorated, and more districts, including those surrounding the dam, were falling into the Taliban's hands.

## Issue Linkage: An Added Complexity

In 2016, following the visit of the Iranian foreign minister to Afghanistan, both sides agreed to start negotiating a package deal. The package deal, called the SCCA, would elevate bilateral relations to a strategic level by replacing a similar yet obsolete, nearly century-old agreement from 1926. Similar efforts had been undertaken previously but failed for a variety of reasons, such as international sanctions against Iran, the presence of a large number of international forces in Afghanistan, and the Afghan government's then rather conservative approach to transboundary water cooperation (Ahmadzai, 2016). The lack of water infrastructure on transboundary rivers inside Afghanistan also meant that transboundary waters were not a source of particular concern for Iran previously.

However, by 2016, the completion of the Salma Dam and the near completion of the Pashdan and Kamal Khan dams on Helmand and Hari Rud rivers became a great concern for Iran. These developments provided Afghanistan with leverage, confidence, and public support to negotiate its interests with Iran over these rivers. In addition, the emergence of new political dynamics at the national, regional, and international levels played a crucial role not only in facilitating the negotiation process but also in linking water cooperation to a broader range of political, economic, and security interests. The election of Hassan Rouhani as the new Iranian president in 2013 brought new momentum to improving relations with the United States and the West. As a moderate, Rouhani had a long-standing interest in economic development, including support for increased cooperation with Afghanistan (Koepke, 2013). In Afghanistan, the formation of the National Unity Government after months of contention and allegations of fraud and ballot stuffing was brokered by the intervention from the United States and support from Iran (Wroughton & Golovnina, 2014). Moreover, in 2014, a clear timeline for the withdrawal of international forces from Afghanistan was agreed upon. The gradual decrease in the number of international security forces put the Afghan National Defense and Security Forces (ANDSF) at the forefront of the war with the Taliban, whose strength has been on the rise (NATO, 2014).

Both political and military transitions in 2014 contributed to increasing fragility in Afghanistan on multiple fronts, leading to worsening of economic and security conditions. With the gradual withdrawal of international forces from Afghanistan, the focus also shifted from the battleground toward peace talks with the Taliban. The United States' efforts to seek a negotiated settlement with the Taliban boosted the latter's legitimacy – suggesting that they may play a future role in governing Afghanistan. With reinvigorated peace efforts, regional dynamics toward the Taliban also changed, and countries such as Russia, China, and Iran sought to develop closer relations with the Taliban. The security situation in the western provinces of Afghanistan bordering Iran,

which had been previously relatively stable, became increasingly volatile. Mullah Mansour, the then Taliban leader, was killed by a U.S. drone in 2016 in the Baluchistan region of Pakistan while returning from Iran. This reaffirmed Iran's relationship and increasing engagement with the Taliban, which had once been their sworn enemy.[4] The Afghan government, in a bid to gain regional support, embarked on an ambitious regional cooperation agenda, with water being an important element of such agenda with Iran as well as with Central Asia. With the increased tensions between Afghanistan and Pakistan, the Afghan government shifted its trade and transit priority toward Iran. Iran's export volume to Afghanistan increased steadily, and the country became the largest trading partner of Afghanistan, replacing Pakistan (MFA.IR, 2018). Chabahar port in Iran, with investment from India, became increasingly important for Afghanistan's regional connectivity agenda as well as for decreasing dependence on Pakistan's transit route.

The signing of the Iran nuclear deal, known as the Joint Comprehensive Plan of Action (JCPOA) in 2015, was another major milestone that resulted in the relief of international sanctions against Iran. These sanctions affected not only Iran but also neighboring countries, particularly those dependent on imports from Iran. The easing of international sanctions provided an impetus for boosting bilateral economic cooperation, including trade and transit, between the two. The Afghan government also hoped that with the cessation of restrictions on trade with Iran, both countries could work together to establish an effective legal mechanism to stop illegal imports through porous borders. The volume of such illegal imports was considerable – estimated at the time to constitute approximately 30 percent of total imports from Iran. This illegal cross-border trade not only deprived the Afghan government of considerable income but also financially benefited the Taliban since these illegal routes were crossing through territories controlled and taxed by the Taliban.

The SCCA negotiations package proposed by Iran brought various issues together under a mutual gains approach, whereby Afghanistan would benefit from Iran's support in the areas of security, economy, and cultural cooperation and would be able to define a framework to address the situation of Afghan refugees in Iran. Afghanistan, in return, would cooperate over the Hari Rud and the Helmand rivers and in addressing the environmental situation of the transboundary wetlands. The negotiation process was divided into five committees – security-defense, economic-trade, water, refugees, and cultural – with negotiations taking place simultaneously in each committee, and progress in one committee was dependent on and affected by progress in other committees. The committees' draft articles would later embody the SCCA text, which would be signed by the heads of both states. The agenda topics of each committee were agreed upon in advance at the highest political level, and the committee's job was to finalize the details of these previously agreed-upon agenda items.

The linkage in the package negotiations was explicitly made to transboundary water not only to encourage the Afghan government to cooperate over transboundary waters but also to build Iran's leverage over Afghanistan in other areas. When negotiations address an issue with strong asymmetry between sides, grouping issues with opposite asymmetry can be advantageous because countries are more likely to exchange in-kind side payments than monetary side payments and facilitate credible threats against defections (Daoudy, 2009; Just & Netanyahu, 2000). Linking issues could also incentivize cooperation across issues since a sacrifice in one area may result in higher gains elsewhere (McGinnis, 1986) or indirectly increase bargaining power over water, termed as benefits beyond the river basin (Sadoff & Grey, 2002).

Linking cooperation in various areas offered both incentives and pressure, albeit more so on Afghanistan, which led to a breakthrough in water cooperation. The security aspect was interlinked with every other part of the package deal. For example, the mass deportation of Afghan refugees

and illegal imports from Iran could entail security implications for Afghanistan. For Iran, a potential decrease in water flow in the Hari Rud and Helmand rivers could entail stability and security ramifications in both the Sistan region and Mashhad city. However, even beyond this, security along the shared border and establishing effective mechanisms to address the threat of terrorism, including that of the Islamic State in Khorasan Province (ISKP), narcotics, and illegal trade, were important for both countries. Nevertheless, linking water with security cooperation introduced complex geopolitical issues as well as externalities to the package deal and narrowed the prospect of collaboration. For instance, the Afghan government viewed Iran's support as essential for stability in the western parts of Afghanistan in the face of international troops' withdrawal. This included sharing intelligence and cutting the Taliban's supply and financing channels while providing political support for the Afghan peace process. However, Iran was keen to offer limited support to the Afghan army, albeit not direct support to fight the Taliban, and was keen to use its leverage over the Taliban to help strike a peace deal. Nevertheless, limited support of Iran's military to the Afghan forces was practically difficult given that the latter was trained, equipped, and supported by NATO and U.S. forces, while the Iranian security agencies were under sanctions by the United States. Additionally, Iran's policy toward the Taliban was linked to its strategic objective of defeating the United States in Afghanistan, the main reason for its alliance with the Taliban. A regional coalition of Russia, China, and Iran was also emerging around the issue of how to approach the Taliban and deal with the post-U.S. scenario in Afghanistan. The U.S. efforts to reach a political deal with the Taliban, leading to the signing of the Doha peace agreement in February 2020, also shifted regional dynamics in favor of the Taliban by marginalizing the Afghan government, which was neither part of the negotiations process nor its final outcome. However, the Taliban's full control over Afghanistan, where other Farsi-speaking minorities, including the Shia Hazaras, would be marginalized, was not in Iran's interest either. Considering the close relations that Iran developed with the Taliban and the political opportunity presented by the planned withdrawal and peace talks with the Taliban, Iran faced a strategic dilemma: whether to maintain a balance between supporting the Taliban or the so-called U.S.-backed government in Kabul or, alternatively, to hedge its bets until the situation in Afghanistan became clearer. Since the security and intelligence agencies were the most influential actors in the room, the progress in the package deal was largely hinging on their decisions.

While the overall momentum was overshadowed and the negotiations on security cooperation kept lingering, the economic and trade committee made some progress, though a few critical issues remained unresolved. Provision of preferential tariffs on imports from Afghanistan, easier access to the sea through Chabahar and Bandar Abbas ports, subsidized energy export to Afghanistan, and achieving a balance in bilateral trade through increasing imports from Afghanistan were among the issues included in the economic part of the package negotiations. An increase in collaboration among universities and the provision of scholarships to Afghan students were agreed upon in cultural committees. Providing temporary residence and extending the visas of over one million illegal Afghan refugees were agreed upon in the refugee committee. The agreement in the water committee included initiating technical and legal studies of the Hari Rud, fully implementing the 1973 Helmand Treaty, and appointing a third party to study the reasons for the shrinking of the transboundary wetlands and proposing practical and appropriate ways to revive them.

Despite the draft of three committees being signed and the economic committee having almost finalized the remaining issues, the package deal could not be concluded successfully, and the negotiation process collapsed. The package negotiation helped change the zero-sum perception for both sides by tying cooperation over transboundary waters to a broader range of issues. However, the initial agreement over the transboundary waters seems to have affected the dynamics

of negotiations, with Afghanistan losing its only leverage, resulting in Iran's less compromising position in the security and economic committees. Cooperation on security issues has grown more difficult over time, specifically with the changes in regional dynamics following the U.S. peace deal with the Taliban. The disagreement extended into trade and economic cooperation, particularly after the United States pulled out of the JCPOA agreement in 2018 under President Trump. With sanctions on trade with Iran gradually put back in place, clamping down on illegal imports to Afghanistan didn't seem possible. Investment in the Chabahar port has become more challenging. This implied that some of the economic incentives that had originally motivated Afghanistan became challenging to realize. This raised questions about whether the package deal would yield any benefits for Afghanistan.

While the process aimed to create interlinkages and dependencies among various issues in order to incentivize cooperation, this was not implemented in practice. The five committees negotiated separately and independently, resulting in the interlinkages being largely overlooked. This also resulted in inconsistency between the agreed points and practical steps toward their implementations in drafted articles in each individual committee. Some commitments were clear and straightforward, while others carried rhetoric and lacked a clear understanding and concrete implementation mechanisms. For example, in the economic cooperation committee, a commitment to balance trade between the two countries was made, but how such an ambiguous and highly ambitious goal could be achieved in practice was not sufficiently addressed. In fact, there was a significant gap in the trade volume between the two countries – Iran's annual exports to Afghanistan amounted to approximately 3 billion USD, while the volume of Afghanistan's exports to Iran was less than 100 million USD per year. Another example was the lengthy discussion over the Hari Rud, where Afghanistan favored a more general commitment to start technical cooperation, while Iran pushed for starting separate technical and legal negotiations to reach a legally binding water-sharing agreement based on an agreed timeline. Furthermore, while there was consensus on the importance of collaboration on security issues between the relevant agencies of both sides, the practicality and mechanisms for such collaboration were not agreed upon. Despite being interconnected, these five areas of cooperation encompassed short-, medium-, and long-term objectives. This also raised the question of how long-term commitments could be guaranteed against short-term general commitments and how the intended leverage could be maintained in the face of changing circumstances, particularly after the withdrawal of international forces and a potential peace deal with the Taliban.

The composition of the delegations also resulted in the interlinkages being weakened throughout the process. Negotiations from the Afghanistan side were carried out by technical experts from relevant government agencies, the deputy minister of agriculture in the case of the water committee, and the deputy minister of finance in the economic committee. Iranian diplomats, on the other hand, were leading the negotiations in each committee with other government agencies providing necessary support. For instance, the water committee approached the complex and politically interlinked issue of water from a rather narrow technical perspective and did not fully consider the interlinkages with other issues in the package deal. Hence, progress in the water committee was not carefully balanced by the Afghan side against the progress in the other committees, especially the security and economic committees. Additionally, capacity asymmetries, lack of internal coordination, and weak negotiation skills on the Afghan side contributed to interlinkages being largely overlooked and thus not being able to maintain its leverage throughout the negotiation process. Prematurely arriving at an agreement in the water committee resulted in Afghanistan losing its leverage, leading to a hardened position and less appetite for compromise over other issues by Iran.

Changes in the regional dynamics following the reinstating of international sanctions against Iran by the United States, the advancement of the Taliban on the ground in Afghanistan, and the signing of the U.S.-Taliban deal also affected the momentum in the negotiation process. The emerging dynamics not only questioned the practicality of cooperation in certain areas, such as economic cooperation, but also moved the process into a highly uncertain and securitized realm. Despite intensified efforts at the highest level at the end of 2020 to renegotiate the remaining points, such as border security and trade issues, they have not led to any breakthrough, and the lost momentum could not be revived. Thus, the opportunity to transform bilateral relations between the two countries – from facilitating cooperation over water and boosting trade and transit to improving the security situation across the border region, as well as addressing the situation of Afghan refugees in Iran – was lost. The complexity of the process linking various issues with an aim to facilitate tradeoffs and build leverage for each side, the asymmetries in capacity, and the approach to negotiations – all contributed to the failure of the process. While some of the blame rests with the parties, wider regional politics, some of which were beyond either side's control, also played a role in the failure of the process.

The complex five-year negotiation process over the SCCA – represents the most intense diplomatic efforts between the two countries to date – finally collapsed with the return of the Taliban to power in Afghanistan in August 2021. With the Taliban in power, it seems unlikely that the package negotiations will continue or that the initial agreements will be kept. The security landscape in Afghanistan and the region after the departure of the U.S. and NATO forces has completely changed. Economic cooperation with Iran doesn't seem to be a pressing priority given the Taliban's close and historical relations with Pakistan, which is now Afghanistan's main trading partner. Taliban's announcement of joining the China-Pakistan Economic Corridor and the use of Gwadar port in Pakistan would decrease the importance of Chabahar port and transit routes through Iran (Hindustan Times, 2021). Despite this, initial agreements over transboundary waters still remain relevant. However, the lack of capacity within the Taliban regime to effectively manage the recently built dams in the two transboundary basins and the increasing impacts of climate change will continue to affect both countries and their interactions over transboundary waters in the future.

## Conclusion

The linkage of issues provided incentives and leverage for both Afghanistan and Iran to negotiate over otherwise highly sensitive and difficult issues. However, the very nature of such interlinkages, the complexity of the negotiation process, capacity asymmetries, and finally, the impacts of broader regional and international politics affected the end results for both sides. The interlinkages added more intricacy, uncertainties, and externalities to an already complex and sensitive issue of transboundary waters. While an initial agreement was reached over transboundary waters, the linkages made to other complicated issues, such as security and economic cooperation, made reaching a mutually acceptable outcome difficult. Changes in broader geopolitics, such as the relief of international sanctions and the withdrawal of international forces from Afghanistan, initially facilitated the negotiation process. However, the return of sanctions against Iran and the U.S.-Taliban peace deal introduced a new reality for the parties, making some of the agreed commitments difficult to implement. In complex issue linkage negotiations, where each party seeks to maximize its interests by conceding the least possible, it is critical that such interlinkages are clear tradeoffs that take place simultaneously and that the process can bridge these tradeoffs concurrently. As illustrated above, the premature agreement in the water committee and arguably a

lack of sufficient and direct affinity with other issues resulted in Afghanistan losing its bargaining power and Iran adopting a tougher bargaining position. Current regional geopolitics with the Taliban in power in Afghanistan offer both opportunities and challenges for both countries, with transboundary rivers continuing to be a crucial aspect of overall bilateral relations.

## Notes

1 In the Farsi/Dari language, Rud means river.
2 Given the existing border dispute between Afghanistan and Pakistan, according to Afghanistan's territorial claims Pakistan is not part of the Helmand river basin.
3 A copy of the treaty text can be found at: www.internationalwaterlaw.org/documents/regionaldocs/1973_Helmand_River_Water_Treaty-Afghanistan-Iran.pdf.
4 In addition to the stark ideological difference between the Taliban and the Iranian regime, in 1998 Iran and Afghanistan, then under Taliban rule, were on the brink of war after 11 Iranians including 9 diplomats were killed in the city of Mazar-e Sharif in northern Afghanistan.

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# 40

# THE SALWEEN RIVER BASIN

## Navigating Transboundary Governance, Development Pressures, and Civil Society Engagement in China, Myanmar, and Thailand

*Kyungmee Kim and Nang Won Lee*

### Key Takeaways

- Balance developmental pressure and sustainability through community engagement and rigorous impact assessment.
- Mobilize communities and civil society along the river to provide entry points for enhancing dialogues on sustainable watershed management at the transboundary scale.
- Better understand complex political and security risks to advance water diplomacy in culturally and ecologically diverse basins such as the Salween River.

### Introduction

The Salween River is one of the major rivers in Southeast Asia, with a 2,820-km course shared by China, Myanmar, and Thailand. This chapter focuses on taking stock of existing and future water interactions over the Salween River. Following an overview of the river's geography, people, cultural diversity, rich biodiversity, and development potentials in the introduction, existing water interactions at transnational and subnational levels are outlined in this case study chapter. Then, the chapter focuses on the potential entry points for water diplomacy and concludes the discussion with a set of policy recommendations.

The Salween basin covers 283,500 km$^2$, 48% of which is in China, 44% in Myanmar, and 7% in Thailand (Johnston et al., 2017, p. 1). The river originates from the Tibetan Plateau, flows through the narrow mountainous gorges in Yunnan Province in China, where most of the basin area is high in altitude, over 4,000 m, and then enters Myanmar's Shan plateau ranging from 1,200 to 1,500 m. The river flows to the Karenni and Mutraw (or Hpapun) hills, where it forms the border between Myanmar and Thailand's Mae Hong Son Province. When the river finally comes down to the plains of Hpa-an, it broadens, has several large river islands and deltas within, and continues its journey to the Andaman Sea via Moulmein in Mon State.

The river's cultural diversity is reflected in many names that the Salween River has locally in different parts of the basin. The river is called Nu Jiang (怒江), in China, Thanlwin (သံလွင်) in Burmese, Nam Khone in the Shan language, and Salawin in Mae Hong Son Province in Thailand


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(Lamb, 2019). More than 10 million people live in the basin, and the river is home to more than a dozen ethnic minorities. Some of the major groups include the Shan, Karen (or Kayin), Karenni (or Kayah), Wa, Lisu, Lahu, Kokang, Akha, and Hmong (Johnston et al., 2017, p. 1). Many of these groups are spread across borders, and their co-ethnic ties have facilitated cross-border trade and migration. Such dynamics create a degree of fluidity in the Salween basin, where non-state-driven cross-border exchanges are possible. This conceptualization of the Salween basin as a fluid and dynamic space somewhat contradicts official narratives by governments and colonial authorities of portraying the border regions as a resource frontier and a mission destination for civilization (Lambrecht, 2008; Scott, 2010).

The Salween basin is highly biodiverse and home to endangered and indigenous species that require conservation. The upstream area covers the Three Parallel Rivers of Yunnan Protected Areas, which is a UNESCO World Heritage Site with outstanding natural features such as glaciated peaks and deep gorges and one of the most important conservation areas remaining in the world such as the Hengduan Mountains (UNESCO, 2021). Three Parallel Rivers of Yunnan Protected Areas has 77 animal species and 34 plant species listed as protected or endangered and supports over 25% of the world's and 50% of China's animal species (UNEP-WCMC, 2017). The rich diversity of the area owes to the complex geological history and diverse local climates and topography. Scientists and researchers continue to find new species that are endemic and endangered in the Salween River (Chen et al., 2015; KESAN, 2008). A comprehensive, basin-wide assessment of biodiversity has yet to be conducted despite fast-changing land use and forest coverage in the region (Feng et al., 2010).

The mainstream of the Salween River holds 18 sites that are suitable for large-scale hydropower generation. Two dozen dams are planned on the river's upstream in China, five dams on the downstream in Myanmar, and two on the Myanmar-Thailand border (Table 40.1). China's ambitious plans to develop hydropower have influenced the expansion of a hydropower cascade in the Salween upstream as well as other great rivers such as the Yangtze and Mekong. Yunnan provincial government announced plans to build 13 cascade dams and two reservoirs for hydropower generation in the early 2000s (El-Silimy, 2019) and then suspended the plan due to opposition from environmentalists and local communities. Myanmar and Thai governments have a long history of attempts to harness hydropower from the Salween River, and their official discussions and plans can be traced back to the 1970s (TERRA, 2006). International electricity purchasing agreements between Myanmar and Thailand have been discussed, which would enable the export of electricity generated from some of the Salween dams to Thailand. Salween dam sites in Myanmar are in the conflict-affected regions, and central government control of the areas has been contested. During the 10-year period of political opening in Myanmar during 2011–2021, the state authorities and hydropower developers pursued Salween dam building through appeasement, negotiations, and coercion with non-state armed groups and opposing civil society (Middleton et al., 2019). A more detailed discussion on international cooperation over hydropower development can be found in the subsequent section.

Balancing development pressure and ecological and social sustainability is the key challenge for water diplomacy over the Salween River, which is also endowed with cultural diversity. Sustainable and peaceful development of the Salween is crucial for the basin's population and ecosystems, while how international and local actors can facilitate cooperation among various actors is yet unclear. This chapter takes stock of existing water interactions and explores the potential for water diplomacy over the Salween River. The evaluation of existing interactions is organized at the international level (or between governments and involving transnational civil society) and subnational level (or between subnational authorities and civil society actors).

*Table 40.1* Planned hydropower projects on the Salween mainstream

| | *Status*[*] | | *Installed capacity (MW)* |
|---|---|---|---|
| Chalong | Completed | China | 2[†] |
| Jiquan | Completed | China | 10.8[†] |
| Shading | Dam agreed or under construction | China | |
| Reyu | Dam agreed or under construction | China | |
| Luohe | Dams planned | China | |
| Xinrong | Dam agreed or under construction | China | |
| Tongka | Dam agreed or under construction | China | |
| Kaxi | Dams planned | China | |
| Nujiangqiao | Dam agreed or under construction | China | |
| Yeba | Dams planned | China | |
| Lalong | Dam agreed or under construction | China | |
| Luola | Dam agreed or under construction | China/Tibet | 1,050[†] |
| Angqu | Dam agreed or under construction | China | |
| Hongdong | Dam agreed or under construction | China | |
| Emi | Dam agreed or under construction | China | |
| Songta | Dam agreed or under construction | China/Yunnan | 3,600[†] |
| Bingzhongluo | Dams planned | China/Yunnan | 1,600[‡] |
| Maji | Dam agreed or under construction | China/Yunnan | 4,200[†] |
| Lumadeng | Dams planned | China/Yunnan | 2,000[‡] |
| Fugong | Dams planned | China/Yunnan | 400[‡] |
| Bijiang | Dams planned | China/Yunnan | 1,500[‡] |
| Yabiluo | Dam agreed or under construction | China/Yunnan | 1,800[†] |
| Lushui | Dams planned | China/Yunnan | 2,400[‡] |
| Liuku | Dam agreed or under construction | China/Yunnan | 180[†] |
| Shitouzhai | Dams planned | China/Yunnan | 440[‡] |
| Saige | Dams planned | China/Yunnan | 1,000[†] |
| Yangsangshu | Dams planned | China/Yunnan | 1,000[‡] |
| Guangpo | Dams planned | China/Yunnan | 600[‡] |
| Kunlong | Dam agreed or under construction | Myanmar | 1,400[†] |
| Nong Pha | Dam agreed or under construction | Myanmar | 1,200[†] |
| Mongton | Dam agreed or under construction | Myanmar | 7,000[†] |
| Ywathit | Dams planned | Myanmar | 4,500[†] |
| Weigyi | Dams planned | Myanmar/Thailand | 4,540[†] |
| Dagwin | Dams planned | Myanmar/Thailand | 792[†] |
| Hatgyi | Dam agreed or under construction | Myanmar | 1,360[†] |

[*] Middleton et al. (2019).
[†] TERRA (2016).
[‡] Dore and Yu (2004).

## Water Interactions at the International Level

### *Governments*

There are no water-sharing agreements regarding the Salween River, allowing China, Myanmar, and Thailand to unilaterally develop the basin and use its water. So far, the governments of these water-sharing countries have not expressed a conflict of interest over other countries' development plans. Without water-sharing agreements and tensions, riparian governments have cooperated over

hydropower development, which has involved dialogues and exchanges between representatives from government ministries and state-owned corporations. The current state of the basin alludes to the possibility of formalizing a transboundary agreement on the water use and development plans, including establishing a river basin organization. A major challenge for water diplomacy is the uncertainty of furthering cooperation and formalization of joint management of the Salween to those living in the basin. Riparian governments' top-down approaches and historical and contemporary framing of the Salween basin as a resource frontier suggest that cooperation may lead to accelerated development of hydropower and regional grid, which can result in negative local level impacts as well as impacts on the region's rich cultural and biological diversity. Water diplomacy tools may offer help in ensuring diverse voices within the basin for developing a shared vision for the Salween River. The following details the Salween riparian government policies, actions by state-owned enterprises, and civil society's responses to counter top-down policies.

Governments of China, Myanmar, and Thailand shared similar visions of the Salween, a resource frontier with huge potential for hydropower generation. As explained earlier, China has ambitious plans for developing hydropower on the Salween River. Upstream hydropower development has been driven by the Yunnan provincial government in cooperation with Huadian Power International Company (El-Silimy, 2019). The Chinese plans for the Salween dams were suspended in 2004 and have not been mentioned in the 13th 5-year plan from the National Energy Administration in 2016 (Phillips, 2016). The recent establishment of the Grand Canyon National Park and Dulong River National Park in the Salween basin in 2016 allows the concerned environmentalists to hope that Salween dams are unlikely to be pursued (Yu et al., 2019).

Myanmar also has extensive plans for building dams on the Salween mainstream and its tributaries (tributary dams are discussed in the section focusing on the subnational level). Myanmar's mainstream Salween dams are much larger in scale and would involve substantial international cooperation with China and Thailand because the electricity generated from the dams is intended for export to these countries (Middleton et al., 2019). China and Thailand are not only the export destinations for the electricity generated from hydropower but also drive the development of these dams through the active involvement of the Chinese and Thai state-owned enterprises. If built according to the current plans, the Hatgyi, Dagwin, Weigyi, and Mong Ton dams would be installed with 13,692 MW generation capacity destined for Thailand. The Ywathit, Nongpha, and Kunlong dams, with a total of 7,100 MW generation capacity, are selling electricity to China.

Myanmar's powerful Ministry of Electricity and Energy (MoEE) has signed MoUs for "joint ventures" with Chinese and Thai state-owned enterprises. Joint ventures have been one of the models that the Myanmar MoEE has adopted to finance and develop large dams. Under the joint venture agreement, foreign companies can be the major stakeholder in the hydropower project. This model of development allows the Myanmar government to profit from its huge potential in hydropower generation by attracting foreign investment. Discussions between Thai and Myanmar officials to develop hydropower on the Salween date back to the 1970s (TERRA, 2006). Electricity Generating Authority of Thailand International (EGATi) is a Thai state-owned company that holds a major stake in the Hatgyi, Dagwin, and Weigyi dam projects and a minor stake in the Mong Ton Dam project. The plans for the Dagwin and Weigyi dams have been suspended, while the Hatgyi Dam project has been actively pursued. The involvement of Chinese companies came later, and Sinohydro, China Datang Overseas Investment, HydroChina, China Southern Power Grid, and Hanergy Holding Group have signed agreements with the Myanmar authority to invest and construct mainstream dams (Middleton et al., 2019).

Thailand is not only interested in jointly developing one of the Salween dams and importing electricity but is also keen on diverting water from the Salween mainstream to other basins within

Thailand. Several diversion plans have been proposed over the years, which include taking water out of the Salween River to tributaries and then filling the reservoir of the Bhumibol Dam (Zerrouk, 2013). The Government of Myanmar has not responded or objected to the Thai diversion plans so far, despite the potential impacts of the inter-basin water transfer schemes on the downstream populations and ecosystems.

Issues regarding the Salween upstream hydropower dams have been treated as internal affairs within China, although these dams may result in transboundary impacts. In a sense, China is an upstream hegemon in the Salween basin due to its superior military and economic powers that allow China to develop the basin unilaterally (Zeitoun & Warner, 2006). Concerned downstream countries have had little influence over China's plans for the Salween dams, but the Chinese government has met with critical domestic discourse invoked by domestic environmental activism and grassroots pressure by NGOs in the Yunnan Province. The subnational dynamics within China are further explored in the next section, focusing on water interactions at the subnational level.

One may suspect that China can take a similar approach as in the Mekong basin, where China is also considered an upstream hegemon. The basin cooperation agreement in the Mekong has been more formalized and supported by the Mekong River Commission. China is not a party to the Mekong Agreement but has extensively cooperated through the Mekong River Commission by attending meetings, exchanging water data, and sharing information about dam operations for downstream countries.

### *Civil Society and NGOs*

NGOs in China, Thailand, and Myanmar have attempted to influence international-level water interactions by supporting dialogues among diverse civil society actors from the Salween basin. Environmental and human rights NGOs in the region have cooperated over a set of common agendas for years. The principles of environmental and social sustainability and justice have been shared among civil society groups, and they have organized forums to share knowledge about the Salween River, its ecology, and the methods of resistance in respective countries. Collective actions by civil society groups in each country can be seen as "fragmented" (e.g., Suhardiman & Middleton, 2020), but the series of collective actions has been guided by an emerging norm of ecological sustainability and social justice. Several regional hubs and institutions have played an important role in fostering exchanges and cooperation. Various transnational NGOs have supported the dialogues among civil society actors from the Salween basin and offered training. These forums have been instrumental for "learning" between grassroots actors in the basin across borders and contributed to the creation of a notion of transboundary commons and solidarity.

Changing political contexts and environments have influenced over time how civil society actors from China, Thailand, and Myanmar cooperated over the Salween River. All Salween riparian countries currently have limited political spaces for civic activities, and these actors bear a degree of risk in opposing government-led projects publicly. Despite the risk of repression, transboundary cooperation among civil society actors in the Salween basin has a long history. Environmental NGOs based in Thailand have long provided platforms for long-term cooperation for civil society actors in the region (Simpson, 2014). The presence of the Myanmar exile community in northern Thailand also has been a factor in forging cooperation. Chinese civil society groups were gradually being included after the success of Yunnan-based Chinese civil society groups during the early 2000s, as mentioned in the previous section. Myanmar civil society groups became more proactive and vocal after the political opening in 2011.

These grassroots actors learned from each other's mobilization and movement tactics, which became a common practice in the Salween basin. A Chinese NGO organized a village exchange program between a community facing displacement and a community already displaced by a dam (Yu et al., 2019). This method was particularly effective in generating a sense of urgency and realization in local communities facing dam-induced displacement. A Myanmar NGO organized a similar exchange program within the country to raise awareness about dams. Another example is organizing protests on the International Day of Action for Rivers, which has become a shared practice in the region. International Rivers has this annual event for opposing large dams all around the world, and civil society groups in the Salween basin have organized protests attended by local communities in different parts of the basin.[1] This demonstration of solidarity has been a powerful tool of mobilization.

Regional initiatives and programs such as the Water Land Ecosystem Mekong (WLE Mekong) program and Chiang Mai University's Regional Center for Social Science and Sustainable Development have offered research trainings and dialogues on the environmental and social sustainability of rivers, including the Salween. International conferences have been organized to exchange views on water-related issues and to engage in constructive dialogues between civil society, the private sector, and the research community. The WLE Mekong program offered fellowships to local researchers to carry out substantial research work involving their communities (Middleton & Lamb, 2019). One participant noted, "We are now seeing the rise of new local and transnational actors that are exerting a growing influence over policy-making and governance outcomes."[2]

The examples of regional cooperation among civil society actors in the Salween demonstrate that building common practices and a sense of solidarity can enhance accountability and inclusivity in water governance in transboundary basins. One of the key limitations is derived from the changing political environment, especially authoritarian backsliding in Southeast Asia. Increasing restrictions against NGOs in China with international funding ties have affected the activities of environmental NGOs working on the Salween (Wang & Connell, 2016). These macropolitical considerations are important for water diplomacy and related conflict mediation efforts.

## Water Interactions at the Subnational Level

With an absence of international agreements over water sharing, the governments of China, Thailand, and Myanmar have bilaterally cooperated over hydropower development on a project basis. Salween riparian governments somewhat shared similar ideas about the Salween basin as a resource frontier and a backwater needing development, which led to tensions with civil society and NGOs focusing on human rights, environmental sustainability, and protecting local livelihoods. Mobilization by civil society and NGOs has influenced the decisions of the Salween riparian governments to a degree. In the case of Myanmar, even ethnic rebel groups were drawn into opposing the government's plan for hydropower dams. Such diversity and dynamism at the subnational level demonstrate various entry points for water diplomacy. There is an obvious need for conflict mediation and peacebuilding endeavors in the Salween, although current political environments are highly risky for undertaking conflict mediation efforts using water diplomacy tools. Despite such limitations, understanding complexity and diversity at the subnational level can be highly useful and informative for considering water diplomacy for transnational and international processes. The following focuses on the interactions primarily between governments and civil society actors and is organized by subnational interactions in China, Myanmar, and Thailand.

### *China*

In China, the Yunnan provincial government has a major influence on the development of the Salween River, and the central government's policies on environmental protection and renewable energy have also affected the provincial-level decisions to a degree. Chinese national politics on environmentalism and renewable energy are embedded in the larger narratives and a different set of actors that are different from the national policies affecting the Salween River. One of these national policies that supported the Salween upstream dams was the West-East Power Transfer scheme as a part of the Western Regional Development Strategy (2000–2020). This power transfer scheme prompted the Yunnan provincial government to put forward an ambitious plan for hydropower development, including 13 dams on the upstream Salween or Nujiang in 2000. The Yunnan provincial government and prefecture authorities counter-mobilized in support of the dam construction by emphasizing the importance of hydropower for national development and promoting the research and opinions of pro-hydropower scholars in academia (Yu et al., 2019). The provincial government's plan for the Salween dams was suspended in 2004 due to the intervention by the State Environmental Protection Administration and the mobilization by Yunnan-based environmentalists (Yu et al., 2019). Later, the Chinese official policies gradually changed from an industry-oriented economy to a service-oriented economy, and the Yunnan provincial government also adopted an alternative approach to developing the upper Salween.

Chinese civil society mobilized intensely during the early 2000s in response to the Yunnan provincial government's plan for 13 Salween dams. Green Watershed, a Yunnan-based environmental NGO, has played a pivotal role in creating the anti-dam coalition. Green Watershed carried out a social impact assessment for one of the Mekong upstream dams and became known as a credible NGO within the Chinese environmentalist network (Yu et al., 2019). Opposing the upstream Salween dams or Nujiang dams emerged as one of the key moments in Chinese environmental activism. The involvement of the Beijing-based environmental organizations was crucial in forming the critical media narrative against the dams (Yu et al., 2019). Beijing-based NGOs were well connected with transnational conservation groups and environmental NGOs, including the World Commission on Dams.

In 2004, Premier Wen Jiabao suspended plans for the hydropower dams, which was a watershed moment for civil society in China. Environmental groups continued to lobby the provincial and central governments for alternative development for the Salween upstream, which involved the creation of national parks. The World Heritage Committee of UNESCO designated parts of the Salween basin within the Three Parallel Rivers site in 2003 (UNESCO, 2021). In 2016, the Yunnan provincial government established the Grand Canyon National Park as an economic development strategy for the region. The creation of the national park would generate significant tourism income for the local population, as the provincial government expects. The environmental footprint from tourism would be substantial but still less than large-dam construction, Yunnan-based environmental groups assess (El-Silimy, 2019).

There seems to be little interaction between local communities and the authorities around small-scale dams (less than 50MW generation capacity according to the Chinese standard) on the Salween tributaries. According to one estimate, more than 100 small dams have been built and are operating on the Salween tributaries in Nujiang Prefecture in the Yunnan province (Kibler & Tullos, 2013, p. 3106). These small dams have generated some positive socio-economic benefits for the rural populations, but their cumulative impacts on the river's ecology and the environment appear to be significant (Ptak, 2014).

Subnational interactions over the Salween in China demonstrate how the state's water development policies have been challenged and shifted over time by civil society. Such dynamics are also observed in Thailand and Myanmar, where state policies for border development have clashed with local actors' alternative visions for development, which are subsequently outlined. These subnational interactions over a transboundary river basin provide valuable inputs for various actors to influence decision-making over water through official and informal diplomatic efforts.

### *Myanmar*

Subnational water interactions over the Salween River in Myanmar are embroiled with violence, displacement, and decades-long state-society conflict. Myanmar's generals set out plans to develop the Salween hydropower by proposing seven dams on the mainstream and installing four dams on the tributary. Previous and current juntas have extensively cooperated with Thai and Chinese companies to materialize their plans for the Salween dams, and the details of cooperation have been discussed in the previous section. Civilian administrations during the 2011–2021 period similarly pursued the Salween dams but were more susceptible to civil society's concerns. A trend in growing accountability in water governance was reverted after the 2021 military coup and subsequent armed resistance and conflict in the country.

The Salween River flows through Shan, Karenni, Karen, and Mon states that have experienced protracted ethnic insurgency, and the population living in the basin area has been exposed to various types of human rights abuse. Salween dams in Myanmar, Kunlong, Nongpha, Mong Ton (previously known as Tasang Dam), Ywathit, Weigyi, Dagwin, and Hatgyi are in the middle of the conflict zones and associated with forced displacement and violence (Human Rights Watch, 2012; Karenni Development Research Group, 2006; Shan Sapawa Environmental Organization, 2006). The narrative of dams as a tool of state repression and violence is central in civil society's opposition to Salween dams. In the Myanmar context, ethnic relations, especially the minority-majority group relations, are important to understand the resistance by various ethnic groups living in the Salween basin.

The planning for the dam appears to completely ignore that the proposed location is in a sensitive area in national politics with a long history of military intimidation and ethnic unrest (Nang Shining, 2016). The linkages between armed conflict and dams in the Salween basin can be observed in three ways: conflict events near the dam sites; the implications of dams to the prospects for peace and stability; and human rights abuses by armed groups including forced displacement linked to dams. First, there have been numerous reports of troop movements, military base installations, and violent clashes between armed groups near the dam sites over the years. For instance, the Nong Pha Dam in Shan State is planned in a site where the east of the riverbank is controlled by the United Wa State Army, the most powerful ethnic rebel group in Myanmar, and its west riverbank is contested between the Shan State Army-North and the government troops (Hogan, 2016). Similarly, the site for the Mong Ton Dam in Shan State has the presence of a local Lahu Border Guard Force, the government army, and an influential ethnic armed organization – the Shan State Army-South. These armed groups compete for control of territories both upstream and downstream of the river, including the dam site. In 2011, three Chinese engineers working on the project and their interpreter were held for three months before their release after their detention by a local Shan force (Nang Shining, 2016). Not all conflict events near dam sites are directly linked to the dams, but it highlights the possibility of these dams being part of the conflict economy and triggering the escalation of violence between armed groups.

Secondly, dams can jeopardize the prospect of peacemaking and the long-term stability of the border region. As explained earlier, the presence of these highly profitable hydropower dams in conflict zones could be a source of instability because armed groups may compete for access and control of the dam site. The Nong Pha and Mong Ton dams are planned for exporting electricity to the Chinese market, which can grant stable income for armed groups (Middleton et al., 2019). The Hatgyi Dam site is in the last remaining strongholds of the Karen National Union in Karen State, and the armed group signed a truce with the government in 2011. The armed group was reportedly pressured by the Myanmar government to cooperate for the Hatgyi Dam construction, which led to further mistrust in the ceasefire process (Karen News, 2013).

At last, forced displacement of the population and civilian casualties from violent clashes in relation to dams are major concerns. Human rights activists have raised concerns that the Myanmar army has carried out counterinsurgency campaigns and indiscriminately targeted civilians near Salween dam sites (see Maung Aung Myoe [2009] for the "Four-Cut" counterinsurgency strategy). There have been reports of forced displacement from counterinsurgency campaigns linked to preparatory work for dam building. It is common for local populations to be repeatedly displaced and experience temporary displacement during armed clashes (South, 2008). According to the Shan Human Rights Foundation, as many as 300,000 inhabitants were displaced from their homes in 1996 during military operations by government forces in the central and southern Shan State in the planning stages of the Tasang Dam, later known as the Mong Ton Dam.

Four hydropower stations have been completed on the Salween tributaries, namely Baluchaung 1, 2, and 3 stations on the Baluchaung River in Karenni State and the Kengtung Dam on the Teng River in Shan State. These tributary dams are relatively smaller than the planned mainstream dams, and Myanmar's MoEE currently operates these dams for domestic consumption. Social and environmental impacts of the tributary dams were disproportionately imposed on ethnic minority populations in the region. The Baluchaung 2 hydropower station, for instance, caused the displacement of some 8,000 people from 114 villages between 1969 and 1972 (Kayan Women's Union, 2008; Middleton et al., 2019).

Civil society groups in Myanmar mobilized against Salween dams under the civilian administrations, and the government authorities were slowly changing their positions toward reconsidering the traditional preference for large-scale infrastructure. Several environmental and human rights groups are organized along ethnicity and have formed a coalition such as Salween Watch, Save the Salween Network, and Burma Rivers Network. Salween dam opposition campaigns in Myanmar have actively initiated and engaged in national conversations about hydropower, ethnic minority rights, and peace. Campaigners also shared recommendations with national policymakers, such as members of parliament, about the environmental and social impacts of Salween dams. Campaigners who oppose Salween dams are concerned about the government's lack of capacity to evaluate the social and environmental impacts of dams. An EIA law was approved by the Myanmar parliament in 2015, but many are skeptical about the proper implementation of the law. National League of Democracy's (NLD) 2015 election manifesto stated that it would consider the energy sources that have no harm to people and the environment. Since the NLD government came to power in April 2016, along with their slogan, "It is time to be changed," the development patterns are also moving along with the government policy and their interests.

Campaigners have close ties with the grassroots organizations in communities and local representatives in villages being affected, and these close ties with local communities have been instrumental in protest mobilization and a series of collective actions by communities. Civil society organizations (CSOs) have used different strategies to inform about the updates to the proposed development projects on the Salween River to the potentially affected communities and

the wider public in Myanmar as well as at the Thai-Myanmar border. Awareness raising about the Salween River in Shan, Kayah, Kayin, and Mon states by the respective local organizations have utilized different strategies such as conducting meetings, trainings, workshops, film screenings, performing oppressed forum theater, distributing pamphlets, newsletters, and factsheets. When an Australian consulting firm was hired for community consultation for the Mong Ton Dam environmental impact assessment (EIA), activists and local residents organized protest events during the consultation, which became headlines of both international and national news (SBS News, 2015). The Snowy Mountain Engineering Corporation (SMEC)-led consultation events in 2015 were strongly opposed by local civil society, who were critical of SMEC's "poor" participatory approach and angered by the government military's intimidation prior to the consultation (Kirchherr et al., 2017). An SMEC official said, "It is the government project; whatever matter it will go ahead" (Nang Shining, 2016), and such statements sparked firm resistance by local populations. A statement opposing the dam and refusing to participate in the EIA was signed by over 200 CSOs and 23,717 individuals and sent to SMEC on August 25, 2015 (Press release by Action for Shan State Rivers, 2015). SMEC left the project without completing their survey, and the project is still pending.

Public mobilizing efforts, such as movements on the "International Day of Action for Rivers," were conducted by CSOs, local communities, and diverse ethnic minorities living along the Salween River. For example, various villages along the Salween River have hosted annual protests since 2016. Several public forums about Save the Salween River were also hosted in various locations, such as Yangon, Mandalay, Taunggyi, and Lashio. A forum held in Taunggyi in 2016, the capital of Shan State, was particularly influential in consolidating Shan State-based activists, academics, members of political parties, and representatives elected for the Shan State Government on the issues of Salween dams. Daw Nang Khin Htar Yee, a former member of the Shan State parliament and a member of the Shan National League for Democracy party, raised such issues in the parliament in 2016 but "only got one answer; the Shan State government has authority to manage the project within the capacity of 30MW." This statement illustrates the problems with the 2008 Constitution that grants power to the central government to plan, approve, and manage all large development projects.

The Salween River's periphery status as being a geographically and culturally remote space has been an obstacle to raising the dam opposition as a cause worthwhile for the mainstream media. Compared to the wide-ranging support for the "Save the Irrawaddy" campaign, the Salween campaign received less attention and support from the general public in Myanmar (Kempel, 2012). The Irrawaddy River originates from Kachin State and then flows into the Burmese heartland, including Bagan and Mandalay, unlike the Salween, which runs through the borderlands. The contrasting level of support that these two campaigns received also reflects ethnic relations within Myanmar that many of the members of ethnic civil society have problematized over the years. Subnational water interactions over the Salween River within Myanmar display the power relations and the politics of center-periphery in play. The following subnational water interactions in Thailand, in essence, represent a similar pattern.

### *Thailand*

Subnational water interactions over the Salween River in Thailand are influenced by the development policies set out by the central government, competing and compatible interests of various government agencies, environmental activists, and local communities in the basin. In Thailand, the Salween River borders Myanmar in Mae Hong Son and Tak provinces, which are the least

populated and developed regions in the country. Many of the border communities in Thailand are populated by ethnic minorities, including Karen, Shan, Burmese, and Khon Muang (northern Thai). These border regions have been seen as a backwater needing development through large-scale infrastructure projects, including hydropower dams and irrigation channels.

This approach led to the active involvement of Thai companies in the Salween dam development. The EGATi has played a leading role in the Hatgyi, Weigyi, and Dagwin dams and has claimed to bring developmental benefits to the local population in Thailand (Nang Shining, 2011). Local communities in the border region on the Thai side were poorly informed by the government officials and company representatives about the Salween dams, and their initial source of information about the Salween dams was the environmental NGOs and activists (Nang Shining, 2011). The EGATi-commissioned social and EIA of the Hatgyi Dam claimed that the dam would not have any impact on the Thai side, although some have disputed this finding.

The water diversion plans by the government are motivated by similar development objectives for the border region. As explained earlier, these diversion plans dated back to the 1990s without any objections from the Myanmar government (Zerrouk, 2013). In September 2021, the Yuam River Diversion project was approved to divert water from the Salween for irrigation in the central plains. The Irrigation Department carried out an EIA of the project in 2006, but the process and findings were not clearly communicated to the local residents (Ocharoenchai & Duggleby, 2022). This project would require the construction of a dam, water pumping station, storage tank, and a 67-km long water transport tunnel, which would have a significant impact on the watershed, populations, and ecosystems, according to a leading activist (Deetes, 2018).

Influential environmental NGOs in Thailand opposed the Salween dams and diversion projects due to environmental and social concerns. The issues related to the Salween dams were brought to the National Human Rights Commission. Towards Ecological Recovery and Regional Alliance (TERRA), NGO-CORD North, Salween Watch, Living Rivers Siam (SEARIN), and International Rivers have formed a coalition and initiated debates on the Salween dams. These organizations were well connected with policymakers in Bangkok and the media, and this connection was crucial in lobbying against the dams. Local communities in the border regions submitted petition letters to the National Human Rights Commission and the central government to cancel the Hatgyi Dam in 2008. The National Human Rights Commission concluded in favor of the dam opposition and recommended forming a committee to further investigate human rights and environmental impacts in 2009, while local communities and NGOs continued to put pressure on the government (Hengsuwan, 2019). The progress on the dams has been delayed due to the political instability and uncertainty in Thailand and conflict situations in Myanmar. Water diversion projects, however, seem to be less affected by the international dynamics and to make progress in recent years.

Subnational water interactions in Thailand represent important discussions about different visions of development by various actors in the country. In particular, what is understood as development by local residents in the basin appears to be significantly diverging from the official narratives. This tension around development tends to be a common phenomenon in all three riparian countries' subnational water interactions. Such similarity may be due to the shared political and socio-economic characteristics of the Salween basin when considered as a geographical and cultural periphery.

## Conclusions

The Salween River represents a highly diverse and contested watershed. There is a lack of formalized water-sharing agreements and development plans shared by all Salween riparian governments,

but, as described earlier in this chapter, riparian governments of China, Myanmar, and Thailand have extensively cooperated to develop hydropower on a project basis. These governments have shared a similar ambition for the basin and prioritized large-scale development, and such policy was shaped by the idea of the Salween as a backwater and a border region populated by minorities. The creation of national parks and watershed protection schemes demonstrates that this trend has somewhat changed in China in recent years. Civil society actors in the basin have responded by voicing community concerns and holding dialogues where alternative visions for the river could be shared. Now, transnational civil society networks in the region celebrate culture, ecology, and communities within the Salween basin, aiming to promote ecological sustainability and social justice. The disjuncture between two visions of the Salween cannot be more obvious in contrasting narratives: a river for hydropower generation *versus* a river home to culturally diverse communities and biodiversity. The task of water diplomacy may be to narrow the gap between these two visions. It may not be simple to create a river basin organization because, as Suhardiman and Middleton (2020, p. 311) argue, it "may result in a state-centric managerial approach and might privilege the interest of private-sector or military actors. Rather, we propose that innovative hybrid governance arrangements …" Consolidation of such governance arrangements can benefit from diverse tools of water diplomacy, which this volume offers in detail.

## Notes

1 After the Myanmar military coup in 2021, protests on March 14 have been suspended for two years. Information about the event and archives can be found in: www.internationalrivers.org/take-action/international-day-of-action-for-rivers/

2 The Greater Mekong Forum on Water, Food and Energy was held December 4–6, 2018, in Yangon, Myanmar. Details of the event can be found here: https://web.archive.org/web/20190309122937/https://globalwaterinstitute.unsw.edu.au/news/gwi-participates-in-greater-mekong-forum-on-water-food-and-energy

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# THE JORDAN RIVER BASIN 70 YEARS AFTER THE JOHNSTON PLAN

*Shaddad Attili*

**Key Takeaways**

- The Johnston Plan of 1955, while never formally adopted, remains the key reference point for water rights claims in the Jordan River Basin shared by five riparian states (Israel, Jordan, Syria, Lebanon, and Palestine).
- The total water development envisioned under the Johnston Plan has largely been established, and meeting the allocations of the Johnston Plan is a matter of redistributing about 250 of the approximately 1,500 million cubic meters (MCM) of water.
- Regional water integration through commercial water trading that could meet allocations without compromising national water rights or political positions, potentially leveraging Lebanon and Israel's water resources to benefit the entire basin.

## The Jordan River Basin

The Jordan River Basin is shared by five countries: four Arab countries and Israel. The river is characterized by unique natural landscapes, as well as historical, political, and religious aspects. For over a century, the Jordan River Basin has been the focus of many hydrological, geological, and political plans across different political eras in historical Palestine (Ottoman, British, Jewish, and Arab). Among these, the Johnston Plan of 1955 stands out as one of the most important.[1]

Seventy years after the 1955 Johnston Plan, the political reality in the basin has changed significantly. The Israeli occupation of Arab lands has been ongoing since 1967. The year 1979 culminated in the signing of a peace treaty between Egypt and Israel. The following decade, from 1980 to 1990, was marked by the war on the Palestine Liberation Organization (PLO) in Lebanon (1982), the first Palestinian Uprising, "Intifada," in 1987 that paved the way for the Middle East peace process, which began in 1991 with the Madrid Peace Conference. This was followed by mutual recognition between the PLO and Israel and the signing of the Interim Agreement between them. In 1994, a peace treaty was signed between Israel and Jordan (Israel and Jordan 1994).

Since 2000, the region has been marked by several key events. Notably, these include the failure of the final status negotiations at Camp David between Israel and the PLO, the launch of the Arab Peace Initiative in 2002, and the Quartet Roadmap for a two-state solution in 2003. Israel's


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unilateral withdrawal from Gaza in 2005 was followed by a blockade of Gaza since 2007 after Hamas took control of the territory. The stagnation of negotiations between Israel and Palestine continues, culminating in the events of October 7, 2023, and the subsequent Gaza war, which is significantly reshaping the region.

Since 1955, the Jordan River Basin has witnessed major water and food security changes. It has also seen the development of various resources, including non-conventional ones, in the riparian countries. Infrastructure development has often been carried out unilaterally, including diverting river water from the basin, draining the Hula swamps, constructing huge dams on the river's tributaries, and excessive groundwater extraction from the basin. The basin also witnessed the conclusion of bilateral and trilateral agreements between riparian countries. Additionally, the basin and its countries have also experienced significant population growth. However, tensions remain in the basin over the basin management, access, and riparian allocations. Mismanagement of the basin has resulted in the river's pollution and the Dead Sea's shrinkage.

This chapter addresses the water situation in the basin, focusing on the allocation agreed upon in the technical committees of the riparian countries as outlined by the Johnston Plan. It also sheds light on the water situation in the riparian countries 70 years after the publication of the Plan.

## The Jordan River Basin System

The Jordan River, as shown in Figure 41.1, extends over approximately 140 km (aerial distance), but its meandering course stretches to about 360 km. The area of the Jordan River Basin covers roughly 18,250 km$^2$. The river's sources are located at an elevation of 522 meters above sea level, while its mouth, at the Dead Sea, lies more than 426 meters below sea level (UN-ESCWA and BGR 2013).

### *The Upper Jordan River*

The confluence of its three tributaries forms the Upper Jordan River: the Hasbani of Lebanon, the Banias in the Israeli-occupied Golan Heights, and the Dan of Israel. The largest part of the basin is in Jordan (40%) and Syria (37%), while the rest is in Israel (10%), Lebanon (4%), and Palestine (9%).

### *Lake Hula*

Lake Hula was a small freshwater lake, surrounded by wetland marshes, that was formed by the confluence of the three tributaries of the upper Jordan River that flowed into it. The marshes covered 14 km$^2$ of fresh water until Israel drained the swamp, displaced its Arab inhabitants, and converted the areas into agricultural land in the 1950s. In the early to mid-1970s, several countries ratified the Ramsar Convention on Wetlands, bringing it into force in 1975. By the early 1990s, Israel restored part of the dried area and designated it a Ramsar site in 1996.[2]

### *The Sea of Galilee, Lake Tiberias, or Kinneret*

This lake, known by several names, covers an area of approximately 168 km$^2$ and holds around 4 billion cubic meters (BCM) of water. The lake receives most of its water from three main tributaries of the Jordan River. Annually, the Dan "contributes" about 250 MCM, the Hasbani (Snir) River contributes approximately 150 MCM, and the Banias (Hermon) River contributes approximately

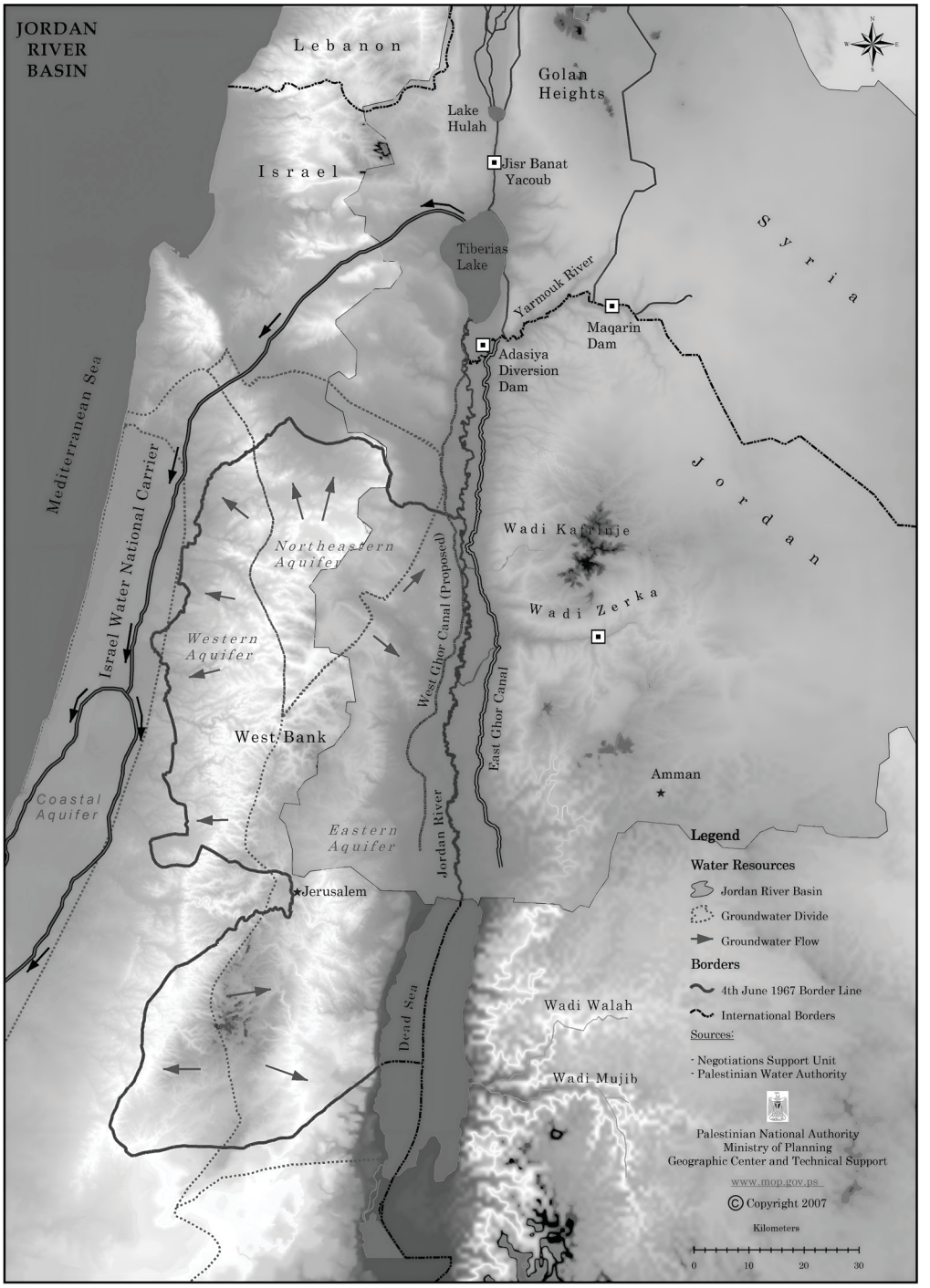



*Figure 41.1* Map of the Jordan River Basin with major infrastructure built on it.

120 MCM. Israel has constructed a dam and a gate on the lake to control water flow to the lower Jordan River.

### *The Lower Jordan River*

The current annual flow from the lake to the lower Jordan River is estimated to be between 10 and 15 MCM. The lower Jordan River extends from Lake Tiberias to the Dead Sea, covering 105 km. The Yarmouk River is one of the most important tributaries of the lower Jordan River. In the 1950s, its annual flow was estimated at 450–500 MCM. However, it has since decreased to a current flow of 83–99 MCM (UN-ESCWA and BGR 2013).

### *Side Wadis and the Dead Sea*

Several seasonal side wadis exist on both banks of the lower Jordan River. Historically, in the early 1950s, the Dead Sea received between 1,300 and 1,500 MCM from various sources in the basin. The amount of water flowing into the Dead Sea currently ranges between 50 and 100 MCM. The decline of the Dead Sea is due to several factors, including the diversion of the river course through the Israeli National Carrier and the King Abdullah Canal, excessive groundwater extractions in the basin and from the Yarmouk River, the construction of dams, the mining industry on both sides of the Dead Sea, and the rise of the basin temperatures, which have increased its evaporation. This decline has led to the phenomenon of the Dead Sea shrinkage and the formation of thousands of sinkholes. The sea has shrunk from its historical area of approximately 1,000 $km^2$ in the 1950s to its current area of about 605 $km^2$. Additionally, its surface level has dropped to 430 meters below sea level.

## The Johnston Negotiations Plan, 1955

Several attempts have been made to calculate the equitable share of water from the Jordan River for the five riparian countries. The Johnston Plan is the most frequently cited example of proposals managing international watercourses for riparian states. The Plan takes its name from Eric Johnston, a special envoy sent to the Mideast in 1953 by US President Eisenhower to mediate a comprehensive agreement.

The Plan allocated the water resources of the Jordan River Basin and proposed various schemes to be developed, including:

- Water storage in Lake Kinneret (considered as the regional reservoir);
- Building Al-Wehda (Maqarin) Dam for water storage and electricity production on the Yarmouk River;
- The diversion dam of the Jordan River at Adassiya;
- Out-of-basin transfer through the proposed Israeli "National Water Carrier" and the establishment of the Eastern and Western Valley Canal; and
- Different ground and surface water allocations in the basin (aquifers, rivers, and wadis).

Johnston's plan for water allocation was based on agricultural water demand only, where the irrigable land area was the sole determinant of water demand, as calculated by Johnston. It completely overlooked other resources available to riparian states. Johnston initially relied on a plan requested by the United Nations Relief and Works Agency for Palestine Refugees in the Near East

(UNRWA) and developed by the company led by Charles T. Main under the supervision of the Tennessee Valley Authority (Chas. T. Main, Inc. 1953). This plan, known as the Master Plan, was issued in August 1953. However, several other plans were produced during the mid-1950s, and Johnston utilized these plans to develop his proposals for the water allocation to the parties on both riverbanks. Johnston discussed these proposals with the Israeli government and representatives of the Arab League during his shuttle diplomacy, which included four visits to the region between October 1953 and October 1955. The Johnston Plan, which was eventually considered for adoption by the regional authorities, was dated September 30, 1955. It's the draft that was accepted by technical teams from various parties.

The total water allocation of the Jordan River Basin, as proposed in the Johnston Plan, is shown in Table 41.1. It is important to note that at the time, Jordan had been administering the West Bank since 1951. According to the plan, Jordan was allocated 720 MCM, while the remaining "residual flow" was allocated to Israel. No specific figure was provided for Israel, except for a statement that designated a specific allocation of 25 MCM per year from the Yarmouk River for use in the Jordan–Yarmouk Triangle.

Fifty years later, after the declassification of the Johnston negotiation documents, it was discovered that this residual flow is estimated at 616 MCM. This figure was first cited by Phillips *et al.* (2007) after extensive research based on declassified official documents relating to the Johnston negotiations. It is very important to note that the results reveal that the total amount allocated is estimated at 1,503 MCM, including the allocation to Jordan and Israel. This also includes the local groundwater that is considered to be a recharge or a return flow to the river, estimated at 150 MCM for Israel and 243 MCM for Jordan.

In 2007, after extensive research on Johnston's declassified documents, the research of Phillips *et al.* (2007) arrived at the overall allocation of the Jordan River Basin as shown in Table 41.1.

Records indicate that the US State Department organized the creation of a summary of Johnston's plan. This summary, drafted by Oliver Troxtell (a member of the team assisting Johnston in the negotiations), dates to January 31, 1956. The summary was informally distributed by the State Department to interested parties in the region in early 1956 (Phillips *et al.* 2007).

*Table 41.1* The allocations to co-riparian underpinning the Johnston Plan of September 30, 1955

| *Country* | *Total water (MCM)* | *Jordan River* | |
|---|---|---|---|
| | | *Diversion* | *Stream depletion* |
| Lebanon | 35 | 35 | 23 |
| Syria | 132 | 132 | 93 |
| Jordan | 720[i] | 477 | 477 |
| Israel[iv] | 616[ii] | 466[iii] | 463 |
| Total | 1,503 | 1,110 | 1,056 |
| Saline water | | 28 | 28 |

The following notes are those shown by Johnston in his "Chart 2." See also Phillips *et al.* (2007).

*Notes:*
[i] Includes 243 MCM of local water.
[ii] Includes 150 MCM of local water.
[iii] May be larger as long as stream depletion values govern.
[iv] These values include salvaged water from the Hula swamp, which was not a part of the natural resources.

Johnston's plan addressed four main components: storage, distribution, water division, and supervision. The Maqarin Dam was listed as an essential element for water storage and was to be constructed to a height of 126 meters, generate 150 million kWh of electricity per year, and contain 300 MCM of water. Torrential flows from the Yarmouk River (estimated at 80 MCM/year on average) were to be stored in Lake Tiberias before being transported to Jordan through the eastern and western Ghor Canals through a canal to be constructed at the southern end of the lake. The plan stated that incoming and outgoing flows would be monitored by the water manager and indicated that potential upstream water storage within the Hasbani Sub-Basin in Lebanon would be the subject of a detailed hydrological and land use survey (Phillips *et al.* 2007).

The volume allocated to Jordan actually consists of two separate flows: 377 MCM per year from the Yarmouk River and 100 MCM per year from Lake Tiberias. This allocation also includes an assumed mixture of saline water, as described in the text of the agreement.

It is notable that based on data from the original Baker-Harza studies, it is suggested that this allocation included 215 MCM/year for the western side of the river (now the West Bank) (Elmusa 1997). This total comprises 180 MCM/year from the river and 35 MCM/year from the side wadis. It is important to note that in their final analysis, the Johnston team distinguished between "local water" (the contribution of local wadis and other sources before these enter the main river system) and the flows taken directly by the riparian from the river. The findings reveal that the overall quantity allocated is estimated at 1,503 MCM. It is important to note that the allocations to Jordan and Israel include the local groundwater, considered a recharge or return flow to the river estimated at 150 MCM for Israel and 243 MCM for Jordan.

Even though the Johnston Plan is not officially endorsed by the riparians in the basin, it is somehow considered as a reference for the countries in the basin as their water rights.

## Developments in the Jordan River Basin since 1955

As no political agreement was reached on the Johnston Plan, Israel and the Arab countries continued to create a "fait accompli" on the ground, working toward controlling and utilizing the waters of the Jordan River. Each party relied on the proposed allocation and schemes outlined in the plan.

The Israelis continued their plan to drain the Hula swamps and build the National Water Carrier, which began operating in 1964. Meanwhile, the Syrians and Arabs aimed to divert the Banias and Hasbani rivers. The Palestinians launched a military operation against the pumping stations installed to divert water from the lake to the Israeli water carrier. The clashes continued until June 1967, when Israel launched the second war against the Arab states, resulting in the occupation of the West Bank, including East Jerusalem, the Gaza Strip, the Egyptian Sinai, the Lebanese Shebaa Farms, and the Syrian Golan Heights. On the ground, with Israel's occupation of the West Bank, Israel tightened its control over the upper and lower parts of the Jordan River Basin. Israel destroyed all installations, including Palestinian and Turkish pumping stations along the lower Jordan River, and declared the area a militarized zone.

The United Nations issued UN Security Council Resolution No. 242, calling on Israel to withdraw from the occupied territories. However, Israel extended its control over the entire area of the Jordan River, including the Palestinian side of the Dead Sea, and maintained control over the occupied Golan Heights, including the Banias River; Israel issued military orders to control all groundwater resources and restricted Palestinian access to water, conditioning access on prior military approval.

Since 1967, Israel has built massive settlements in the occupied West Bank, controlling land and resources. By 2024, the number of settlers had reached approximately 740,000, settling

illegally on Palestinian land. These settlers have gained access to Palestinian water resources in the West Bank and control more than 150 MCM of brackish water that discharges into the Dead Sea (NAD 2024).

Jordan constructed the East Ghor Canal, which was designed in 1957 and was built in phases. Construction began in 1959, and the first section was completed in 1961. By 1966, the upstream portion to Wadi Zarqa was completed; the canal was then 70 km in length. It was later extended three times between 1969 and 1987. United States Agency for International Development (USAID) provided financing for the project's initial phase after receiving explicit assurances from the Jordanian government that Jordan would not withdraw more water from the Yarmouk River than was allocated under the Johnston Plan (Alkhoury *et al.* 2010).

In 1987, an agreement was signed between Jordan and Syria regarding the construction of the Al-Wehda (Maqarin) Dam. According to the agreement, Jordan would receive 75% of the stored water, while Syria would receive 25% of the flow, along with all 46 megawatts (MW) of hydroelectric power that the dam will generate. The dam – built without its power-generating component – was completed only in 2006 and was renamed the Wehda (or Unity) Dam. Since then, the dam has never met expectations and has remained empty. The conflict over extracting water from both surface and groundwater continues, with ongoing disagreements and conflict between Jordan and Syria (Syria and Jordan 1987).

By August 1988, there were 20 dams in the Yarmouk Basin with a combined storage capacity of 156 MCM. The number of dams has since increased to 32 dams, with a total capacity of about 260 MCM. However, a study of the Yarmouk Basin indicated that the Syrian dams, with a total storage capacity of 197 MCM across 32 dams, stored 20–40% less than the actual capacity (UEA 2019). Meanwhile, Israel has increased its withdrawal from the Yarmouk River, exceeding the 25 MCM allocated in the Johnston negotiations and drawing between 70 and 100 MCM/year (Zeitoun *et al.* 2019).

In the early 1990s, the political reality in the basin changed. This shift was marked by the launch of the Madrid Peace Conference in 1991 and the mutual recognition between the PLO and Israel, which paved the way for the signing of the Declaration of Principles between Israel and the PLO. In 1994, Israel and Jordan signed a peace treaty with a special focus on water, especially the use of the Jordan River between the two countries. Article 6 and Annex II of the treaty address the water arrangement between Israel and Jordan as follows. During the summer, Israel pumps 12 MCM from the Yarmouk River, with Jordan receiving the remainder of the flow. In winter, Israel pumps 13 MCM, with Jordan receiving the remainder of the flow, except for a concession by Jordan of 20 MCM of additional pumping by Israel. Any overflow is diverted at Adassiya to Israel. Regarding the Jordan River, Israel concedes to transfer 20 MCM to Jordan in exchange for the additional water from the Yarmouk River that Jordan provides to Israel during the winter. Additionally, during winter, Jordan is entitled to store a minimum average of 20 MCM of the floods of the Jordan River for its own use. Jordan is entitled to an annual quantity of 10 MCM of desalinated water from the desalination of approximately 20 MCM of saline springs diverted into the Jordan River. Israel and Jordan are to cooperate in constructing a diversion/storage dam on the Yarmouk River, directly downstream of the Adassiya Diversion. Additionally, Israel and Jordan shall cooperate in identifying sources for supplying Jordan with an additional 50 MCM/year of water that meets drinking standards (Israel and Jordan 1994).

In 1995, the PLO and Israel signed the Interim Agreement addressing the water issue. Israel recognized the Palestinian water rights in the West Bank but postponed allocating them to permanent status negotiations. The Jordan River was not mentioned in the Agreement, as it was considered a political issue to be discussed during border negotiations. Israel continued to maintain

full control over the Jordan River and all groundwater aquifers. Extraction is limited to the quantities agreed upon in the agreement, and Israel controls water sector developments through the established Joint Water Committee. Under this frame, Israel must approve all projects in the West Bank before they can be implemented (Israel and Palestine 1995).

Tensions in the basin remain high. Israel occupies the Golan Heights, maintaining full control of the Banias River and the Syrian eastern bank of Tiberias Lake. Israel also controls the Palestinian water resources, including its share in the Jordan River, and continues its occupation of the Shebaa Farms in Lebanon. Moreover, tensions persist between Jordan and Syria over the allocation and usage of the Yarmouk River water. In 2001, amid the controversy surrounding increasing its share of the Hasbani River to meet its allocation under the Johnston Plan, Lebanon installed two pumps in the Wazzani spring. This move sparked a political conflict with Israel over Lebanon's attempt to increase water allocations from the Hasbani/Wazzani River (Ufheil-Somers 2002).

Meanwhile, in 2003, the lower riparians of the Jordan River (Israel, Palestine, and Jordan) began negotiations regarding the conveyance water canal (pipes) between the Red Sea and the Dead Sea, a trilateral cooperative project aimed at addressing the shrinkage of the Dead Sea. In 2013, the Dead Sea–Red Sea Agreement was signed.

## The Jordan River Basin as of 2022

Despite the absence of a comprehensive basin agreement for the Jordan River Basin, the reality on the ground as of 2022 shows that the infrastructure proposed in the Johnston Plan has been implemented except for the West Ghor Canal. Moreover, concerning allocation, Palestine remains the only riparian that does not receive any of its proposed allocation from the river itself. The other riparians either receive less or more than their allocated amount.

As of 2022, the population of the Jordan River Basin has increased significantly. With an average growth rate ranging from 1.8% to 2.5%, the riparian countries' population increased from 8.5 million in the early 1950s to 49 million inhabitants in the basin countries. However, the amount of cultivated land in the Jordan River Basin, which was the basis of the Jordan River Basin's allocation, has remained more or less unchanged.

Water consumption and demand have increased significantly, and the basin countries have developed non-conventional water resources to meet the increasing demand. Israel has become a leader in developing large-scale desalination plants and improved water treatment facilities. Jordan has developed dams and wastewater treatment facilities. However, an internal water crisis looms due to a lack of resources, compounded by waves of refugees from Palestine, Iraq, and Syria to Jordan.

### *The Sea of Galilee, Lake Tiberias, or Kinneret*

The total average annual flow into the lake from its catchment base is approximately 850 MCM, of which 65% comes from the Jordan River and its tributaries and 35% from all other sources. About 300 MCM of this water evaporates. The lake receives additional water from the diversion of the Yarmouk River, ranging between 25 and 37 MCM and more, depending on the flooding of the Yarmouk River.

As of 2022, the Sea of Galilee receives most of its water from the upper Jordan River, with approximately 616 MCM of water annually from its main tributaries, according to the UN-ESCWA and BGR (2013). This amount is equivalent to the allocation given to Israel under "the residual

flow," as calculated based on declassified Johnston documents, as previously explained by Phillips *et al.* (2007).

Between 2013 and 2018, the level of the Sea consistently dropped, reaching the "black line" at 213 meters below sea level, the threshold at which pumping water for economic needs was halted. The decline in the lake's water level and increase in salinity have forced Israel to adopt a reverse pumping project, which involves pumping desalinated water back into the lake. The reverse pumping project was established at approximately 264 million USD (in 2022 prices) and includes 31 km of pipes with a 1.5-meter diameter, designed to maintain the lake's level during dry years (Dori 2022).

### *The Yarmouk River*

Approximately 335 MCM of water is consumed annually on the Syrian side of Yarmouk, including 165 MCM from surface water (including reservoirs) and 170 MCM from thousands of underground wells. As for the Jordanian side, 98 MCM are used annually, including 66 MCM from surface water and 32 MCM extracted from more than 200 groundwater wells. Recent data indicates that this figure has increased to 50 MCM (Zeitoun *et al.* 2019). Based on 2019 data, current figures indicate that the quantities of water from the Yarmouk River, measured in Adassiya, have decreased to 79 MCM following the completion of the Al-Wehda Dam.

### *The Eastern Ghor Canal: "King Abdullah Canal"*

The 110 km canal was designed in 1957 and constructed in stages. The canal's design capacity is 20 $m^3/s$ at the northern entrance and 2.3 $m^3/s$ at its southern end. The construction of the canal, also known as the King Abdullah Canal, began in 1959, and the first section was completed in 1961. The canal, the largest irrigation canal system in Jordan, runs parallel to the eastern bank of the Jordan River. The main water source for the King Abdullah Canal is the Yarmouk River, along with the Mukheiba Wells within Wadi Yarmouk. Further south, additional water is supplied from Wadi Yarmouk-Arabs and the Zarqa River, along with its reservoir behind the King Talal Dam. Water flows by gravity from a height of about 230 meters below sea level to nearly 400 meters below sea level. The canal supplies irrigation water and 90 MCM/year of drinking water to Greater Amman through the Deir Allah-Amman station, which was built in two phases in the mid-1980s and early 2000s.

### *Adassiya Dam*

The Adassiya Diversion Dam diverts water to the King Abdullah Canal and enables Israel to get the overflow (floodwaters) that passes over it or through its bypass gates. According to the Jordan Valley Authority, Israel receives approximately 37 MCM of water annually through the gates of the Adassiya Dam. Israel has constructed an artificial lake, known as the "Yarmouk Reservoir," to collect the surplus water from the Yarmouk River (Zeitoun *et al.* 2019). According to available data, Jordan received an average of 125 MCM of Yarmouk water annually between 1961 and 1999. However, this rate decreased to 71.5 MCM between 1999 and 2018. This amount of water includes an average of 25 MCM per year from the Mukheiba Wells dug on the Jordanian bank of the Yarmouk River in the early 1980s. Consequently, the actual amount of water Jordan currently receives from the Yarmouk River is not more than 47 MCM per year.

### *Al-Wehda (Maqarin) Dam*

Al-Wehda (Unity Dam), formerly Maqarin Dam as outlined in the Johnston Plan, is located on the Yarmouk River. The dam has a height of 110 meters and a storage capacity of 115 MCM. In February 2004, the King of Jordan and the Syrian President launched the construction of the dam, and it was completed in 2006. In 1987, the Jordanian–Syrian Yarmouk River Treaty established the Jordanian–Syrian Yarmouk River Basin Supreme Committee. The agreement was renewed in 2001, during which the dam's design was modified. The storage capacity was reduced from 480 to 115 MCM, and a hydroelectric power station, which had initially been part of the plans, was removed. In 2012, approximately 18.5 MCM were stored in the dam, but the storage reached a record high of 88 MCM in 2018 due to the internal Syrian war that forced Syrians in the south to leave cultivated land and reduced water use in the Yarmouk River. By 2020, the storage in the dam had decreased to around 62 MCM.

### *Israeli National Water Carrier*

The Government of Israel approved the construction of the National Transporter in 1956, with the project completed in June 1964. Upon its opening, approximately 80% of the water transported by the National Water Carrier was allocated to agriculture, and 20% was designated for drinking water. In an average year, around 500 MCM of water is available for pumping from the Sea of Galilee. The United Nations Economic and Social Commission for Western Asia (ESCWA) water inventory report stated the following: "Official Israeli data for the period 1969–2007 indicate that the average annual water transfers from Lake Kinneret through the National Water Company amounted to approximately 329 MCM, with a minimum extraction of 151 MCM and a maximum Extraction of 521 MCM. Extraction rates depend on water levels in the lake, and extraction is restricted when levels fall to 212 meters below sea level or lower, as was the case in the late 1980s" (UN-ESCWA and BGR 2013, p. 198).

## Mapping the Water Status in the Basin

### *Israel Water Status*

While Israel has important endogenous aquifers, such as Carmel, Tiberias, Upper Galilee, Negev, and Arava aquifers, it also shares the West Bank's mountain aquifer with Palestine, which includes the western, northeastern, and eastern aquifers. Additionally, Israel and Palestine share a coastal aquifer that extends underneath the Gaza Strip. Both Israel and Palestine are also riparian states in the Jordan River Basin, sharing their water with the other riparian countries.

Since 1967, Israel has implemented military orders to control Palestinian water resources in the West Bank and Gaza Strip. Since 1995, Israel has acknowledged Palestinian water rights in the West Bank but postponed their reallocation to permanent status negotiations under Article 40 of Israel and Palestine (1995). Israel is estimated to use up to 850 MCM of the Jordan River Basin, including 350–450 MCM from the lake, about 70–100 MCM from local water around the upper Jordan River, 25 MCM from the Yarmouk River, and some additional resources. Israel illegally extracts water from the lower part of the Jordan River, mainly from the eastern aquifer in the occupied West Bank and the Jordan Valley, with an estimated extraction of 60–70 MCM. Moreover, Israel exercises full control over saline and brackish water, particularly from the

Fashkha Spring Group, which contributes around 160–200 MCM into the Dead Sea (Palestinian Water Authority 2013).

As of 2022, Israel has developed massive desalination plants that produce around 750 MCM of water annually. Israel plans to increase this capacity to 1.1 BCM by 2030 (Government of Israel 2018). Due to the huge production of desalinated water and the lack of customers, Israel has begun to study the feasibility of reverse pumping water from the National Water Carrier to the lake. This initiative aims to address drought, the decline in the lake's water level, and the rising lake salinity.

### *Jordan Water Status*

About 280 MCM of storage is available in Jordan's dams in the basin, but the total storage averages about 100 MCM. In 2017, the Ministry of Water and Irrigation in Jordan estimated the country's annual water availability at 1,054 MCM. Of this total, 288 MCM come from surface resources, 619 MCM from groundwater, and 147 MCM from treated wastewater. The agricultural sector accounts for 45% of the total water consumption (MWI and BGR 2019).

Jordan uses 143 MCM from the water of the Yarmouk River, of which 98 MCM come from surface water. According to the peace treaty, Jordan receives approximately 50 MCM annually from the Jordan River through the King Abdullah Canal. In 2021, Israel and Jordan reached an agreement in which Israel would sell an additional 50 MCM of water per year to Jordan, effectively doubling the amount of water Jordan receives under the 1994 peace treaty (Foundation for Defense of Democracies 2024).

Johnston allocated a total of 720 MCM of water to Jordan, including approximately 215 MCM to the West Bank. This means that Jordan's allocation was 505 MCM. Of the 720 MCM allocated by Johnston, 377 MCM per year was sourced from the Yarmouk River, 243 MCM from local water sources, and 100 MCM per year from the upper Jordan River via Lake Tiberias (of which up to 15 MCM per year is saline water). By recent agreement, Jordan has purchased an additional 100 MCM per year from Israel. Data indicates that Jordan received a total of between 345 and 400 MCM of water from the basin, including groundwater.

#### *Prosperity Deal: Tripartite Memorandum of Understanding Blue Green Deal*

In November 2022, the United Arab Emirates (UAE), Jordan, and Israel signed a cooperation agreement to facilitate the exchange of renewable energy and water between Jordan and Israel. Under the terms of the agreement, Masdar, a renewable energy company owned by the UAE government, will build a large solar farm in Jordan. In return, Jordan will send the estimated 600 MW of solar energy generated to Israel in exchange for 200 MCM of water produced from a new coastal desalination facility. The agreement also outlined the sale of electricity generated by the solar farm to Israel at an annual cost of $180 million, with the revenues to be shared between Jordan and Masdar. However, following the war on Gaza, Jordan has postponed the deal.

#### *Red Sea–Dead Sea Project Lower Jordan River Basin Agreement on Saving the Dead Sea*

During the Earth Summit in Johannesburg in 2002, Israel and Jordan announced their attempt to launch a project aimed at saving the Dead Sea. However, the Palestinians objected to the project, citing that they were not consulted in the planning process. Formal negotiations with the PLO/PA began in mid-2003 regarding the project's terms of reference. It was not until mid-2005 that

the three parties reached an agreement on these terms, paving the way for the launch of feasibility studies, along with various social and economic assessments and the exploration of alternative options. This cooperation between the parties was the first of its kind at the official level, which drew the world's attention to the chronic problem of the Dead Sea and the Jordan River and sent signs of possible cooperation in the basin. In 2013, the parties signed a Memorandum of Understanding on Regional Water Sharing.

Although project studies demonstrated the project's feasibility with an estimated cost of US $10.9 billion, the findings recommended that the three governments refrain from proceeding with the construction until further information is gathered regarding the mixing of the two seas. Modeling results indicated that injecting 400 MCM into the Dead Sea would alter the composition of the seawater, leading to the formation of suspended gypsum layers and the formation of red algae plumes. The studies recommended conducting a pilot project to test the mixing process. In response, Jordan and Israel agreed to build a water desalination plant in Aqaba, Jordan, to supply desalinated water to the Israeli city of Eilat while facilitating the exchange of water between the two countries. Under this arrangement, Israel would supply Jordan with an equal amount of water via the King Abdullah Canal. Meanwhile, the Palestinians would receive a similar amount of water from Israeli desalination plants along the Mediterranean coast. In accordance with the agreement signed, Jordan and Israel held numerous meetings to determine funding and allocate responsibilities between the two parties. Unfortunately, neither Israel nor Jordan could obtain the required funding, and Jordan blamed Israel for failing to implement the project.

### *Jordanian Red Sea Project*

Following the failure to implement the Red Sea–Dead Sea Conveyance project, Jordan decided to proceed with its national initiative, the Jordanian Red Sea Project (JRSP). Jordan faced a major challenge in securing the necessary budget for the project. Furthermore, one of the challenges faced by Jordan was securing the necessary budget for the project. Besides, there is an ongoing issue regarding the disposal of the brine, as neighboring countries around the Gulf of Aqaba (Israel, Saudi Arabia, and Egypt) have raised objections to discharging brine into the Gulf. Jordan announced an expansion of the JRSP project, aiming to desalinate approximately 300 MCM of water, significantly higher than the planned 50–70 MCM desalination facility. The financing required for the project is estimated at around US$2.6 billion, which raises deep concerns about its feasibility, especially given the challenges related to brine disposal. However, the enormous cost and the substantial engineering effort required to bring the JRSP project to fruition mean that it will take several years – from securing financing and completing the design and construction phases to beginning operations (TNA 2025).

## ***Palestine: State under Occupation***

Israel has total control of Palestine's water resources. A total of 118 MCM has been allocated to Palestinians from the shared aquifers of the West Bank (called the Mountain Aquifers) under Schedule 10 of the 1995 Oslo Accords (Israel and Palestine 1995). The Palestinian allocation from the groundwater of the West Bank aquifers represents only 20% of the total water in the shared basins. The Jordan River water has not been allocated, with Israel maintaining total control over it. The Coastal Aquifer Basin that extends beneath the Gaza Strip (with Palestine being downstream) has an estimated sustainable capacity ranging between 270 and 350 MCM. The Gaza aquifer yields approximately 55 MCM, of which only 3% is fit for human consumption within the Gaza Strip.

The per capita water available for Palestinians is the lowest in the basin, estimated at 80 liters per capita per day, with water quality in Gaza not meeting standards for human consumption. To meet their demand, Palestinians are purchasing water from Israel, approximately 100 MCM in 2023.

Despite Israel's recognition of the Palestinian water rights under the 1995 Oslo Accords, water remains a continuous issue, with the resolutions of water rights postponed until permanent status negotiations. Currently, Israel exploits over 85% of all transboundary water resources and has restricted access to and use of the Jordan River Basin since 1967. Based on the Irrigable Lands and Johnston Plan, Palestine estimates its water share to be around 215 MCM (Elmusa 1998). If the water allocation under the Johnston Plan had considered the groundwater of the Jordan River Basin, Palestinians would currently receive about 50 MCM of groundwater from the portion of the Jordan River Basin located in the West Bank.

## *Lebanon*

While Lebanon is relatively water-rich compared to other riparian countries of the Jordan River Basin, the country's per capita renewable water resources are below the water poverty threshold of 1,000 $m^3$. Nevertheless, Lebanon remains the wealthiest in terms of water resources compared to other riparians in the basin. In an average year, 2.6 BCM of water is available, equating to about 600 $m^3$ per capita. Only parts of river flows are trapped in dams, while most of the surface water and some groundwater continue to flow into the sea. About 500 MCM flows into Syria annually, while 160 MCM of Hasbani-Wazzani River flows into the Jordan River.

The main rivers that flow entirely within Lebanon are the Litani River, with an average annual flow of 800–900 MCM; the Abraham River, with an average flow of 500–550 MCM; and the Awali and Damour Rivers, each at an average level of 300 MCM. The 1994 agreement between Lebanon and Syria stipulates that Lebanon will receive 80 MCM of water annually, provided the river flow inside Lebanon is 400 MCM annually or more (Lebanon and Syria 1994). Al Kbair River, which has an average flow of 200 MCM per year, is also shared with Syria, and the river itself forms part of the border between the two countries (Fanack Water 2024).

### *The Hasbani/Wazzani Crisis*

In 2002, the Wazzani conflict erupted when Lebanon initiated some development at the Wazzani spring, prompting Israel to threaten war. The situation then de-escalated after the United States intervened through its water envoy, Charlie Lawson.

Lebanon launched the Reconstruction and Development Program for South Lebanon in an attempt to develop water resources in the region. In March 2001, the Southern Council installed two small pumps in the Wazzani Springs. In response, Israel threatened military intervention if any water was withdrawn from the Hasbani River. The project was part of the Lebanese government's plan to rebuild the south, ensure the reintegration of the local population, meet household water needs in 13 villages in the region, and create job opportunities in the agricultural sector. The Wazzani pumping station is designed to operate at a capacity of 12,000 $m^3$/day, resulting in a total capacity of 4.4 MCM/year. Israel considered Lebanon's move to extract water from the river potentially setting a precedent for future water infrastructure projects in the Hasbani region, which could affect water flow to Lake Tiberias. In response, Lebanon stated that the planned extraction represents only a small portion of its allocated share of the Jordan River Basin water under the Johnston Plan, which is 35 MCM (Washington Post Foreign Service 2002).

### *Syria*

Syria has 16 rivers and tributaries; six are considered transboundary rivers: the Euphrates (shared with Iraq and Turkey), Tigris (shared with Iraq and Turkey), Orontes (shared with Lebanon and Turkey), Khabour (shared with Turkey), Sajur (shared with Turkey), and Balikh (shared with Turkey). The flow from these rivers constitutes approximately 75% of the country's total regulated surface water resources and more than 45% of the available water resources.

Estimates of Syria's water resources vary significantly due to different assumptions about inflows and outflows to other countries. The Food and Agriculture Organization estimates the country's "total actual renewable water resources" to be approximately 16.8 $km^3$ per year (FAO 2003).

Regarding the Jordan River Basin, Syria has been unable to access the Golan Heights since 1967 and utilizes most of the Yarmouk River's water by building dams (32 dams in the Yarmouk Basin, with some sources claiming that the number of dams is 41). Syria uses 165 MCM of Yarmouk's surface water stored in dams (an increase of 33 MCM of surface water allocated to the Johnston Plan), as well as approximately 170 MCM of groundwater from the Yarmouk Basin, bringing the total water usage to about 335 MCM.

The ESCWA inventory report states:

> For the period 1999–2009, total annual water use in the Syrian part of the Yarmouk Basin (including surface and groundwater) was estimated at an average of 453 million cubic meters, of which 327 MCM were used for irrigated agriculture, 92 MCM for domestic purposes and 34 MCM for industry use.
>
> *(UN-ESCWA and BGR 2013, p. 197)*

The study by Zeitoun *et al.* (2019) indicates that ESCWA figures related to Syria's usage of the Yarmouk River consider groundwater that is actually outside of the Yarmouk Basin catchment.

## Toward Basin-Wide Agreement: Meeting the Johnston Plan Allocation

The current water allocation and infrastructure proposals in the Johnston Plan are being implemented quietly in the absence of a comprehensive basin agreement. If negotiations over the Jordan River Basin were to take place today, the current water status in the riparian countries would shape the negotiations. If an effort were taken to renew the understanding and update the plan, a basin water agreement could potentially be reached, provided that other political aspects are excluded.

This is aided by the significant development of non-conventional water resources, such as through desalination, which was not part of discussions during Johnston negotiations. This could positively address the countries' needs and frame the need for additional infrastructure to meet demand (e.g., West Ghor Canal and Ebl Saqi Dam in Lebanon). It should also be noted that several agreements have been reached in the basin among its riparian countries, both bilateral and trilateral, such as the regional water sharing agreement signed in 2013 among the three lower riparians of the Jordan River Basin. The signing of the 1997 United Nations Convention on the Non-Navigational Uses of Transboundary Watercourses[3] by four Arab countries constitutes a radical shift that could be considered a step forward toward a comprehensive basin agreement. This could help resolve disputes over managing and allocating the basin's water resources if built upon.

Considering the current allocation to each riparian country from the basin and comparing it to Johnston's allocation, it can be concluded that:

- Lebanon has to get an additional 13 MCM;
- Palestine, which currently receives around 50 MCM from the Eastern Aquifer, would gain an additional 150–180 MCM by constructing the West Ghor Canal (either in Israel or in Jordan and siphoning back to the West Bank);
- Israel has to release approximately 200–300 MCM from its current use and control in the Basin;
- Syria has to release approximately 30–50 MCM from Yarmouk; and
- Jordan would need to receive an additional 50–100 MCM, mainly from the Yarmouk River, assuming it maintains the 100 MCM that it currently receives from the Jordan River under the Treaty and Purchase agreement with Israel.

In the absence of agreement among the riparian countries and with the current allocation each country is receiving, approximately 250 MCM must be reallocated within the basin or introduced into the basin through either rich water countries (trading water) or the use of non-conventional resources. Integrated water resources management for the entire basin requires initiatives and a potentially reframed political context to address the basin's mismanagement of resources, rehabilitation of the river, stabilizing the Dead Sea, and resolving conflicts over water resources. Addressing the 250 MCM needed to stabilize the Basin countries' needs is key to resolving the basin's chronic dilemma and tension. This issue can be resolved if serious attention is given to it.

## Regional Integration: Trading Water in the Basin

Considering the existing bilateral and trilateral agreements in the basin, the author believes that Lebanon and Israel could play a major role in any future changes in the basin despite the political reality. However, due to Lebanon's political and economic crisis, the energy and water sectors are collapsing, requiring hundreds of millions of USD for recovery and reform along with political will (USAID 2017). Due to the financial crisis, Lebanon's plans to store water behind 35 dams have stalled for years, and progress on protection and rehabilitation of rivers has been minimal. The discharge of hundreds of millions of cubic meters of river water into the sea is unfortunate, and the pollution of river water with sewage and industrial water is exacerbating the situation.

Despite the political conflict, Lebanon and Israel have reached an agreement on maritime border demarcation. This development opens the door to building regional integrity and provides additional examples of addressing issues of collective and mutual concerns. The current problematic situation in Lake Tiberias is characterized by drought, a drop in water levels, and increased salinity, and it has forced Israel to plan the reverse pumping of desalinated water, a costly solution (Rimmer 2015). Such a plan requires an investment of over US$200 million in addition to ongoing pumping costs. In discussions with Israeli water experts at a technical level, Israel has expressed willingness to store water from Lebanon in the lake. This stored water could be allocated through a purchase agreement between Lebanon, Palestine, and Jordan. An additional agreement with third-party assistance could be reached on water storage and exchange. For example, Israel could benefit from using Lake Tiberias as a water reservoir (as suggested by the Johnston Plan), helping to stabilize the lake's water levels and salinity while avoiding the need to pump desalinated water. In return, Israel could supply the agreed-upon water quantities to Palestine or Jordan, either from the lake itself or other available resources, such as nearby desalination facilities for Gaza, in exchange for fees related to water transfer.

Lebanon can get international support and funding to address water quality and rehabilitation of rivers, along with the infrastructure needed to store and transfer water to the lake; Lebanon would have the option to close the valve anytime if an agreement is over or breached. If Lebanon, through a national consensus, decides to approve selling water to Palestine and Jordan through the Litani River, it could be the easiest and technically feasible option through a 14 km canal to connect to the lake either from the river or Lake Qaraoun. With Lebanon maintaining full control and sovereignty over the connection facility, an international or multilateral water agreement could enable Lebanon to benefit from international financial support in order to protect its rivers and build the necessary infrastructure. This could include building the Ebel Saqi Dam at the Hasbani River and reaching an understanding related to increased pumping from the Wazzani spring, which could, in the future, pave the way toward future river basin-wide agreement.

Such out-of-the-box thinking requires further consideration and discussion among the riparian countries in the basin within bilateral, trilateral, and potentially multilateral frameworks. Such an agreement, based on each country's interests, will undoubtedly help keep water issues out of conflict, restore regional water cooperation, restore the Dead Sea, and rehabilitate the river. It will also ease tensions by addressing political challenges and tackling the consequences of climate change, increasing water demand, and the growing need for food due to the continuous population growth in the basin.

## Conclusion

The population in the riparian countries of the Jordan Basin is approaching 50 million, with future projections of water and food demand that will far exceed the region's capability to meet those needs. This is particularly concerning given the pessimistic expectations that the countries of the Jordan River Basin will be able to meet their Sustainable Development Goals and Nationally Determined Contribution targets.

After more than half a century since it was originally negotiated, the Johnston Plan remains the key reference of all riparians regarding their rights to the basin water, even though it was never formally adopted. Since then, the development of non-conventional water resources has not been the only change in the basin. Major infrastructure has been developed, and bilateral and trilateral agreements have been reached among the riparian countries of the basin without compromising water rights or political position on Israel's occupation of Arab lands in Palestine, Lebanon, and Syria (UN-ESCWA and BGR 2013). Research shows that all infrastructure outlined in the plan has been implemented, except for the West Ghor Canal. Regarding allocation, Palestine is the only country that does not receive any water from the surface water of the Jordan River. Despite existing bilateral agreements in the basin, the Jordan River still lacks a wide basin agreement.

A redistribution of the current allocation is required to meet the Johnston Plan. Only about 250 MCM is required to be reallocated or introduced. Tension exists not only between Arab countries and Israel but also between Jordan and Syria over the Yarmouk River water allocation and management. The Basin countries have introduced new water resources into the region's water budget. Israel is leading in water production of around 750 MCM with plans to reach 1.1 BCM by 2030, in addition to approximately 600 MCM of treated wastewater. Jordan's plan to build a 300 MCM desalination plant is uncertain, raising the need to rethink regional water integrity. The tripartite Prosperity Deal between Israel and Jordan will enhance the water status of the two countries. Lebanon should secure a key position in regional water management through a multilateral framework, leveraging financial support to reform its water and energy sectors. Also, Lebanon could trade the water currently discharged to the sea, deriving benefits for itself and the wider region.

Palestine must gain access to the Jordan River, establish its water rights with Israel, and be able to build its required infrastructure. Additionally, Palestine could receive water from Lebanon stored in Lake Tiberias, which should be considered a regional water reservoir per the Johnston Plan. If Lebanon engages in trading water, a possible understanding is to upgrade the Al-Wehda dam for electricity production after introducing more water in the basin. This would help ease the tension over the Yarmouk River and prompt a re-evaluation of water management and use in Yarmouk and the valley area. Syria, which has been suffering from internal instability since 2011, faces challenges, with millions of Syrian refugees in neighboring countries contributing to water stress in those hosting countries. Without a political agreement, Syria should also work toward regaining water security.

The establishment of the East Mediterranean Gas Forum, with Jordan, Israel, and Palestine as core members, the landmark 2022 maritime demarcation agreement between Lebanon and Israel, and the political shifts in Lebanon and Syria since December 2024 have collectively set the stage for meaningful discussions on revisiting the allocation and management of the Jordan River Basin. These developments also open the door to rethinking regional integration, where Lebanon and Israel – jointly the most water-rich countries in the basin, based on both conventional and non-conventional resources – could play pivotal roles in reconfiguring water management within the basin and across the broader region.

Regional water integration can be based on the commercial trade of water in the basin without compromising each country's water rights or its political stance. This can be achieved through a regional political agreement, assisted by the international community to help address, reform, and rebuild Lebanon's water sector. This would enable the water currently polluted or wasted into the sea, which amounts to hundreds of millions of cubic meters, to be repurposed, benefiting Lebanon's prosperity and contributing to regional integration, even in the complex political reality. Table 41.2 outlines the reallocation required to meet the Johnston Allocation.

*Table 41.2* Current allocations and infrastructure relative to the Johnston Plan

| *Country* | *Allocation (MCM)* | | | *Infrastructure* | *Status* |
|---|---|---|---|---|---|
| | *Johnston* | *Current* | *To Meet Johnston* | | |
| Lebanon | 35 | 12.5 | +22.5 | | |
| Syria | 132 | 335[iii] | −33 | Wehda Dam | Built |
| Jordan | 720[i] | 341+100[iv] | +64 | East Ghor Canal | Built |
| Israel | 616[ii] | 750 + (100 sold to Jordan) | −234 | National Water Carrier/ Adassiya Diversion | Built |
| Palestine | Included in Jordan's allocation | 50[v] | +165 | West Ghor Canal | Not Built |
| Total | 1,503 | 1,588 | −15.5[vi] | | |

*Notes:*

[i] This includes an allocation to West Bank estimated at 215 MCM, leaving 505 MCM for Jordan. Jordan's allocations are currently estimated at 441 MCM (98 from the Yarmouk, 243 from local sources, 50 from Lake Tiberias under the treaty, and 50 from the lake under a purchase agreement). Therefore, Jordan requires an additional 64 MCM to meet the Johnston Plan allocation.

[ii] This includes 150 MCM from local sources.

[iii] This comprises 165 MCM from the river (compared with a 132 MCM river allocation under Johnston) and 170 MCM from groundwater.

[iv] 341 MCM from the basin and 100 MCM by treaty and purchase agreement from Israel.

[v] Current use from eastern aquifer in West Bank.

[vi] This suggests that achieving the Johnston Plan allocation is a matter of redistribution of about 250 MCM (i.e., +22.5, +64, +165) from current allocations, or alternatively, an equivalent volume through some mix of redistribution and introduction of new sources.

## Notes

1 For details, see www.academia.edu/10060240/History_of_plans_on_jordan_river_basin
2 For Ramsar listing details, see https://rsis.ramsar.org/ris/868
3 In 1997 the draft *United Nations Convention on the Law of Non-navigational Uses of International Watercourses* (UN Watercourse Convention) was adopted by more than one hundred nations and opened for signature in May 1997. The UN Watercourse Convention provides a flexible and overarching global legal framework that establishes basic standards and rules for cooperation between watercourse states on the uses, management, and protection of international watercourses. The UN Watercourse Convention is based on the principle of equitable and reasonable utilization of transboundary water while also promoting environmental protection of international watercourses and encouraging regional integration and sustainable development around the world. These principles are viewed by the International Court of Justice as the codification of customary international law generally binding on all states, including those, like Israel, that are not party to the Convention.

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# 42

# WATER DIPLOMACY IN SUPPORT OF SUSTAINABLE DEVELOPMENT

## The Case of the Sava River Basin

*Dejan Komatina*

**Key takeaways**

- Develop broad legal frameworks for transboundary water management that integrate all aspects of water resources, balance the interests of all parties, socio-cultural/economic/environmental needs, and address complex water issues across boundaries and sectors.
- Build flexibility into agreements by including provisions for additional protocols that can be developed as specific needs arise, enhancing adaptability and hydro-political resilience.
- Ensure agreements integrate water diplomacy tools, establish permanent implementation monitoring systems, and enable stakeholder involvement and public participation.
- Empower joint bodies with both coordination and implementation roles that can be balanced according to contracting parties' needs and available funding.

### Introduction

The implementation of an integrated approach to the management of water resources and cross-sectoral cooperation and coordination on water issues are challenging tasks, particularly in transboundary basins and aquifers (see, e.g., Komatina 2018, p. ix). These challenges have been recognized by international governance bodies, including the United Nations Economic Commission for Europe (UNECE) (see, e.g., UNECE 2018), and United Nations Environment Programme (UNEP) (see, e.g., UNEP 2021).

In general, the complexity of international water governance stems from the following facts:

- Global water treaties and institutions provide a good basis for international water governance and cooperation; however, concrete water problems are best handled on *the basin scale*, as recognized, e.g., in the *UN Watercourses Convention* (UN 1997, Article 3) and the *UNECE Water Convention* (UNECE 1992, Article 9.1).
- A variety of "*collective action problems*" exists in transboundary basins, ranging from the problems of water quantity and allocation, to those of water quality and pollution, and environment and biodiversity protection (Schmeier 2013, p. 68).

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- There are various factors affecting the systems of international water governance by tending to increase their "*hydro-political vulnerability*" (Wolf 2009, p. 1), including global water challenges (e.g., growing demands and decreasing water resources of sufficient quality, or problems related to climate change) or basin-specific water, political, and economic challenges (e.g., unilateral implementation of major water projects, decline of political relations, non-uniform economic growth) (Baranyai 2019, p. 74).
- There is an increasing need for an *integrated and coordinated approach across sectors* using the water resources to reconcile potentially conflicting interests due to their competition for the same resource, which requires thinking beyond the water resources management and coupling it with the management of other natural resources, such as energy, land, or forests (see, e.g., UN-Water 2022).

Therefore, a combined use of the interdependent concepts of "*water cooperation*," "*water management*," and "*water diplomacy*" (Schmeier 2018) is needed to address complex water problems at transboundary and cross-sectoral scales.

A great number of international basin organizations have been established to handle water issues in transboundary basins worldwide. In terms of mandate, they are spread in a continuum between "*coordination-oriented organizations*" (performing purely coordination and harmonization of water management activities in the basin, which are then implemented on a national level) and "*implementation-oriented organizations*" (having broader mandates that include development, implementation, and maintenance of joint projects, in addition to coordination) (Schmeier 2010, p. 11).

In Europe, international basin organizations typically deal with coordination and harmonization (Schmeier 2010, p. 11). In line with the scope of the conventions dealing with rivers such as the Danube, Rhine, Elbe, and others, the respective basin organizations are focused either on *sustainability issues* (water protection and/or hazard management) or on water-related *development activities* (navigation or tourism), whereas the sustainability and development are usually integrated through the implementation of policies and strategies provided or projects supported by the European Union (EU) (Komatina 2011, p. 23).

In this context, the case of the Sava River Basin seems to be peculiar. In the early 1990s, the region of the former Socialist Federal Republic (SFR) of Yugoslavia experienced geopolitical changes that brought about significant challenges, not only to *water management* but also to *economic development* and the overall *political stability* of the region. The decay of SFR Yugoslavia converted the Sava River from the largest national river of the former country into an international watercourse and caused fragmentation of water management in its basin to the national level of newly created countries (Bosnia and Herzegovina, Croatia, Slovenia, and the Federal Republic of Yugoslavia, which was later divided further into Montenegro and Serbia), contrary to the integrated approach emerging in Europe at the same time (EC 2000). The region also saw a sharp decrease of water-related economic activities, such as navigation, unlike European trends to support the development of inland waterway transport as a competitive transport mode (EC 2006). Therefore, *a new international framework* for the Sava basin became necessary to support its economic development through sustainable use, protection, and management of its water resources.

After a process of negotiations, the new cooperation framework was created by concluding the *Framework Agreement on the Sava River Basin* (*FASRB* 2002) and establishing the International Sava River Basin Commission (ISRBC) as an organization with the responsibility to coordinate implementation of the agreement. Despite various challenges to the development and implementation of *FASRB*, this agreement and ISRBC as its implementing body have shown to be an

appropriate framework for water cooperation, management, and diplomacy in the transboundary Sava basin, supporting its sustainable development and political stability.

This chapter introduces the framework and presents how it is used to address water problems crossing political and sectoral boundaries in the Sava basin and why it is considered an example of good practice on a broad geographical scale. The example also shows how water can be used as an incentive for cooperation in complex geopolitical circumstances to help re-establish the basin-wide management of water resources, facilitate cross-sectoral cooperation at both international and national levels, and contribute to regional economic development and political stability following a conflict.

## Establishment of water cooperation in the Sava River Basin

### *Main facts about the basin*

The Sava River Basin is *a major drainage basin of South-Eastern Europe* (SEE) with an area of 97,700 km$^2$, and *the second largest sub-basin of the Danube*, sharing 12% of the total Danube basin area (ISRBC 2017, p. 2). Hosting a population of roughly 9 million, the basin extends to territories of six countries (Table 42.1). However, given a minor Albanian share, it is usually considered as *shared by the five states* that emerged following the disintegration of former Yugoslavia.

The basin has a moderate climate, with clearly distinctive cold and hot seasons (its average annual air temperature being 9.5°C, and the mean monthly temperatures about −1.5°C in January and 20°C in July), and moderate hydrologic variability, with the long-term average precipitation of about 1,100 mm/year and runoff of 18 l/s/km$^2$, which corresponds to effective rainfall and evapotranspiration of about 570 and 530 mm/year, respectively. The elevations vary between approx. 70 m above sea level (m a.s.l.) at the Sava mouth to the Danube (Belgrade, Serbia) and 2,864 m a.s.l. (Triglav, Julian Alps, Slovenia), with a basin average of approx. 545 m a.s.l. The basin is covered by the forest and semi-natural areas (54.7%) and agricultural surfaces (42.4%), while the share of artificial surfaces is 2.2% (ISRBC 2017, pp. 3–4).

The Sava River is formed by two mountainous streams – Sava Dolinka and Sava Bohinjka. From their confluence in Slovenia to its mouth to the Danube, the Sava River is 945 km long (including 594 km of waterway), thus being *the third longest tributary of the Danube*. Together with its longer headwater (Sava Dolinka), it measures 990 km, flowing in a NW-SE direction through Slovenia, Croatia, Bosnia and Herzegovina, and Serbia, and creating a 304 km long border between Croatia and Bosnia and Herzegovina (ISRBC 2017, p. 7). The Sava River is *the richest-in-water Danube tributary*. Having the long-term average discharge at the mouth of about 1,700 m$^3$/s (ISRBC 2017, p. 5), it contributes almost 25% to the Danube's total discharge.

*Table 42.1* Geographical composition of the Sava River Basin (ISRBC 2017, p. 2)

| | *SI* | *HR* | *BA* | *RS* | *ME* | *AL* |
|---|---|---|---|---|---|---|
| Total country area (km$^2$) | 20,273 | 56,542 | 51,129 | 88,361 | 13,812 | 27,398 |
| Country area in the basin (km$^2$) | 11,734 | 25,373 | 38,349 | 15,147 | 6,929 | 179 |
| Share of national territory in the basin (%) | 52.8 | 45.2 | 75.8 | 17.4 | 49.6 | 0.6 |
| Share of the basin (%) | 12.0 | 26.0 | 39.2 | 15.5 | 7.1 | 0.2 |

Alphabetic country codes: SI – Slovenia; HR – Croatia; BA – Bosnia and Herzegovina; RS – Serbia; ME – Montenegro; AL – Albania.

The Sava basin is widely known for its *high environmental and socio-economic values*, associated with its natural beauties and outstanding biological and landscape diversity, but also high potential for the development of economic activities based on the use of water, such as inland waterway transport, hydropower use, tourism and recreation, and others (Komatina 2011, pp. 27–28). The basin hosts the largest complex of alluvial wetlands in the Danube basin and large lowland forest complexes, with some of the floodplains still intact, thus supporting biodiversity and flood alleviation. Protected areas (six Ramsar sites, eight national parks, many important bird and plant areas, areas protected at the national level, and Natura 2000 sites) cover over 16% of the basin (ISRBC 2017, p. 78). The economic activities in the basin contribute significantly to the gross domestic product of the riparian countries (ISRBC 2017, p. 84). The total annual water use in the basin is estimated at close to 4.1 billion $m^3$. The consumptive water uses are related to thermal power plants (and one nuclear plant), public water supply, irrigation and other agricultural purposes, and industry (ISRBC 2017, p. 86), while the non-consumptive uses include waterway transport, hydropower use, recreation, and fishing.

### *Drivers of cooperation*

The establishment of new countries on the territory of SFR Yugoslavia in the early 1990s and the consequent conversion of the Sava basin from a national to a transboundary basin have influenced the management of water resources in the region significantly (Komatina and Grošelj 2015, p. 9). The national legal and institutional framework for the implementation of water policy in the entire Sava basin was no longer applicable, while the pillars of basin-wide water management (data exchange, monitoring, and early warning systems, or protocols regulating emergency situations or flood protection) ceased to exist or function. This confined the water management in the basin to the national level of the newly created countries, unlike the river basin management approach promoted by EU's *Water Framework Directive* (*WFD*) (EC 2000) at the same time. In such circumstances, the countries recognized the need for a new international framework for the Sava basin, with the view to *re-establishing the management of water resources on the basin scale*.

Another consequence of the geopolitical changes and conflict in the region was a sharp decrease of economic activities in the Sava basin, including navigation (Komatina 2011, p. 24), unlike the trends in other parts of Europe, where inland waterway transport was recognized as a competitive transport mode, being environmentally friendly and capable of reducing congestion on roads (EC 2006). Since then, the Sava River had hardly been used for transport due to the lack of infrastructure maintenance and investments (which resulted in a poor quality of infrastructure and poor intermodal road and railway connections) and negative consequences of the conflict (damaged ports and river infrastructure, and unexploded ordnances in the waterway endangering safe navigation) (Komatina 2011, p. 24). Therefore, the need to untap the economic development potential, associated with the use of water resources in the basin, was rather strong. On the other hand, given a clear ambition of all basin countries to accede to the EU and the transposition of EU regulations into national legislation that the countries undertook to that end, the preservation of the basin's outstanding environmental values was not only recognized as a necessity, but it also became legal obligation of the countries (Komatina and Grošelj 2015, p. 7). For this reason, a *balanced approach to using the development potential while preserving the environmental values in the basin* became necessary to create a basis for sustainable development of the region.

*Table 42.2* Establishment of cooperation – important dates (Komatina and Grošelj 2015, p. 10)

| *Activity/event* | *Date* |
|---|---|
| Launch of the "Sava River Initiative" | June 2001 |
| Signing of *Letter of Intent on Cooperation within the Sava River Basin* | November 29, 2001 |
| Signing of *FASRB* | December 3, 2002 (Kranjska Gora, Slovenia) |
| Establishment of the Interim Sava Commission | March 12, 2003 (Brussels, Belgium) |
| Entry of *FASRB* into force | December 29, 2004 |
| Establishment of ISRBC | June 25–27, 2005 (Zagreb, Croatia) |
| Start of work of the ISRBC Secretariat | January 9, 2006 (Zagreb, Croatia) |

Obviously, the re-establishment of management of the Sava water resources on the basin scale and the balanced approach to economic development within the basin were also considered as a means to *strengthen the regional political stability*, an important additional outcome of the process.

### *Establishment of the cooperation framework*

Following the signing of *Dayton Peace Agreement* in 1995 that ended the conflict in the region, EU accession became a political priority of all countries in the region. Therefore, the establishment of the Stability Pact for SEE in 1999, at the initiative of the EU with the aim of reinforcing peace and security in SEE, provided a good basis to facilitate contacts of stakeholders from the Sava countries (Komatina 2011, p. 29). Thus, by using water as an incentive for cooperation, the countries entered a process of negotiations, mediated by the Stability Pact.

The negotiation process started in mid-2001 (Table 42.2) by considering the rehabilitation and development of navigation on the Sava River as an important potential area of cooperation, with a view to fostering the economic development of the region after the conflict. However, given the countries' different priorities related to water management, the scope of negotiations was gradually extended by including other water issues – management of water quality and quantity (in line with the EU's newly adopted *WFD*), flood protection, and development of other economic activities based on the water use (river tourism, hydropower use, etc.) (Komatina and Grošelj 2015, p. 9). The location of the seat of the joint body was a topic for discussion as well.

Despite complex relations and a low level of trust among the Parties, the process was completed relatively quickly (Table 42.2), thanks to a *broad scope of the agreed legal framework matching the interests of all parties* and hence being acceptable to all, as well as a *continuous and active involvement and support of the EU and other external actors*. The process resulted in the conclusion of *FASRB* and subsequent establishment of ISRBC with the legal status of an international organization, as the body responsible for implementation of the agreement. Active cooperation of the countries, based on *FASRB*, started in January 2006, following the establishment of the permanent Secretariat of ISRBC, with the seat in Zagreb (Croatia).

## Mechanism of cooperation

### *Framework Agreement on the Sava River Basin and its protocols*

*FASRB* is an international agreement *integrating all elements of water resources management* – protection of water and aquatic ecosystem, protection against harmful effects of water, and various

water uses in the Sava basin. Its strategic goal is to enable transboundary cooperation of its parties on water issues, with *the aim of providing conditions for sustainable development within the basin*. The goal is supposed to be reached by establishing:

- An international regime of navigation on the Sava River and its navigable tributaries;
- Sustainable water management in the basin; and
- Sustainable management of water-related hazards (floods, droughts, ice, accidental water pollution) in the basin.

While the highest attention among the development issues is paid to navigation, the agreement also enables dealing with other activities such as river tourism or hydropower use (Komatina and Grošelj 2015, p. 10). *FASRB* covers both surface- and groundwater, water quality and quantity aspects, and biodiversity. By addressing both sustainability and development aspects of water management, *FASRB* provides *the broadest legal framework among those governing the work of river basin organizations in Europe*, enabling its parties to address complex water problems that cross not only political but also sectoral boundaries.

The basic principles, stipulated by *FASRB*, include (Komatina 2011, p. 30):

- Cooperation based on sovereign equality, territorial integrity, mutual benefit, and good faith, aligned with *WFD* (directly referred to in *FASRB*) and other EU directives (e.g., *Floods Directive* [EC 2007], noted in *Protocol on Flood Protection to the FASRB*) and UNECE conventions;
- Collaboration with international organizations (International Commission for the Protection of the Danube River [ICPDR], Danube Commission, UNECE) and EU institutions; and
- Regular exchange of information within the basin, reasonable and equitable use of water resources, implementation of measures aimed at securing the integrity of water regime in the basin, reduction of transboundary impacts caused by economic and other activities of the Parties, and respecting the "no-harm rule."

Thereby reflecting fundamental principles of contemporary international water law, expressed, e.g., in the *UN Watercourses Convention* (Baranyai 2019, p. 41).

From a political point of view, *FASRB* has a special importance as *the first development-oriented multilateral agreement concluded in the region* of former Yugoslavia *in the post-conflict period*, i.e., after the 1995 *Dayton Peace Agreement* and the 2001 *Agreement on Succession Issues* (Komatina 2011, p. 30).

The parties to *FASRB* include Bosnia and Herzegovina, Croatia, Serbia, and Slovenia (Figure 42.1). Montenegro has not been a party since its separation from Serbia in 2006 (when Serbia remained a party as the legal successor of the former union of the two states); however, it has been involved in the implementation process, particularly since 2013, when the cooperation between ISRBC and Montenegro (on a technical level) was formalized through a memorandum of understanding (MoU). In terms of the EU membership status, Slovenia and Croatia are member states (since 2004 and 2013, respectively), whereas the other three countries have the candidate status.

*FASRB* is implemented by the national authorities and institutions officially nominated by the Parties for that purpose, under the coordination of ISRBC (Komatina 2011, p. 30). However, a high number of other stakeholders also contribute to the process in various roles, as explained below. To contribute to the quality and transparency of the process, *FASRB* requires the Parties to develop a system for *permanent monitoring of implementation of the agreement*, including the

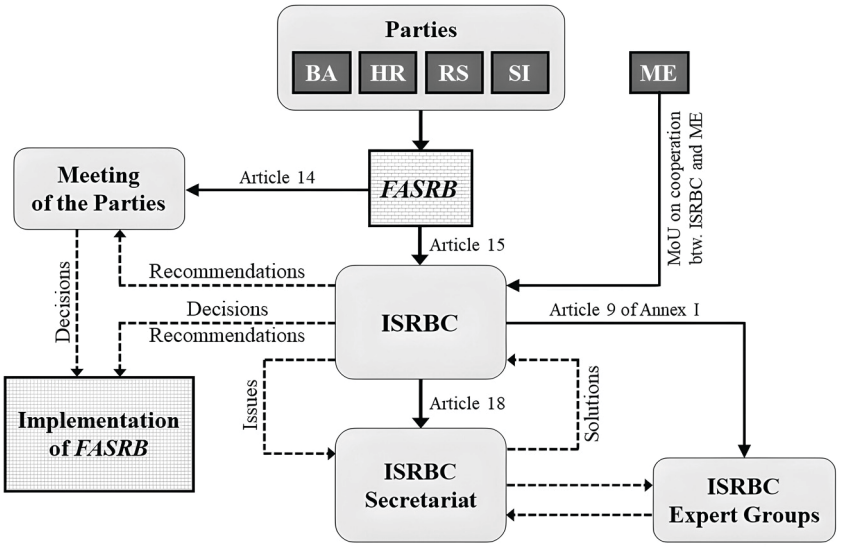



*Figure 42.1* Mechanism of cooperation under *FASRB* (adapted from the website of ISRBC, https://savacommission.org/).

*timely provision of information to stakeholders and the general public* by the nominated authorities (*FASRB* 2002).

The *dispute settlement mechanism*, established by *FASRB*, is modeled closely on principles of the *UN Watercourses Convention* and is found to be the most extensive one compared to other multilateral basin treaties in Europe (Baranyai 2019, p. 190), introducing the mechanisms of negotiation, third-party involvement (mediation/conciliation or arbitration, including by the International Court of Justice), and mandatory fact-finding missions.

According to *FASRB*, its parties have the possibility to expand and strengthen the legal framework for water cooperation and management in the basin by developing additional protocols to regulate specific water issues according to their joint interest and needs. The possibility of tackling issues by the Parties as the need arises provides a modular and flexible legal framework, which enables an *adaptive management of water resources in the basin* and positively affects the *hydropolitical resilience* of this international water governance system.

### *International Sava River Basin Commission*

Due to the integrated nature of *FASRB*, ISRBC has *the broadest scope of work among international basin organizations in Europe*, being responsible for the coordination of the following activities (Komatina 2011, p. 31):

- Preparation and implementation of joint or integrated plans for the basin (e.g., river basin management plan, flood risk management plan);
- Preparation and implementation of programs for the development of water-related economic activities (navigation, river tourism);
- Establishment, maintenance, and improvement of basin-wide integrated systems (for the information and data exchange, monitoring, forecasting, early warning); and

- Development, upgrade, and implementation of water policy (i.e., development of protocols to *FASRB* and other policy documents and guidelines, as well as harmonization of national regulation with the EU regulation).

In addition to this *basic, coordinating role*, ISRBC took up managing projects and programs of regional importance and, hence, *the implementation role* as well. This approach yielded multiple benefits for the Parties (elaborated in the next section) but also contributed to the efficiency and effectiveness of ISRBC in performing its basic role.

ISRBC has a *dual legal capacity* (Figure 42.1): in the field of navigation, its decisions are legally binding for the Parties, whereas on all other issues (water protection and hazard management, information management, etc.), it provides recommendations (Komatina 2011, p. 31). River basin organizations from Europe typically provide recommendations to their member countries, so *the decision-making power of ISRBC in the field of navigation* is exceptional (comparing only to that of the Central Commission for the Navigation on the Rhine). Additionally, ISRBC provides recommendations to the Meeting of the Parties (Figure 42.1), a ministerial-level body that makes decisions related to strategic issues of the *FASRB* implementation and performs a general monitoring of the implementation process (Komatina 2011, p. 31). Decisions of the Meeting of the Parties, as well as decisions and recommendations of ISRBC, are made solely by consensus.

ISRBC is financed, primarily, through regular annual contributions of the Parties, paid equally. The Secretariat is an administrative and executive body of ISRBC, composed of officials with the status of international civil servants – citizens of the Parties, employed by ISRBC on an equal basis. Like other basin organizations in Europe, ISRBC established expert groups (Figure 42.1), composed of delegated experts from each party (e.g., from water or environment agencies, national hydro-meteorological services, port master offices). Six permanent expert groups deal with the main issues in the basin – river basin management, accident prevention and control, flood prevention, navigation, GIS, and hydrological and meteorological issues, while three *ad hoc* expert groups cover specific issues and tasks – legal issues, financial issues, and River Information Services. There is also a task group supporting the development of sustainable river tourism in the basin. The official languages of ISRBC include all the six languages used in the Parties, while English is used as a working language when needed and applicable. Although these modalities are common for river basin organizations, some of them (e.g., consensus as the only decision-making mechanism, an equal number of the ISRBC Secretariat officials from each party, all languages of the Parties declared as official languages of ISRBC, despite their similarity) can still be considered as suboptimal, and partly attributed to the level of trust among the Parties at the time of negotiating the agreement.

ISRBC is *the only permanent subregional mechanism of water cooperation in the Danube River Basin*. At the Danube scale, water cooperation is coordinated by ICPDR (water management and environmental protection) and the Danube Commission (navigation), in which member countries of ISRBC participate as well. Therefore, ISRBC's activities need to be coordinated with those of the two Danube commissions to ensure their complementarity and maximize the effectiveness of the cooperation processes.

### *Stakeholder involvement and public participation*

Due to the broad scope of cooperation under *FASRB*, the number of stakeholders at different levels (international, national, local) and from various water sub-sectors (environment, water management, navigation, tourism, hydropower, agriculture, civil protection, economy) and societal

sectors (governmental, non-governmental, academic, business) is rather high. Therefore, ISRBC pays considerable attention to cooperation, stakeholder involvement, and public participation.

*Cooperation* with international organizations and institutions outside the Sava basin is focused on UN organizations, the European Commission (EC), financial institutions, and river commissions, but it also includes other organizations and governments (Komatina and Grošelj 2015, p. 18). Coordination of ISRBC's activities with those performed at the Danube scale is based on the memoranda of understanding signed by ISRBC with each of the two commissions for the Danube, providing for their periodic consultations on all issues of cooperation, regular exchange of data and information, and joint implementation of activities or projects of mutual interest. Within the Sava basin, ISRBC cooperates with the national institutions of the Parties responsible for the implementation of *FASRB* (mostly line ministries) and other governmental institutions (e.g., water, environment, or waterway agencies; hydro-meteorological services; port master offices; civil protection administrations; regional chambers of commerce), as well as stakeholders from the non-governmental, academic, and business sectors.

For the *provision of information* to stakeholders and/or the wide public, ISRBC uses a wide range of tools, including its official website and publications, the *Sava NewsFlash* bulletin, the Sava Youth Parliament, the International Sava River Day, or various awareness-raising events. An important mechanism is provided by *the system for permanent monitoring of the FASRB implementation*. It requires Parties to prepare and submit national reports on the implementation of the agreement to ISRBC, which subsequently prepares a joint report (based on the national reports and its own findings) and submits it to the Meeting of the Parties for consideration and adoption. All these reports are posted on the website of ISRBC, so the views of all key stakeholders concerning the process, its progress, challenges, and lessons learned are available to the wide public.

*Consultation* with, and *active involvement* of, stakeholders is ensured through their participation at sessions and meetings of ISRBC (including as observers), in the Sava Water Council (a standing advisory platform of ISRBC involving a broad array of stakeholders from non-governmental, academic, and business sectors), at capacity-building and consultation events, or in the stakeholder fora established within major projects or processes coordinated by ISRBC (Komatina and Grošelj 2015, p. 18).

A good example of stakeholder involvement is the process of development and implementation of the *Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin* (ICPDR et al. 2008), led jointly by ICPDR, the Danube Commission, and ISRBC, with an active involvement of the EC. This process provides a platform for regular dialogue between stakeholders from navigation, environmental, and water management sectors from the Danube basin about the integration of environmental protection into navigation development. The outcomes of the dialogue influence the planning and implementation of new navigation projects in the Danube basin, but also the EC's approach to developing related policies and financing navigation projects.

## Process of implementation

### *Key features of the approach*

#### *Integrating coordination and implementation*

The broad scope of *FASRB* makes its implementation a challenging task, as the achievement of its principal objectives requires an *integrated approach* balancing the needs for development of economic activities (navigation, river tourism) and the needs of other water sub-sectors (water

protection and hazard management, environmental protection, other water uses), as well as the involvement of numerous stakeholders.

To maximize effectiveness of the process, ISRBC complemented its basic role (i.e., coordination of activities on a regional scale) with the *management of projects and programs of regional importance*, thus providing a number of functions for the benefit of the Parties: facilitation of project identification, prioritization, planning, and development; fund-raising (focused on ensuring grants from external funding sources); and facilitation of project implementation (as a responsible body on behalf of the Parties, coordination body, or communication platform). The joint planning and prioritization of projects through ISRBC ensures that all projects from the priority list of ISRBC are supported by all Parties (on both political and expert levels) and fully aligned with relevant EU directives and strategies, which largely contributes to successful fund-raising. For illustration, six years after the establishment of ISRBC, the share of external project funding (mostly grants) reached 87%, the remaining 13% being funded by the Parties, in addition to their regular annual contributions (Komatina and Grošelj 2015, p. 18).

The Parties' growing expectations from ISRBC's implementation role posed a challenge to the commission to fulfill the mandate with an unchanged capacity. To overcome it, ISRBC integrated its two roles by *coordinating activities of the Parties within the implementation of projects* (e.g., development of basin management plans or establishment of basin-wide integrated systems), which even helped strengthen its basic role.

### *Managing interests and expectations*

At an early stage of the process, there was a notable concern among the Parties, already participating in the cooperation processes at the Danube level, that the emerging process at the Sava level might cause a duplication of their effort without adding a remarkable value to the Danube processes, which sometimes affected the Parties' perception of the "value for money" provided by ISRBC. Also, the Parties' evaluation of outcomes and success of the Sava cooperation process was highly influenced by their diverse interests, priorities, and expectations (depending on their location within the basin, the economic power, and the EU accession progress).

This drove ISRBC to (i) establish close *cooperation and coordination of activities with the two Danube commissions*, to create synergy and ensure complementarity of work of the national authorities within the processes at the Danube and Sava levels; (ii) strive to *advance cooperation in all areas of its work in a balanced way*, by simultaneously dealing with various issues (e.g., water status assessment, flood protection, sediment management, climate change adaptation, navigation development); and (iii) focus, initially, on those *activities that cover the entire basin and provide benefit to all Parties* (e.g., preparation of *Sava River Basin Management Plan* or development of the Sava GIS). The effectiveness of this approach was greatly supported by ISRBC's project implementation role, including its use of project opportunities emerging from the *EU Strategy for the Danube Region* (EC 2010).

Meeting the interests and expectations of all Parties in a balanced way contributed to the prevention of water conflicts, so that the dispute settlement mechanisms, foreseen in *FASRB*, have never been used.

### *Adaptive management*

The complexity of the process required ISRBC to apply a flexible and adaptive management approach, particularly when there was a need for:

- *Balanced solutions satisfying the interests of all Parties*, due to their diverse interests, priorities, and expectations, on one hand, and the consensus-based decision-making, on the other;
- *Step-by-step implementation* of processes (e.g., gradual development of information and data exchange in the basin, as the conditions – willingness of the Parties, technical possibilities, availability of funds – were improving);
- *Extending the scope of cooperation*, due to the Parties' common interest in tackling new issues (e.g., sediment management, river tourism development);
- *Shifting the focus of cooperation*, due to changed circumstances (e.g., the occurrence of a disastrous flood in the basin in 2014 required an immediate shift of ISRBC's focus on flood management and pressed the Parties to urgently ratify *Protocol on Flood Protection* and establish the Sava flood forecasting and warning system);
- *New modalities of cooperation* (e.g., needed to implement activities in the whole basin when Montenegro, after its separation from Serbia, ceased to be an ISRBC member state);
- *Modified technical solutions and implementation arrangements*, due to inter-sectoral conflicts (e.g., a strong opposition of environmental non-governmental organizations to the rehabilitation of the Sava River waterway).

### *Trust building*

The relations and level of trust among the Parties following the conflict affected, not only the development of the framework for water cooperation and management in the basin but also the process of its implementation as well. This called for ISRBC's continuous efforts to create a solid enabling environment by providing a platform for the Parties' *permanent work on defining their joint priorities, vision, and programs* for the development of the Sava basin, *and* then *implementing the activities and projects* under the coordination of ISRBC, as a key factor of trust building.

Indeed, the progress was gradual. In the beginning, the activities were limited to those covering the entire basin and providing comparable benefits to all Parties (e.g., development of basin-wide studies, management plans, or data exchange and information systems). With the level of trust rising based on the Parties' cooperation and achievements made through ISRBC, the process also included the activities targeting a part of the basin and providing unequal benefits to the Parties (e.g., activities targeting the Drina River sub-basin). Finally, the process reached the stage where it included those activities for which the resources would be provided by one country, while benefits would be shared by multiple countries (e.g., planning of the Sava River waterway rehabilitation and development). With this, the process was elevated to another level, furthering political stability in the region.

## *Achievements and the role of water diplomacy*

Despite its high complexity, the process yielded notable *accomplishments*, summarized in Table 42.3. (More information about the accomplishments, along with the respective documents, is available on the website of ISRBC.)

These accomplishments are firmly rooted in the use of *water diplomacy tools*, most of which are embedded into *FASRB*, either explicitly or implicitly. For example, the regular exchange of information among the Parties is an explicit requirement of the agreement, being recognized as a pillar of the process and an essential element in undertaking basin-wide activities for sustainable and integrated water resources management. Joint fact-finding and assessment of development trends and interests, as well as joint planning and development of scenarios, were key tools

*Table 42.3* Main outputs of the water cooperation and management process coordinated by ISRBC

| *No.* | *Output* | *Status* |
|---|---|---|
| Water protection and hazard management | | |
| 1 | *Protocol on Flood Protection to the FASRB* | Signed in 2010, in force since 2015 |
| 2 | *Protocol on Sediment Management to the FASRB* | Signed in 2015, in force since 2017 |
| 3 | *Protocol on Emergency Situations to the FASRB* | Under final harmonization |
| 4 | *Sava River Basin Management Plan* (and its update) | Adopted in 2014 (2022) |
| 5 | *Flood Risk Management Plan for the Sava River Basin* | Adopted in 2019 |
| 6 | *Sediment Management Plan for the Sava River Basin* | Implementation of preparatory steps |
| 7 | Water contingency management platform for the Sava River Basin | Implementation in progress |
| 8 | Flood forecasting and warning system for the Sava River Basin | Operational since 2018 |
| 9 | Sediment monitoring and data exchange system for the Sava River Basin | Implementation of preparatory steps |
| Navigation and other water-related economic development issues | | |
| 10 | *Protocol on Navigation Regime to the FASRB* | Signed in 2002, in force since 2004 |
| 11 | *Protocol on Prevention of Water Pollution Caused by Navigation to the FASRB* | Signed in 2009, in force since 2017 |
| 12 | Policy and other documents related to technical standards and safety of navigation | Continuously since 2006 |
| 13 | Waterway marking, maintenance, and development plans | Continuously since 2006 |
| 14 | Sava River Information Services | Operational since 2013 |
| 15 | The Sava River waterway marking system | Restored in 2009 (after 20 years) |
| 16 | Rehabilitation of the Sava River waterway (planning and execution of works) | Continuously since 2006 |
| 17 | Documents supporting the development of sustainable river tourism in the Sava River Basin (political, technical) | Continuously since 2009 |
| 18 | *Joint Plan of Actions for the Sava River Basin* and *Sava and Drina Rivers Corridors Integrated Development Program* (targeting economic integration of the region for its sustainable development) | 2017 (*Plan*) and 2022 (*Program*) |
| Cross-cutting issues | | |
| 19 | *Sava GIS Strategy* | Adopted in 2009 |
| 20 | *Policy on the Exchange and Use of Sava GIS Data and Information* | 2019 |
| 21 | Sava GeoInformation System – Sava GIS (and its improvements) | 2016 (2018, 2021) |
| 22 | *Policy on the Exchange of Hydrological and Meteorological Data and Information in the Sava River Basin* | 2014 |
| 23 | *Hydrological Yearbook for the Sava River Basin* | Since 2006 (revived after 20 years) |
| 24 | Joint hydrometric measurements by Parties on border sections (under the coordination of ISRBC) | Since 2012 |
| 25 | Hydrological Information System – Sava HIS (and its improvements) | 2015 (2016, 2017) |
| 26 | *Water and Climate Adaptation Plan for the Sava River Basin* | 2015 |

*Table 42.3* (Continued)

| *No.* | *Output* | *Status* |
|---|---|---|
| 27 | *Outline of the Climate Change Adaptation Strategy and Priority Measures for the Sava River Basin* | 2018 |
| 28 | Hydrological model of the Sava River Basin (and its improvements) | 2010 (2014, 2017, 2020) |
| 29 | Hydraulic model of the Sava River and its major tributaries (and its improvements) | 2012 (2018) |
| 30 | Integration of the hydrologic and hydraulic models into the flood forecasting and warning system for the Sava River Basin | 2018 |

supporting the development of management plans (outputs 4–6, 13, and 26 in Table 42.3), as well as integrated systems, models, and databases for the basin (outputs 7–9, 14, 21, 23, 25, and 28–30). The development of a shared vision, principles, and objectives was a foundation for the joint preparation of protocols to *FASRB* and other policy, strategic, and planning documents (outputs 1–6, 10–12, 17–20, 22, and 27), identification and use of shared development opportunities (outputs 16–18), as well as implementation of activities on the ground (outputs 15, 16, and 24), by the Parties. Collaborative adaptive management was at the heart of many activities, as explained earlier in the section. All activities were performed with regular involvement of stakeholders, and many of them also included interdisciplinary collaboration, extensive official and informal communication, and negotiations. The capacity-building and awareness-raising activities were a part of most of the activities and processes as well.

### *Challenges and benefits*

The process of water cooperation and management in the Sava basin, based on the implementation of *FASRB*, includes various *challenges* and (existing or potential) *obstacles* (Komatina 2011, p. 39, Komatina and Grošelj 2015, p. 21).

Main complexities of the process are related to the broad scope of ISRBC's work, as it requires:

- *Additional protocols* to regulate specific issues of *FASRB* (which implies implementing, both technically and politically, complex processes);
- *Resolving inter-sectoral conflicts* on both national and international levels (which are expected to even grow in future, e.g., due to climate change);
- *Good inter-sectoral communication and coordination* at the national level, as well as *many focal points* and *significant human and financial resources from each Party*, necessary for realization of the activities agreed on the basin scale; and
- *Sharing a wide range and large amount of data* possessed by the Parties (the access to which is sometimes limited).

Majority of ISRBC's activities are also influenced by one or more of the following factors:

- *Differences between the Parties*, e.g., those arising from their different EU membership status (unequal levels of harmonization of the national legislation with the EU *acquis* and implementation of the EU directives, or uneven eligibility for approaching the EU funds), or their

differences in the level of economic development, organizational structure, and environmental awareness of the public;
- The Parties' *different perceptions of requirements* in the field of water protection and hazard management, where requirements toward the Parties are based on recommendations and conclusions of ISRBC (unlike its legally binding decisions in the field of navigation), which may, in some situations, complicate satisfying the interests of all Parties;
- The possibility of ensuring *funds for the implementation of activities* (e.g., priority projects, strategic studies, establishment of basin-wide integrated systems), particularly considering the Parties' growing expectations related to ISRBC's project implementation role;
- The *ability of ISRBC to constantly play both the coordination and implementation roles*, given its limited capacity; and
- *High number of official languages* of ISRBC and related practical implications.

Finally, ensuring the Parties' *continuous commitment and support at a high political level*, as well as *contributions of national institutions* (e.g., data submission, participation at meetings) *in the long run*, as important preconditions for the success of the process, are challenging tasks as well.

Despite all the challenges, the process of cooperation in the Sava basin under the coordination of ISRBC yielded multiple *benefits* to the Parties (Komatina 2011, pp. 38–39, Komatina and Grošelj 2015, pp. 18–20):

- Thanks to its cohesiveness, the process provided conditions for intensified contacts of the Parties after the conflict, their joint work on identifying shared development opportunities, defining priorities, and developing a joint vision, implementing activities and projects, harmonizing national regulation, methodologies, and procedures, exchanging information and experiences, and providing additional training of their experts. In addition to notable *achievements* and *trust building*, the process yielded either newly established or strengthened *links between institutions and professionals* from various countries and sectors, on both political and expert levels, which improved *cross-sectoral coordination on national level* and contributed to *political stability on regional scale*.
- Based on its integrated nature, the process enabled implementation of activities covering the whole Sava basin (or its part), dealing with both sustainability and development issues, and technical, legal, and governance aspects of water resources management, bringing together stakeholders from all societal sectors (governmental, non-governmental, business, academic), and combining the "top-down" and "bottom-up" approaches whenever possible. Also, thanks to its transparency and inclusiveness, the process enabled the stakeholder involvement and public participation at three levels – provision of information, consultation, and active involvement. The approach provided the Parties with *balanced solutions supporting sustainable development of the entire region*.
- With the process being aligned with the UNECE multilateral environmental agreements and EU directives and strategies and being complementary to the cooperation processes at the Danube basin scale, the stakeholders' *benefits from the process are maximized*.
- The process is pragmatic and practical, so the stakeholders benefit from a *broad range of its tangible outputs* (e.g., basin management plans or integrated systems, infrastructure for navigation and river tourism, protocols and policy documents, harmonized regulation, or development plans and strategies).

- Thanks to its educative character, the process provided different forms of "*nonformal education*" (including permanent capacity building for experts from national institutions and *ad hoc* capacity building for various groups of stakeholders) and "*informal education*" (i.e., awareness raising targeting the basin's wide public or some of its groups).

## Conclusions

This chapter introduces the framework for water cooperation, management, and diplomacy in the Sava River Basin. It was created following a conflict and considerable geopolitical changes in the region, with the aims of re-establishing the basin-wide management of water resources, supporting sustainable development of the region by using the development potential while preserving the environmental values in the basin, and contributing to political stability of the region.

Achieving these objectives and matching the interests of all parties in the process was made possible by developing a broad framework that integrates all branches of water resources management, enables dealing with technical, legal, and governance aspects of it, and includes both coordination and implementation of activities at the basin scale. As a result, the framework allows the Parties to address complex water problems crossing both political and sectoral boundaries.

The framework is based on the use of various water diplomacy tools, supporting the water cooperation and management in the basin by facilitating the resolution of a broad range of issues related to sustainable management of shared resources and contributing to water-related economic development and water security. It enables the Parties' permanent joint work, information sharing, planning, and implementation of the agreed activities under the coordination of the joint body, thereby supporting trust building and contributing to regional political stability. The framework also establishes solid mechanisms for the permanent monitoring of implementation of these processes, stakeholder involvement and public participation, and the settlement of disputes among the Parties, in case the need arises. The framework has a modular structure and high degree of flexibility, thus enabling an adaptive management of water resources in the basin, increasing the hydro-political resilience of the water governance system, and contributing to peace and security in the region.

Given the existing interest of other regions (Europe, Asia, Africa) in the framework described in this chapter, it seems to be an attractive example of good practice, with advantages over instruments governing the water cooperation and management elsewhere. Although rather demanding in terms of resources and continuous, joint efforts of the Parties, and despite various challenges to its development and implementation, it created a good basis for the application of a principled, pragmatic, and negotiated problem-solving approach that provides multiple benefits to its stakeholders. The example also shows how water can be used as an incentive for cooperation in complex geopolitical circumstances, to facilitate trust building and cross-sectoral cooperation at both international and national levels and contribute to sustainable development and political stability in the region following a conflict.

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# 43

# FACTORS THAT CONTRIBUTE TO SUCCESSFUL DIPLOMATIC OUTCOMES

## Case study of the Colorado River Basin cross-boundary institution

*Sharon B. Megdal*

**Key takeaways**

- The International Boundary and Water Commission has a long record of successful water diplomacy outcomes along the border shared by Mexico and the United States (US).
- Process considerations loom large when addressing complex water challenges.
- A functional mechanism for cooperation is required for successful water diplomacy across national boundaries.
- Trust and mutual respect are among the several foundational factors for successful water diplomacy.

### Introduction

The Colorado River system provides water, hydropower, and recreational services to millions of people. Shared by seven states in the western US, two states in Mexico and most of the 30 Native Nations within the watershed, it is estimated that 40 million people rely on the 2,330-kilometer river. A map of the Colorado River Watershed is provided in Figure 43.1.

Behind the Hoover Dam, considered one of the seven industrial wonders of the world, lies Lake Mead, which, when full, is the largest surface-storage reservoir in the US. Upstream and behind Glen Canyon Dam, Lake Powell serves as a second large reservoir, and there exist additional smaller storage reservoirs. Not only is water delivered to users within its 637,000 square kilometer drainage area, but it is also conveyed to users outside the watershed boundaries, including urban water users in large metropolitan areas, such as Los Angeles and Denver. In Mexico, Colorado River water is transported west to meet agricultural irrigation needs in the Mexicali Valley.

In 1944, the Treaty on Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande (1944 Treaty) became effective, establishing the guiding principles for cooperation on these three transboundary rivers. It expanded the authorities of the former International Boundary

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*Figure 43.1* Map of the Colorado River watershed in the context of the US-MX border (Eckstein et al., 2023).

Commission to include surface water and wastewater responsibilities and renamed the commission the International Boundary and Water Commission (IBWC). Since that time, the IBWC has jointly addressed binational matters per the 1944 Treaty, as interpreted through jointly developed and signed Minutes, which specify actions required to implement the treaty's provisions.

Since the turn of the century, precipitation and temperature patterns have, in most years, produced below-average annual Colorado River flows, sometimes well-below-average flows when compared to the prior 30 years (Salehabadi et al., 2022, Wheeler et al., 2022). Lower flows resulting from this Millennium Drought, fixed water allocations based on generous assumptions of river flows, and increased water demands of this growing region of North America result in an imbalance of water demand and supply.

Due to very low flows occurring in the early 2000s, the US states and the US federal government recognized the urgent need to adopt shortage sharing guidelines, something that heretofore had not existed. In 2007, the US government formally adopted its first regulations regarding sharing Colorado River shortages via the "Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead" (2007 Interim Guidelines). This imbalance was further evaluated via the 2012 US Bureau of Reclamation Colorado River Basin Water Supply and Demand Study (2012 Study), which also looked to possible means of addressing the growing imbalance but was not intended to lead to a specific action.

Though significant undertakings, the multi-year processes of negotiation and analysis leading to development of the 2007 Interim Guidelines and the 2012 Study had recognized shortcomings. The 2007 Interim Guidelines only pertained to sharing of shortage among the US water users. How/if to address cutbacks to the 1944 Treaty's 1,850 million cubic meter US delivery obligation to Mexico would require a binational process. Likewise, preparation of the 2012 Study was a US-only study. Moreover, the 2012 Study was met with resounding criticism from Native Nations in the basin. Despite their holding rights to 20–25 percent of Colorado River water, Native Nations, which are sovereign nations located within the US, were not formally consulted or explicitly included. Recognizing this major shortcoming, a companion study, the Colorado River Basin Ten Tribes Partnership Tribal Water Study, was undertaken and released in 2018 by the US Bureau of Reclamation and the Ten Tribes Partnership.

The challenges associated with the imbalance in water demand and supply are core to the work being done at many geographic and jurisdictional levels, especially between the US and Mexico through the IBWC. Though the case study will concentrate on how the structure and processes of the IBWC contribute to successfully negotiated binational outcomes, which include national agencies, such as the US Bureau of Reclamation and Mexico's National Water Commission (CONAGUA), state agencies, and other entities. The discussion of the contributing factors should clarify their relevance to other scales and cross-boundary settings.

## IBWC's history of adaptive governance and processes

The IBWC is set up as an international organization of co-equal parts. The US and Mexican sections of the IBWC are headed up by a federally appointed Commissioner with engineering experience. The sections operate as part of each respective federal government, coming together through diplomatically agreed upon processes to deliberate and act as the IBWC. Each Commissioner is supported by a staff of engineers and others funded by the home country. Rather than being in each country's capital city, they are located in sister cities along the border, specifically, El Paso, Texas, on the US side and Ciudad Juárez, Chihuahua, on the Mexican side. This proximity contributes to ease of in-person meetings of the Commissioners and/or their staffs.

IBWC operates in the context of various asymmetries. There are asymmetries in the water-governance regimes. Mexico's water governance is highly centralized, unlike US water governance, where many authorities are within the purview of state rather than federal authorities (Megdal and Scott, 2011). The two countries speak different languages, experience different socio-economic conditions, and even employ different units of measurement. Over the years, especially given this century's extremely stressed Colorado River conditions, institutional innovation and water cooperation have increased. What has contributed to this increase?

One key instance involved a natural disaster – a crisis – providing an impetus to agreement on an innovative cooperation to store water in the US on behalf of Mexico. On April 4, 2010, an earthquake in the region did substantial damage to Colorado River water delivery infrastructure within

Mexico. Unlike in the US, there are no storage reservoirs on the Mexican side, and there was no formal mechanism for Mexico to store water within the large US reservoirs. The US obligation is to deliver water to Mexico based on scheduled requests from Mexico that sum up to the annual delivery requirement. Mechanisms for over-year storage of water in Lake Mead had only recently been established for US-based Colorado River water users through the 2007 Shortage Guidelines. Following the earthquake, Mexico canceled its scheduled delivery requests because the water could not have been diverted and used as intended due to the inoperability of much of the Mexican-side delivery system. Instead, just over two months later, on June 17, 2010, the Commissioners signed Minute 317, "Conceptual Framework for U.S.-Mexico Discussions on Colorado River Cooperative Actions." This framework Minute established a binational Consultative Council to consider legal, administrative, and policy matters associated with cooperative actions (Megdal, 2021, Minute 317). Through the Consultative Council, the Commission would "explore opportunities for binational cooperative projects that: minimize the impacts of potential Colorado River shortage conditions; generate additional volumes of water using new water sources by investing in infrastructure such as desalination facilities; conserve water through investments in a variety of current and potential uses, including agriculture, among others; and envision the possibility of permitting Mexico to use U.S. infrastructure to store water" (Minute 317). The natural disaster resulted in a change to treaty implementation that has served the two countries well. Later Minutes, most notably Minute 319 and Minute 323, have established parameters for storing water in Lake Mead on an ongoing basis and for quantifying shortage sharing during low-flow river conditions.

Another key innovation, which resulted from Commissioners' initiative, was the broadening of opportunities to participate in IBWC processes. The Commissioners established working groups that expanded the opportunity for representatives from government agencies, non-governmental organizations (NGOs), and universities to deliberate and provide input on matters under consideration. These more expansive consultative and information-sharing processes enabled broad cooperation on environmental flows through Minute 319 and Minute 323 (Gerlak, 2015) and on a binational study of desalination opportunities through Minute 323 (International Boundary and Water Commission, 2020). The IBWC is extending this broader and more inclusive consultative approach to its Rio Grande activities.

In the 2020 open-access journal article "Hydrodiplomacy and adaptive governance at the US-Mexico border: 75 years of tradition and innovation in transboundary water management," Wilder et al. analyze IBWC's adaptive water governance and innovations across the border region since the implementation of the 1944 Treaty. A map of the entire border region is shown in Figure 43.2.

Examining the history of IBWC successes, the authors present (on p. 191) these five indicators or contributing factors to adaptive capacity: (1) social learning and knowledge co-production, (2) sustained and iterative relationships, (3) flexibility and innovation, (4) state and non-state actor networks, and (5) robust and foundational institutions. In the context of the five indicators, the authors further connect (on p. 199) IBWC achievements to five events or turning points: (i) the significance of temporal and spatial context; (ii) the expansion of transboundary water-governance capacity; (iii) a movement toward inclusion of non-nation-state actors at different scales and toward a more ecological focus; (iv) the linkage of governance-capacity changes across time and space, with each phase building on prior phases; and (v) diverse roles played by both science and diplomacy efforts in these cases.

Though the IBWC operates along the entire border and most of the border region can be described as semi-arid, areas of focus or concern are not necessarily the same across the different primary river systems. Spatial and temporal considerations differ. The Colorado River flows south from the US into Mexico, whereas the Rio Grande/Rio Bravo itself is a long east-west border

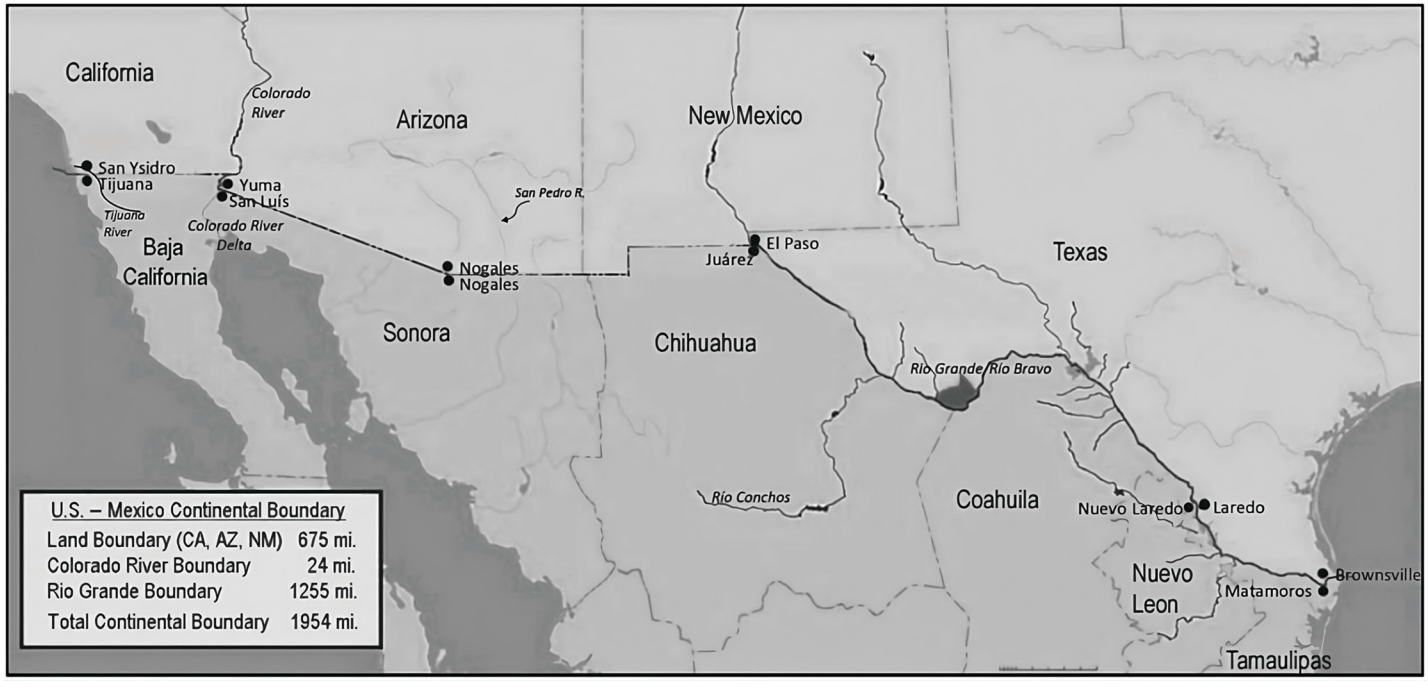



*Figure 43.2* Map of the entire border region, showing the Colorado and Rio Grande/Rio Bravo Rivers (Wilder et al., 2020).

along the US state of Texas. The timing and direction of river deliveries differ as well. The 1944 Treaty requires the US to deliver Colorado River water to Mexico annually, while the cross-border delivery obligation for the Rio Grande/Rio Bravo system, which is from Mexico to the US, must be met over a five-year period. The processes of consultation and programmatic focus may differ as well. As noted in the prior section, the more inclusive approach and ecological focus noted have been more prevalent in the Colorado River system but are being extended to the Rio Grande/Rio Bravo system. For the third major shared river system, the Tijuana River, wastewater treatment and outflows have recently been a key concern. The IBWC therefore attends to different issues across the border and over time, and builds upon its experiences. As described by Wilder et al. (2020), science and diplomacy figure in regularly across the border, including in transboundary aquifer assessment efforts, where innovative strides have also been achieved (Pineda Pablos et al., 2020, Petersen-Perlman et al., 2021, Tapia-Villaseñor and Megdal, 2021).

Most if not all of the five indicators highlighted by Wilder et al. (2020) relate to process. Social learning and knowledge co-production relate to the process of acquiring and sharing data, information, and analyses. Sustained and iterative relations of course speak to the actual relationships between the Mexican and US IBWC sections, along with how other individuals and entities are connected. Flexibility and innovation relate to the fundamental processes associated with arriving at policies as conditions change over time. The existence of state and non-state networks points to the involvement of the various agencies and organizations. The existence of robust and foundational institution(s), perhaps the most important determinant of the predictability, effectiveness, and durability of process, is listed as the fifth indicator. The next section further focuses on process by considering the factors that contribute to IBWC's effectiveness in tackling binational water challenges – challenges that can often be described as wicked water problems.

## Foundational factors for successful diplomacy

Wicked water problems can be defined as those that do not have single, easily identified and implemented solutions (Beutler, 2016, Megdal, 2020, Beutler, 2021). Ongoing efforts involving many entities and individuals are required to identify pathways to mitigating the impacts of wicked water problems, meaning process considerations loom large. There is no shortage of wicked water problems being tackled globally, with the Colorado River Basin's imbalance between water demand and supply being a prime example. This imbalance affects all the water-demanding sectors – municipal, agricultural, industrial, and environmental – and its binational implications make addressing the impacts more complicated. As discussed earlier, the IBWC has been able to develop actions to identify adaptive measures. This section details key factors that have contributed to the IBWC's success, factors that underscore foundational process and interpersonal factors.

### *Factor 1: A functioning mechanism for cooperation, including knowledge co-production*

This factor has multiple layers to it. First and most obvious is that the institution for cooperation must function in the intended manner. It must be more than something "on paper." The degree of functionality of an entity or institution may be hard to measure, but it is not hard to recognize when there is a lack of functionality (Schwind, 2019). Without an entity that functions on an ongoing basis, there is no reliable opportunity to deliberate and negotiate. With its authorities established through the 1944 Treaty, the IBWC is an established and continuing institution with predictable operating protocols. Each section is housed in their federal diplomatic agencies and

works regularly with other federal agencies. The two sections operate as co-equals. Agendas are co-developed, and activities, including studies, are conducted in both national languages, with highly qualified translators employed. There are expert professionals and supporting staff with institutional memory. Another factor that contributes to the IBWC's functionality is the proximate location of the two sections' offices at the El Paso-Ciudad Juárez border region, thereby facilitating meetings of the staff and Commissioners.

Engaging in joint studies, with both sections involved in study review and modifications, is another layer of this factor. IBWC processes enable the co-production of information and analyses, as highlighted by Wilder et al. (2020), resulting in jointly accepted and released reports, which are produced in both English and Spanish. Developing common understanding has resulted from working through complex river modeling (Wheeler et al., 2018) to harmonizing existing groundwater information (Callegary et al., 2016). Actions are then based on common understanding of the need for and implications of the actions.

A third and important functionality layer relates to the mechanism for taking action, namely, the Commission's authority to interpret the 1944 Treaty through Minutes. Minutes that involve complicated, often long-term agreements are codified via the signatures of the Commissioners representing each nation. Though complex and frequently long-term negotiations take place, official action is accomplished within IBWC; congressional action is not required.

### *Factor 2: Mutual respect contributing to trust*

Though mutual respect and trust could be listed as two separate factors, they go hand-in-hand. The IBWC is led by the two appointed Commissioners, one for each country. As Wilder et al. (2020) note, the IBWC Commissioners have worked as colleagues. Their schedules are coordinated so that they regularly appear together at convenings on matters under deliberation. They engage in common fact-finding and inspection missions. (Sadly, in 2008 Commissioners Arturo Herrera (Mexico) and Carlos Marin (US) perished while aerially inspecting flood damage (Pineda et al., 2020).) They travel together to conferences and fact-finding trips outside their border region (Megdal, 2017, Megdal, 2023a). Mutual respect has been built into the IBWC as a binational organization. Trust is an outgrowth of mutual respect. While getting into matters of psychology and interpersonal relationships is beyond the scope of this case study and the author's expertise, the crucial role of trust is mentioned in the context of difficult negotiations and deliberations. Trust between individuals is something that is built over time. Mutual respect contributes to building trust. Like many of these suggested factors, it is hard to measure respect. Rather, its absence is more readily recognized. Trust, something that is earned, can be easily shattered. Once a trustful relationship is broken, it may be hard to mend.

### *Factor 3: Involvement of interested parties (stakeholders)*

The importance of involvement of diverse interested parties in water deliberations and decision-making is well recognized (Gerlak, 2015, Eden et al., 2016, Mott Lacroix and Megdal, 2016, Megdal et al., 2017). In the Colorado River Basin, the IBWC has increased engagement opportunities through the formation of binational discussion tables, committees, and minute oversight groups, through which underlying scientific, engineering, hydrologic, and/or policy considerations are fully explored. These platforms include representatives of water agencies, suppliers, users, NGOs, and academic institutions from both sides of the border. The necessary time and resources for engagement are built into IBWC's decision-making timelines. That the IBWC is looking to

replicate these more inclusive deliberative processes in the Rio Grande/Rio Bravo region is evidence of their value.

### *Factor 4: Good communication*

A key to successful outcomes is good communication throughout the diplomatic process. The processes of consultation, deliberation, and decision-making must be shared so that the parties understand their opportunities to engage. When multiple languages are involved, as is the case along the border shared by Mexico and the US, all official materials are prepared in both languages. Meetings must include sequential or simultaneous translation by translators familiar with water terminology. Fully bilingual reports and technical studies must be prepared. A noteworthy example of a fully bilingual study is the "Binational Study of Water Desalination Opportunities in the Sea of Cortez" (IBWC, 2020), which examines the opportunity to engage in water augmentation in the Colorado River Basin through desalination. This study, which includes a side-by-side, page-by-page presentation of the desalination study in English and Spanish, resulted from Minute 323. Another example is the "Binational Study of the Transboundary San Pedro Aquifer" (Callegary et al., 2016), a peer-reviewed report of the binational Transboundary Aquifer Assessment Program (Megdal, 2019a, Megdal, 2023b). This study of groundwater associated with a portion of the Colorado River tributary was published as a single, bound volume, with the text and all the many maps presented in both languages. In addition to the transmission of materials, whether in writing or orally, communication skills also come into play on the receiving side as well. Good communication is a two-way street. Listening to understand the positions of others involved is essential to successful water diplomacy.

### *Factor 5: Persistence and patience*

Persistence and patience are presented here together because, like mutual respect and trust, they are related. Addressing difficult water issues in a transboundary setting will require persistence. One cannot get discouraged by setbacks or obstacles along the way. And the processes take time, which requires patience. People of multiple cultures and backgrounds are involved; sometimes it may seem like one country or the other is always observing a holiday, meaning meetings are difficult to schedule. Though those involved with the study of the previously mentioned transboundary San Pedro aquifer thought preparing a companion report for an adjacent binational aquifer system would go more quickly, for various reasons the preparation and peer review process have taken much longer than expected. Persistence and patience have been necessary to see the study progress through the process. Both are required for successful water diplomacy.

### *Factor 6: Eating with your partners*

"Eating with your partners" was mentioned at a 2019 conference session in response to a question about what contributes to success in establishing productive working relationships in a binational setting. As noted by Megdal (2019b, 2), panelists "… agreed that having good functioning relationships is crucial. When working across national boundaries, it is critical to identify what is beneficial to both nations in order to identify win-win opportunities. It was also acknowledged that identifying such opportunities can be difficult and that relationships can have peaks and lows. Especially when working with neighbors with different cultures and languages, good communication, sincerity, and leadership will enable things to happen. Again, panelists came back to noting

that eating together helps foster the friendships that then can facilitate the work required to forge formal agreements." Unfortunately, the COVID-19 pandemic curtailed the ability to meet, greet, and eat with partners for a considerable period of time. Virtual meetings were the only option for quite some time, and diplomatic efforts did continue virtually. However, many agree that establishing new connections and professional relationships is more difficult in a virtual setting. Though virtual meetings continue to be held and do save on travel time and costs, they are not a substitute for getting to know your diplomatic partners through meals shared in a setting less formal than the official business meetings.

### *Factor 7: Leadership*

Leadership is connected to all the above factors. It is foundational. As the Colorado River flows worsened since the turn of the decade, Commissioners, their staffs, and representatives of the negotiating and cooperating parties have had to embrace new approaches to river management. They and the respective federal agencies have worked across changing presidential administrations and budget conditions. New partnerships were forged with NGOs. Academic partners and private sector consultants provided analyses.

Leadership is required for functioning mechanisms that work diplomatically to address wicked problems, whether manifested in binational, subnational, or local settings. Leaders are mutually respectful and will endeavor to ensure that trusting relationships are maintained. Leaders will respect the role of the external individuals and organizations that engage in the diplomatic process. Leaders will monitor communications for effectiveness, and they and/or their staffs will be available to explain. Leaders will diligently listen to others in order to hear their concerns and understand their positions. Leaders will understand the need for persistence and patience as they work through identifying pathways forward. Leaders will set the tone for all through how they interact with others, whether it be through informal settings such as meals, formal meetings, and/or written materials. Leaders will maintain focus. Leaders will be problem solvers. In summary, leadership is foundational to arriving at successful diplomatic outcomes.

## Concluding remarks

Multiple states in the US and Mexico and many sovereign Native Nations rely on the Colorado River to meet their water needs. What has always been a complex system in terms of water allocations has become more stressed since the turn of the century. Yet, under adverse hydrologic circumstances, the binational diplomacy efforts of the IBWC have been productive. The burden of water delivery cutbacks has been shared, joint efforts focused on the environment have proceeded, and forward-looking binational, and bilingual technical studies have been undertaken. The 1944 Treaty provided IBWC with a structure for operation and the Minute development framework for interpreting the treaty. Providing the robust structure and framework has been instrumental in the success of IBWC's diplomatic processes.

However, structure and framework only go so far. How the people who make up a cross-boundary institution carry out their responsibilities will determine their success in adapting to changing circumstances. Fundamental to the success of the IBWC is the mutually respectful manner in which the Commissioners, their staffs, and their partners have co-produced knowledge, communicated and formulated strategies and actions. Others can learn from their leadership, mutual respect, and commitment to inclusive processes to address the many water challenges of the 21st century.

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# 44

# FAILED ATTEMPTS TO CONCLUDE WATER AGREEMENTS

## The Case of the Silala

*Otto Spijkers*

**Key Takeaways**

- Historical political tensions between the countries created an unfavorable negotiating environment.
- In this case, contested definitions of the watercourse itself prevented application of standard governance frameworks.
- Legally, local community participation in transboundary water governance is a right under international law, even when it complicates negotiations rather than simplifies them.
- Practically, governance processes that exclude the broader public or appear ad hoc can pose severe issues of legitimacy and contribute to a failure to conclude an agreement.

### Introduction

On June 6, 2016, the Republic of Chile ("Chile") initiated a case against the Plurinational State of Bolivia ("Bolivia") before the International Court of Justice, requesting the Court to confirm that the use of the Silala is governed by general principles of international water law, as developed in customary international law and partly codified in the *Convention on the Law of the Non-Navigational Uses of International Watercourses* (*UN Watercourses Convention*). This convention was opened for signature on May 21, 1997, and entered into force on August 17, 2014. It currently has 38 Parties, not including either Bolivia or Chile. This treaty purports to provide a global framework of principles, norms, and procedures, which can be applied *mutatis mutandis* to all the world's transboundary watercourses, including those situated in Latin America (Sasaki Otani 2021).

The International Court of Justice ("Court" or "ICJ") is the principal judicial organ of the United Nations (UN). Its main task is to settle legal disputes between states, in accordance with international law. Chile requested this Court to adjudge and declare that the Silala is indeed an *international* watercourse, the use of which is governed by customary international law (see e.g., Notini 2021; Kong 2020; Mauludila 2018; Meshel 2017; Vučić 2017; and Kriener 2017). During

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the oral pleadings, it became clear that Bolivia no longer disputed the status of the Silala as an international watercourse, and thus the Court did not have to adjudicate this now undisputed claim. In its judgment of December 1, 2022, the Court reached a similar conclusion about Chile's claim that it was entitled to the equitable and reasonable utilization of the Silala; it was entitled to its current use of the Silala. With respect to Chile's claim that Bolivia had an obligation to take all appropriate measures to prevent and control pollution and other forms of harm to Chile resulting from Bolivia's activities near the Silala, the Court concluded that Bolivia did not contest this obligation either. Only about Chile's claim that Bolivia had breached its obligation to notify and consult Chile with respect to activities that may affect the Silala did the Court conclude that a dispute between Chile and Bolivia still existed. In the view of the Court, the parties disagreed on "the scope of the obligation to notify and consult," "the threshold for the application of this obligation," as well as "whether Bolivia has complied with this obligation when planning and carrying out certain activities" (ICJ 2022: 89). The Court held that both states were required to notify and consult the other about any planned activity that poses a risk of significant harm to the other State (ICJ 2022: 118). In view of the Court, Bolivia had not breached this obligation to notify and consult, because no actual steps were taken to implement most of the plans that Bolivia had developed to exploit the Silala, and those plans that had been carried out were not capable of causing the slightest risk of harm to Chile (ICJ 2022: 127–128). Indeed, as will be described in more detail below, Bolivia has not made much use of the Silala in the past. In its counterclaims, Bolivia first requested the Court to adjudge and declare that it has sovereignty over the artificial channels and drainage mechanisms in the Silala located in its territory, and it has the right to decide whether and how to maintain them (ICJ 2022: 138). Since Chile did not dispute this claim, the Court did not need to address it. In the second counterclaim, Bolivia requested the Court to declare that Chile does not have an "acquired right" to the maintenance of the *status quo* (ICJ 2022: 152). On this point, the Court again concluded that since Chile did not challenge this claim, it need not issue a decision thereon (ICJ 2022: 155). In the third counterclaim, Bolivia alleged that, when it decides to dismantle the channel works on the Silala, the "conditions and modalities for keeping the channels in operation and maintaining the current flow, and the compensation due to Bolivia for doing so, would need to be the subject of a negotiated agreement between the two States" (ICJ 2022: 156). The Court rejected this last counterclaim because Bolivia therein "seeks an opinion from the Court on a future, hypothetical situation," and the Court does not normally pronounce on hypothetical situations (ICJ 2022: 160–162). With the help of this ruling, the two states now need to find a way to jointly manage the Silala waters in the future (Kebebew 2023; Sangbana 2023).

Now that Chile and Bolivia agree that the Silala is an international watercourse, it seems clear that any such settlement needs to take into account in one way or another – depending on the particularities of the Silala – the global principles of international water law. The most important substantive principles of international water law are (1) the principle of equitable and reasonable utilization and (2) the obligation not to cause significant transboundary harm. The first principle confirms all watercourse states' right to an equitable and reasonable share of the uses and benefits of a shared watercourse, and their corresponding obligation to respect the other states' right. In short, it obliges states sharing a watercourse to achieve an equitable and reasonable balance of uses. The second principle obliges watercourse states to take all appropriate measures to prevent significant transboundary harm caused by activities undertaken within their jurisdiction or control. The role of the International Court of Justice in shaping these principles was considerable. Think, for example, of the Court's judgment of September 25, 1997, relating to a dispute between Hungary and Slovakia regarding the Gabčíkovo-Nagymaros Hydropower Dam (ICJ 1997). The dispute has not been finally resolved and is still pending before the Court. Another classic is the

judgment of April 20, 2010, in a dispute between Argentina and Uruguay about Pulp Mills on the River Uruguay (ICJ 2010). And there is the judgment of December 16, 2015, relating to a dispute between Costa Rica and Nicaragua about the construction of a road in Costa Rica along the San Juan River (ICJ 2015).

These substantive principles are complemented by procedural principles that all have something to do with transboundary cooperation – such as the duty to consult, inform, share information, etc. Both the two substantive principles, and the procedural principles, primarily apply in the relationship between the two riparian states, Chile and Bolivia. By focusing on this interstate dimension, as the Court has done, we get the impression that the dispute relating to the Silala is just a high-level political game between politicians of both countries, instead of a dispute about concerns of local stakeholders. Indeed, the interests of local non-state actors are somewhat neglected (Plagemann, Rodríguez, and Destradi 2022: 18).

It is for that reason that this chapter looks at failed attempts to conclude an agreement on the Silala between Chile and Bolivia. This attempt is particularly interesting because of the participation of local groups in the negotiations and drafting process. This participation occurred mostly ad hoc, not in a formal way. Before getting to analyze this process, a brief overview of the past and future uses of the Silala is provided.

## Past and Future Use of the Silala

Before turning to the failed attempt to conclude an agreement on the governance of the Silala, it might be useful to say something about the Silala itself. As mentioned earlier in the summary of the Court's ruling, Bolivia and Chile now both agree that the Silala is an international watercourse. It contains a small river that begins in Bolivia and then crosses the border into Chile. The Silala is situated in one of the driest parts of the world, the Atacama Desert, which explains why it is such an important natural resource for Chile and Bolivia (Cossío Klüver 2021). Bolivia included the Silala waters in its description of the Los Lípez wetlands, which were designated as the "Wetland of International Importance" on June 27, 1990, under the regime of the *Convention on Wetlands of International Importance Especially as Waterfowl Habitat*. This convention was concluded on February 2, 1971, and entered into force on December 21, 1975. Bolivia became a party to this treaty on October 27, 1990, and Chile did so on November 27, 1981.

With this background, we can now begin to consider the past and future use by local actors of the Silala. This section begins with a brief description of the past, then turns to the future, and then provides some concluding reflections.

### *Past Use*

In various public statements, the governor of Bolivia's Potosí region, Félix González, has referred to Chile's "historic debt," echoing the words of his Bolivian President Evo Morales. The argument is that Chile has been using the waters of the Silala for irrigation, consumption, and mining and has done so, without paying, for about 100 years. As a result, according to some Bolivians, Chile owes Bolivia approximately US$1.6 billion (*La Tercera*, April 8, 2011).

To appreciate the "historic debt" argument, we need to look in more detail at the past use of the Silala by local communities and corporations, on both sides of the border. Quetena Chico, a Bolivian community situated around 70 kilometers from the Silala, with a population of approximately 800 inhabitants, has never used the Silala, neither for drinking water nor for agriculture or any other commercial purpose. In a radio interview, a Chilean legal counsel concluded that only

a handful of Bolivian soldiers, placed near the Silala, make use of it (Jara 2019). Most scholars echo this conclusion. For example, Rossi concluded that, in Bolivia, "only a handful of soldiers and stray llamas draw from [the Silala's] headwaters" (Rossi 2017: 57). Indeed, Bolivian llama herders have been grazing their herds in the vicinity of the Silala, and they have provided their stock with water from the Silala wetlands and canals for generations. The Silala is also a stopping point for Indigenous Bolivian travelers to find water on their treks between communities in the region. While it is an exaggeration to conclude that the Silala has been entirely untouched on the Bolivian side, it has not been used extensively.

The situation is different on the Chilean side of the border. Already in 1906, Chile granted a British company, called *Ferrocarril de Antofagasta a Bolivia* (*Railway from Antofagasta to Bolivia*, "FCAB"), the right to use the waters of the Silala. Two years later (in 1908), the Bolivian Prefecture of Potosí gave a similar concession to the same company, this time relating to the use of the Silala waters situated on Bolivian territory. FCAB needed the Silala waters primarily to power its steam-engine-driven locomotives, but it also used the Silala waters to provide its workers and local people with drinking water. The FCAB constructed canals in the Silala to facilitate its work. These canals were mostly situated on Bolivian territory. The canals still exist today. Bolivia insists that these canals make the Silala in some ways a *unique* type of international watercourse. In short, Bolivia argues that the Silala is an "international watercourse with artificially enhanced surface flows" (Bolivia 2022). Even though the channelization works carried out by the FCAB on the Bolivian side of the border had no effect on the direction of flow of the Silala waters, the channels did increase the surface flow of the Silala and decreased the groundwater flow. These are the "artificially enhanced surface flows" that Bolivia is referring to. Be that as it may, it is worth mentioning that the International Court of Justice concluded, in its ruling of December 2022, that Chile and Bolivia agreed that the former "has a right to the use of an equitable and reasonable share of the waters of the Silala irrespective of the 'natural' or 'artificial' character or origin of the water flow" (ICJ 2022: 64).

When giving permission to FCAB to construct these canals, the Bolivian Prefecture of Potosí asked for nothing in return. And thus, FCAB never paid for the Bolivian water, nor did it provide Potosí with any other form of compensation. It is sometimes suggested that the Prefecture was coerced into signing this agreement with FCAB (Klein 2016). However, it could also be that FCAB did not pay for the concessions, neither in Chile nor in Bolivia, because that was the norm at the time, and because there was a public interest in Chile (potable water supply for the city of Antofagasta) as well as in Bolivia (to allow the railroads to use good quality water for the steam engines).

In 1997, Bolivia terminated the Bolivian concession to FCAB. The official reason for the termination was that the FCAB had stopped using steam-engine-driven locomotives and thus no longer needed the water. It is a generally accepted fact that FCAB had replaced its steam locomotives with diesel machines already in 1961. It is thus interesting that FCAB's user rights were rescinded only 36 years later (Bórquez 2014). In that period, Chile, and companies and individuals based in Chile, did use the Silala waters for various other purposes, including the provision of water to a nearby mine and to nearby Chilean communities. The Bolivians now insist that this was never part of the concession (Hache 2003). In 2000, Bolivia granted a concession for the use of the Silala to a Bolivian company Ductec, but this concession was rescinded again a couple of years later.

The Chilean communities of Baquedano and Sierra Gorda, situated less than 300 kilometers from the Silala, have been using the Silala source for drinking water. They are receiving this water at least in part via the Loa River, and much of the Silala water is also taken in by FCAB near the boundary and then sold to Sierra Gorda, more than 150 kilometers away. The Silala flows

into the San Pedro River, which flows into the Loa River, which in turn terminates in the Pacific Ocean. The amount of water that the Silala provides to the San Pedro and Loa rivers is quite small compared to the two rivers' own flows. However, the fact that the Silala waters are mixed with those of San Pedro and Loa waters does not diminish the legal status of the local Chilean communities as stakeholders of the Silala, let alone reduce their participatory rights in the transboundary governance of its waters.

There is also the Chuquicamata copper mine, the largest open-pit copper mine in the world. Finally, in the Chilean city of Antofagasta, some of the Silala water is used for industrial purposes. But this city is situated quite far away on the Pacific coast, and it does have other freshwater resources, including the ocean. Antofagasta has a desalination plant, which currently provides the city with most of its drinking water.

### *Future Use*

This brings us to current and future uses. In 2012, the governor of Bolivia's Potosí region, Félix González, told local media that Bolivia was working on an irrigation system, a hydroelectric plant, a water bottling plant, and the commercial development of trout in the waters of Silala (*La Tercera*, October 14, 2012). In fact, in his capacity as president, Morales officially opened the Silala trout farm in 2013 (Bórquez 2014), but this farm is no longer in operation. In the view of Félix González, Bolivia could undertake all these activities without consulting with its neighbor Chile, because "these are our waters, we are not stealing anything from anyone" (*La Tercera*, October 14, 2012). Thus far, Bolivia's proposed uses have not developed beyond plans. Currently, the occasional llama herders and travelers are still the only ones using the Silala waters in Bolivia.

This happens to be the main reason why the Court, in its ruling of December 2022, concluded that Bolivia had not breached its obligation to notify and consult Chile (ICJ 2022: 127–128), as "no steps were taken to implement the plans to allow the Bolivian company DUCTEC to use the waters," "no action was taken in respect of the projects to build a fish farm, a weir and a mineral water bottling plant," and "the ten small houses that were built […] have never been inhabited." Thus, the Court determined that "only the military post was in fact built and put into operation" but that this post was "modest," and Bolivia had taken "all necessary measures to prevent the contamination of the Silala and its waters" (ICJ 2022: 127).

It is worth noting in this context that Chile and Bolivia agreed, when appearing before the Court, that "it is entirely within Bolivia's sovereign powers to dismantle the channels and to restore the wetlands in its territory in conformity with international law" (ICJ 2022: 75).

## Initial Agreement on Silala

Before the proceedings before the ICJ were initiated, several attempts were made to conclude an agreement between Chile and Bolivia relating to the joint management of the Silala waters. Most notably, between 2001 and 2009, Chile and Bolivia tried to agree on a common understanding of the status and use of the Silala. A draft agreement was produced on July 28, 2009, after years of mainly inter-state negotiations (Caffi 2012). This so-called *Acuerdo inicial sobre el Silala* (*Initial Agreement on Silala*) was meant to be an interim agreement, a first step toward the conclusion of a final and binding agreement between Chile and Bolivia relating to the "preservation, sustainability, use and exploitation of the Silala […] to benefit both countries" (Article 1, *Initial Agreement on Silala*). In this agreement, both states recognized the need to perform scientific studies to better understand the nature of this complex water system, which is not a traditional watercourse. The

agreement also covered the groundwaters. Unfortunately, the *Initial Agreement on Silala* never entered into force.

One scholar, Héctor Marcelo Angles Larrea, was so disappointed that he decided to draft a better agreement himself (Larrea 2012). Other scholars tried to encourage both states to sign the agreement, because they felt that it was better to have a flawed agreement than to have no agreement at all, considering that political tensions might otherwise turn into a "water war" (Winkelman Guzmán 2010). These scholars had no formal role in the negotiation process; they simply tried to exert influence through their academic publications. But that plea was to no avail.

The local authorities of the Bolivian Prefecture of Potosí and the Potosínista Civic Committee ("Comcipo") did participate in the failed negotiations of the 2009 *Initial Agreement on Silala*. At the time, these local actors were not categorically opposed to the proposed arrangement, which stipulated that a new juridical person would be established that was authorized by Bolivia to allocate the Bolivian portion of the waters of the Silala and seek compensation paid to Bolivia for the use of that water. For the same reason, the Bolivian community of Quetena Chico encouraged the Bolivian government to sign the *Initial Agreement on Silala*. At least some of the local Bolivians considered the *Initial Agreement on Silala* an improvement compared with no agreement at all. At the same time, it is said that some of the members of the Potosí Civic Committee initiated a hunger strike, insisting that Chile should acknowledge its "historic debt" for using the Silala waters for purposes other than those agreed upon since 1908 (Horzella 2016). Antonio Bazoberry, in his highly influential, as well as politically and scientifically controversial book on the myth of the Silala, argued that it was a mistake by the Bolivian authorities to allow only the inhabitants of Quetena Chico and Comcipo to have some influence on the negotiations of the *Initial Agreement on Silala*, without consulting the remainder of the inhabitants of Bolivia (Bazoberry 2002).

This unhappy encounter with the participation of local actors clearly demonstrates the considerable challenges the two states are likely to meet when such participation is facilitated again in the future. And they already need to resolve the historical and political tensions that exist between them at the inter-state level. Is this fertile ground for a lasting solution? That appears to be the wrong question to ask, because participation of local actors in the conclusion of a watercourse agreement is not meant to make things easier. Quite the opposite. Local actors simply have a right under international law to participate meaningfully in the governance of a watercourse such as the Silala, even when this might considerably complicate the consultations (Spijkers 2022). Allowing local actors' participation in freshwater governance is not meant to make things easier for the policymakers; it is simply the right thing to do. But ultimately it can also make for a better decision-making process and lead to a better outcome. In other words, the policymaker should always aim for public participation that is both meaningful and effective. Perhaps Bolivia can benefit from some past experiences in handling power relations, with local actors and others, in the co-creation of water policy in Bolivia (Gruberg, Dessein, Benavides, and D'Haese 2022).

## Conclusion

It seems clear that one of the sticking points resulting in the failure of the *Initial Agreement on Silala* was the reluctance of Chile to agree to the compensation demanded by the Potosínos based on the "historic debt" argument. This is a highly explosive issue, which risks obstructing any path toward a lasting solution, but it is also an issue on which local actors have particularly strong views and sentiments. In contrast, the two governments seem not to insist on this point. Indeed, before

the International Court of Justice, it became clear that "Bolivia does not claim in these proceedings that Chile owes compensation to Bolivia for past uses of the waters of the Silala" (ICJ 2022: 71).

So, how influential should these local communities be, or be allowed to be? In other words, is it only the local public, the ones that are most directly engaged with the Silala, that should be included in the governance of the Silala? Or should the broader Bolivian and Chilean public be involved in such participation? Or both? Are there any policy recommendations for governments considering legal actions in a transboundary context that can be drawn from lessons learned in this case study? What would be the general recommendation? It appears that, in practice, the loudest voices have the most influence. However, this will likely result in a failure to conclude a bilateral agreement, as in the case study examined in this chapter.

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# 45

# SAFEGUARDING THE SUNDARBANS MANGROVE FOREST

## A shared commitment for future India–Bangladesh water agreements

*Rezaur Rahman*

**Key takeaways**

- Leverage common concerns for an ecological resource to frame a good entry point for water negotiations.
- Show the importance of resources to the negotiating parties and document the harm to the resource in the absence of an adequate water supply.
- Research agreements made by the parties outside the water sector that might influence the negotiations for the sharing of water resources.

**Introduction**

India and Bangladesh are co-riparian countries in the Ganges-Brahmaputra-Meghna (GBM) basin. They share 54 transboundary rivers of this basin; Bangladesh being situated downstream of all these rivers. Diversion of water from various transboundary rivers by India has caused significant damage to Bangladesh. Especially in the case of the Ganges, the diversion of its water through the Farakka Barrage in India has considerably increased salinity in the Sundarbans, the world's largest mangrove forest, situated at the downstream end of the Ganges delta and shared by India and Bangladesh (Figure 45.1). The increased salinity threatens the long-term survivability of this important mangrove ecosystem, maintaining its unique characteristics.

Bangladesh and India signed a 30-year Ganges Water Treaty (GWT) in 1996. This treaty mainly considered navigation requirements in India and agricultural requirements in Bangladesh. The freshwater requirement for checking salinity intrusion into the Sundarbans was not considered in the treaty. The GWT is expected to be renegotiated at its expiry in 2026. An opportunity has therefore arisen on the diplomatic front to bring this important issue onto the negotiation table during the renewal of the treaty. This chapter describes the damage to the Sundarbans because of

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increased salinity and discusses opportunities for collaboration between India and Bangladesh in saving this shared resource.

The chapter is prepared based on a review of secondary data and literature on the extent of damages to the Sundarbans, exploring a possible pathway to improve the freshwater flow situation to the forest through the renegotiation of the GWT.

## The Ganges River

The Ganges, one of the major rivers of the world, is around 2,500 km long, rising in the Himalayas, passing mostly through India (about 2,300 km), and then flowing into the Bay of Bengal through the Sundarbans (Figure 45.1). Major right-bank tributaries of the Ganges River are in India, including the Yamuna River, and major left-bank tributaries are in Nepal, including the Kosi River. It flows to the Bay of Bengal through Hooghly in India and through Gorai and Padma in Bangladesh. On its way to the Bay, it has shifted its outlet (i.e., distributary channel) eastward over the centuries. At one time, Hooghly was the main outlet, then it was Gorai, and now the main channel meets the Brahmaputra River within Bangladesh and flows on as the Padma River.

The annual flow through the Ganges near the Bangladesh–India border is about 400 billion $m^3$ (World Bank, 2014). The annual flow is highly skewed, with most of the flow (more than 80%) occurring during monsoon months (June–October). Its main distributary within Bangladesh, the Gorai River, carries around 10% of that flow (Chowdhury et al., 1997).

The Ganges basin area of 1 million $km^2$ covers the all of Nepal, almost half of India, and one-third of Bangladesh. Most of the basin area is situated in India at nearly 80%, while Nepal and Bangladesh constitute 14% and 4%, respectively (FAO, 2011). It is the most densely populated river basin in the world, supporting 655 million people, and covers some of the largest irrigated areas in the world, using almost 90% of the basin's water (World Bank, 2014). India is the major user of the Ganges water. Bangladesh has only a small irrigation project, namely the Ganges-Kobadak Irrigation project.

There are many structures, such as embankments, dams, and barrages on the Ganges for flood control, irrigation, power generation, navigation, etc. There are more than 1,000 dams in the basin, although their storage capacities are relatively low (World Bank, 2014). One of the major structures in the basin is Farakka Barrage (Figure 45.1) which diverts water from the Ganges to the Hooghly during the dry season.

## The Farakka Barrage

### *History*

Farakka Barrage is a 2.3-km wide and 109-gate structure on the Ganges just 18 km from the Bangladesh–India border. It was commissioned in 1975 to divert 1,133 cumecs ($m^3$/sec) of water from the Ganges to Hooghly-Bhagirathi River to keep Calcutta (now Kolkata) port navigable. The Bhagirathi was a naturally declining river, but the barrage was constructed to keep the Kolkata port operable. Being fearful of the downstream consequences, the then Pakistan Government started to lodge protests with India in the early 1950s when it came to know about India's plan to build the barrage. Brushing aside the protest, India proceeded with the construction of the barrage in 1961 and completed it in 1971. After its independence in 1971, Bangladesh agreed to India's proposal for a pilot testing of the barrage during the dry season of 1975. Although this testing was supposed to be for one dry season, India continued with unilateral water diversion in the following years.

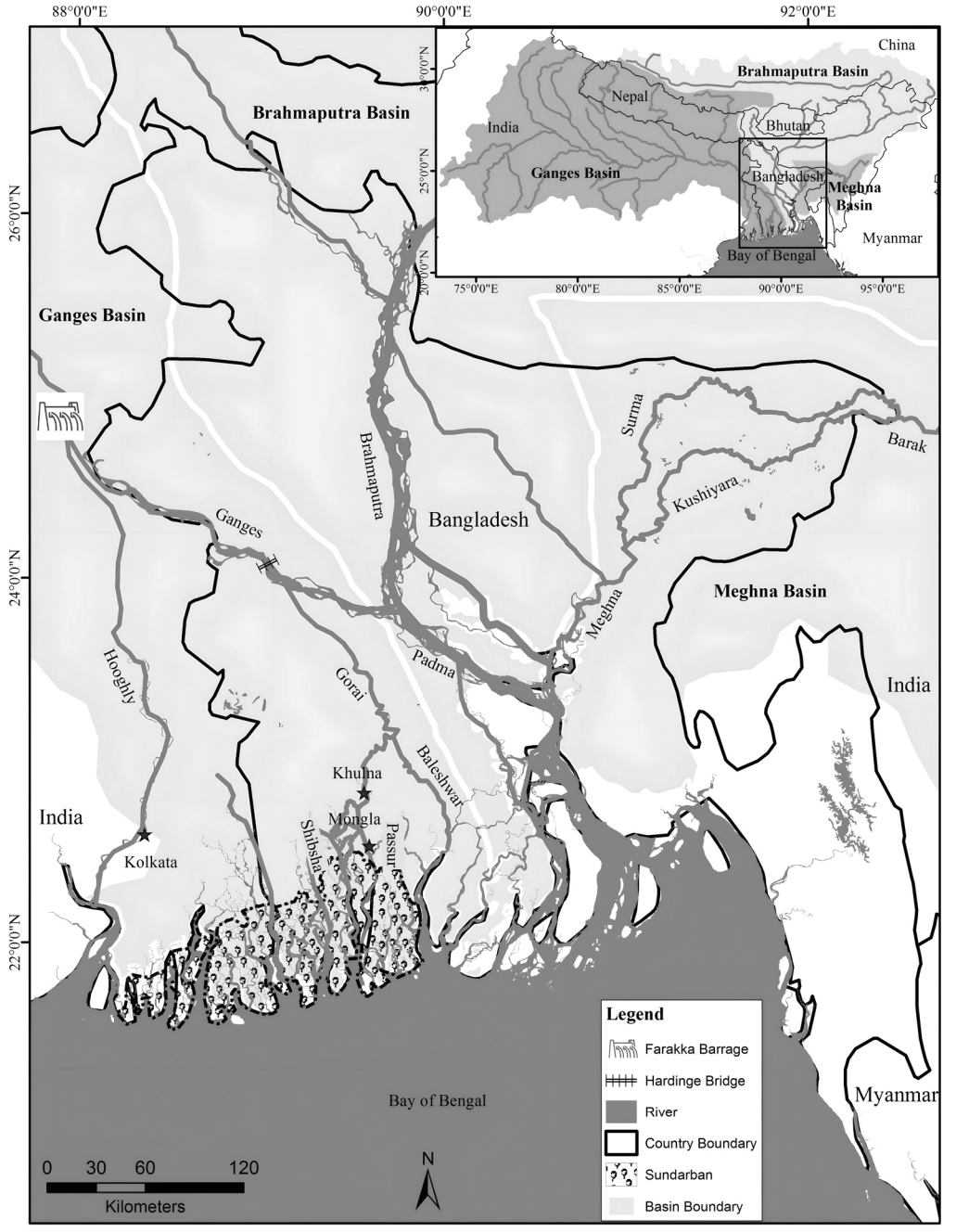



*Figure 45.1* Location of Sundarbans along with the rivers feeding the forest in the lower part of GBM basin.

After a series of negotiations and short-term agreements, eventually, a 30-year treaty was signed in 1996. The entire consultation and negotiation process beginning in 1951 and culminating in 1996, was contentious and time-consuming.

### *Damages in southwestern Bangladesh*

The effect of the operation of Farakka Barrage from 1974 to 1975 on the Ganges flow through Bangladesh was immediate and dramatic. Crow et al. (1995) document the immediate aftermath of the Farakka. In the months of February, March, and April of 1976 and 1977, the Ganges flow was reduced by 45%. The flow through Gorai also fell dramatically. In the months of February to May of 1976, the average flow was only 14% of the historical average.

Flow at the Ganges in Bangladesh was so low and so noticeable that many protests broke out in Bangladesh. Maulana Bhasani, a famous politician of the country at that time, launched a long march toward Farakka on May 16, 1976, and threatened to demolish the barrage (Kawser and Samad, 2016). This event caught wide public and media attention both in Bangladesh and India. Since then, holding public meetings and rallies on dry riverbeds as a sign of protest has become very common.

In the post-Farakka period, the diversion of the Ganges water has caused drastic hydrological changes, as can be seen easily from a mean monthly discharge calculation of the Ganges and Gorai rivers from that period, accelerated aggradation in the Gorai River due to sedimentation and increased salinity in the southwest region of Bangladesh (Mirza, 1998). The study noted that changes in the Gorai River discharge are relatively greater than those for the Ganges River, and a 58% decrease occurred for the May discharge. Virtually no flow condition occurred in the Gorai River during the dry season in many years during the post-Farakka period.

The main damage due to low flow as a result of water diversion through Farakka Barrage has been the creeping salinity in the Ganges delta. During the post-Farakka period, salinity in the southwest region of Bangladesh increased significantly. For example, at the Khulna station (Figure 45.1), the average monthly maximum salinity for April in the pre-Farakka period was about one ppt (parts per thousand). During 1976, when the Gorai discharge dropped to 0.5 cumecs from its pre-Farakka average of 190 cumecs, maximum salinity in April increased to 8.3 ppt (Mirza, 1998).

The reduction in flow in the Ganges and the resultant increase in salinity in the southwest region started to cause various damages. Crow et al. (1995) illustrated the mechanism of damage as shown in Figure 45.2. Industries in Khulna, the second-largest industrial city in the country, started to suffer immediately. Khulna's largest industries included the Khulna Newsprint Mill (the only one of its kind in Bangladesh in the 1970s, now closed), a number of jute mills, and the 60-MW thermal power plant (the only one in the southwest region in the same period). By and large, most of the industries suffered significantly due to the increase in salinity. Mirza (1998) provides some examples of industrial disruption. For example, the Khulna Newsprint Mill required about 300 tons of freshwater daily for its operation. In the post-Farakka period, it had to import fresh-water from a source 40 km upstream due to the unavailability of enough freshwater in the Rupsha River flowing beside Khulna city. The high cost of water importation later compelled the use of saline water for cooling purposes, resulting in frequent leakages of condensers and hampering production. Similarly, the Goalpara power plant had to bring freshwater by barge from 50 km upstream to keep its turbine running. It also used saline water for cooling, which led to corrosion and resulting leakages. In 1981, the plant had to replace relatively new condensers, and power generation had to shut down for several months.

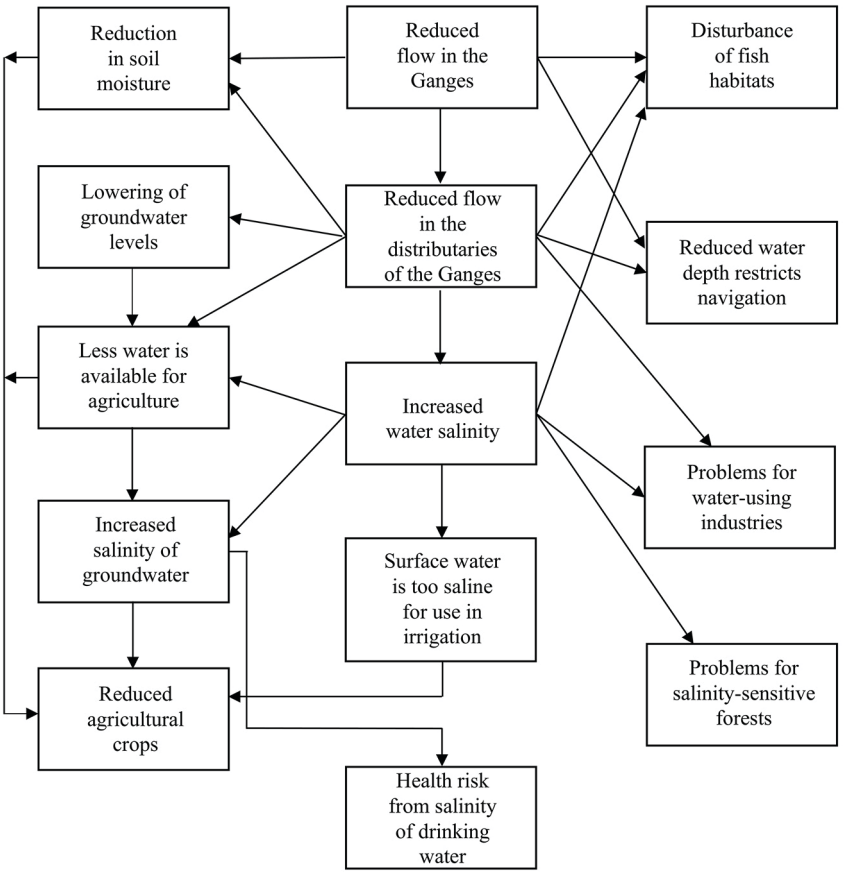



*Figure 45.2* Summary of impact of reduced Ganges flow in southwest region of Bangladesh.
*Source:* After Crow et al. (1995).

Agricultural sector also suffered various damages. Crow et al. (1995) reported that in the immediate post-Farakka period, an official position paper argued that such loss occurred in three ways: first, reduced river flows caused depleted soil moisture, with the result that crop yields were lower. Second, increased salinity in river water may have precluded irrigation, or, if the water was used for irrigation or inundation, crops may have been damaged by the salinity. Finally, farmers may have perceived increased salinity levels or decreased water availability and may, therefore, have chosen to delay planting their crops.

Sundarbans started showing evidence of serious decline because of increased salinity. The above-mentioned position paper claimed that if the freshwater flow were to be reduced further than normal, the equilibrium of the forests could be destroyed, and a long period of change might ensue before a new equilibrium would be established with different species taking over areas of increased salinity. This apprehension proved to be largely true later on (Crow et al., 1995).

In a more recent paper, Murshed et al. (2019) show that water diversion in Farakka is inducing drought-prone conditions in the southwest region of Bangladesh. The reduction in freshwater flow

increased the extent and intensity of salinity intrusion. This freshwater scarcity is reducing livelihood options considerably and indirectly forcing population migration from the delta region.

## The Ganges Water Treaty

### *Framework*

The GWT was signed between India and Bangladesh in 1996 after protracted negotiations. The two countries made the treaty

> being desirous of sharing by mutual agreement the waters of the international rivers flowing through the territories of the two countries and of making the optimum utilization of the water resources of their region in the fields of flood management, irrigation, river basin development and generation of hydropower for the mutual benefit of the peoples of the two countries.

The treaty has a life span of 30 years, ending in 2026. The treaty covers only a dry period (January–May), as flow is sufficient for both countries during the rest of the year. Each country's share of 50% was determined on the basis of historic flow at Farakka. Additionally, each country is due to receive a minimum flow in every alternate 10-day period. This 10-day period is related to the irrigation sequence and is therefore important for agriculture. The needs for ecosystems, environmental flow, or for checking salinity intrusion were not considered in the treaty.

### *After-effects on downstream flow*

Mahmood et al. (2021) report an analysis by the Water Resources Planning Organization of Bangladesh of the discharge in the Ganges at the Hardinge Bridge point and in the Gorai at Gorai railway bridge point during the wet and dry seasons of three distinct periods: pre-Farakka (1934–1974), post-Farakka (1975–1996), and post-treaty of water sharing (1997–2014). The analysis shows (Table 45.1) that the dry season discharges declined precipitously in the post-Farakka period, increasing somewhat after the signing of the treaty. Penny et al. (2020) also found that the treaty increased dry-season streamflow in Bangladesh by approximately 18% and decreased channel salinity in Khulna by approximately 10%.

*Table 45.1* Average minimum discharges of the Ganges and Gorai rivers during wet and dry seasons at different periods

| *River* | *Seasons* | *Discharge in cumecs ($m^3/s$) during specified periods* | | |
|---|---|---|---|---|
| | | *Pre-Farakka (1934–1974)* | *Post-Farakka (1975–1996)* | *Post-GWT (1997–2014)* |
| Ganges | Wet | 4,381 | 3,433 | 5,016 |
| | Dry | 1997 | 865 | 1,004 |
| Gorai | Wet | 704 | 451 | 548 |
| | Dry | 166 | 49 | 66 |

*Source:* Mahmood et al. (2021).

Rahman and Rahaman (2018) found that during the post-GWT period, the monthly maximum, average, and minimum discharges have been slightly increased in the dry season (January–May) compared to that of the pre-GWT period, except May for maximum discharges and March for minimum discharges. But in comparison with the pre-Farakka period, it has been observed that during the post-GWT period, the maximum, average, and minimum discharges have remained reduced by around 23%, 43%, and 65%, respectively, in the dry season. Moreover, the analysis of post-treaty data (1997–2016) by Rahman et al. (2019) indicates that 65% of the time, Bangladesh did not receive its guaranteed share during critical dry periods with high water demand. Thomas (2017) also notes that India is broadly adhering to the Ganges Treaty but unilaterally withdraws water during critical periods of the dry season.

## The Sundarbans mangrove forest

### *The forest*

The Sundarbans forest is the largest mangrove forest in the world. The forest sprouted first some 7,000 years ago on the Ganges delta and has been sustained by the silts carried by the Ganges from the Himalayas. At one time, the forest was much larger, twice as large even in the eighteenth century. But much of that has been cleared for agriculture. Currently, the forest stands at 10,000 $km^2$, 60% of which lies in Bangladesh, and 40% in India.

The entire forest is a mosaic of numerous islands of salt-tolerant trees, mudflats, and tidal rivers. Much of the forest lies within 1.0 to 2.5 meters above mean sea level. The entire forest is inundated twice a day with the high tide.

In the Indian part of the Sundarbans, most of the rivers that used to nourish the Sundarbans ecosystem have been disconnected from their upstream sources and become defunct with the passage of time. Although Hooghly is the main river of the region and forms the western border of the Sundarbans, hardly any significant amount of water enters the Sundarbans through the present active channels and canal networks (Hazra et al., 2015).

The Bangladeshi part is dominated by the freshwater flows from the Ganges, Brahmaputra, and Meghna rivers. Compared to freshwater flow to the Indian side of the forest, freshwater flows are much larger on the Bangladesh side, particularly through the Baleshwar River on the eastern side of the Sundarbans (Figure 45.1). Gorai is the main source of freshwater flow to the Sundarbans from the Ganges. The freshwater carried by it is distributed to Passur-Shibsha (85%) and Baleshwar (15%) rivers (Islam and Bhuiyan, 2018). The flows are highly seasonal.

The freshwater flows from upstream and the tidal ingress from the sea results in a gradient of salinity that varies both spatially and temporally. In general, the salinity is higher nearer the coast in the south, while the water is nearly fresh on the northernmost boundary of the forest. Similarly, the salinity increases from east to west. The eastern part of the Sundarbans in Bangladesh is oligohaline (<5 ppt of salinity), benefitting from freshwater flow from the Baleshwar River, whereas most of the Indian Sundarbans are polyhaline (18–30 ppt) (Gopal and Chauhan, 2006). Because of the high seasonality of flow, salinity also varies seasonally – the salinity during the dry season is considerably higher in comparison to the wet season.

In the transboundary Sundarbans, the diversity of mangroves is the same in India and Bangladesh, but their distribution is conspicuously variable across the boundary primarily because of differing salinity regimes (Mandal et al., 2019). The Sundari tree, the iconic tree of the Sundarbans, is a freshwater-loving species. Because of the higher salinity in the Indian part, it has

almost disappeared, whereas luxuriant growth of this species can still be found in the Bangladeshi part (Hazra et al., 2015).

The Sundarbans play an important role in the economy of the southwestern region of Bangladesh as well as in the national economy. It is the single largest source of forest and provides raw materials for wood-based industries. In addition to traditional forest products like timber, fuel wood, pulpwood, etc., large-scale harvests of non-wood forest products such as thatching materials, honey, beeswax, fish, crustacean, and mollusk resources of the forest take place regularly. The vegetated tidal lands of the Sundarbans also function as an essential habitat, nutrient producer, water purifier, nutrient and sediment trap, storm barrier, shore stabilizer, energy storage unit, and aesthetic attraction (FD, 2010).

More than one million people are involved in the collection of various resources from the Sundarbans, a large majority of which are fishers. As indirect values to local populations, the forests have immense protective and productive functions, which enhance the resilience of the local community for facing adverse impacts of climate change. Various non-timber forest products help generate considerable employment and income generation opportunities for at least half a million poor coastal populations. Besides the production functions of the forest, it provides natural protection to the life and properties of the coastal population in cyclone-prone Bangladesh (FD, 2010).

The dependency on the Indian Sundarbans is even higher as the forest itself is heavily populated. At present, out of 108 islands of the Sundarbans region, 54 are inhabited with a population of about 4.2 million approximately (Ramsar, 2019).

### *Global status*

Both the Indian and Bangladeshi parts of the Sundarbans were declared World Heritage Sites in 1987 and 1997, respectively. In its citation of the Bangladeshi part, UNESCO notes:

> The site supports exceptional biodiversity in its terrestrial, aquatic and marine habitats; ranging from micro to macro flora and fauna. The Sundarbans is of universal importance for globally endangered species, including the Royal Bengal Tiger, Ganges and Irrawaddy dolphins, estuarine crocodiles, and the critically endangered endemic river terrapin. It is the only mangrove habitat in the world for *Panthera tigris* species.

The citation further notes:

> [T]he property is the only remaining habitat in the lower Bengal Basin for a wide variety of faunal species. Its exceptional biodiversity is expressed in a wide range of flora; 334 plant species belonging to 245 genera and 75 families, 165 algae, and 13 orchid species. It is also rich in fauna, with 693 species of wildlife that includes 49 mammals, 59 reptiles, 8 amphibians, 210 white fishes, 24 shrimps, 14 crabs, and 43 mollusks species. The varied and colorful birdlife found along the waterways of the property is one of its greatest attractions, including 315 species of waterfowl, raptors, and forest birds, including nine species of kingfisher and the magnificent white-bellied sea eagle.

In its citation for the Indian part of Sundarbans (Sundarbans National Park), UNESCO mentions:

> [T]he mangrove ecosystem of the Sundarbans is considered to be unique because of its immensely rich mangrove flora and mangrove-associated fauna. Some 78 species of

> mangroves have been recorded in the area, making it the richest mangrove forest in the world. It is also unique as the mangroves are not only dominant as fringing mangroves along the creeks and backwaters, but also grow along the sides of rivers in muddy as well as in flat, sandy areas.

The citation further adds:

> [T]he Sundarbans support a wealth of animal species including the single largest population of tiger and a number of other threatened aquatic mammals such as the Irrawaddy and Ganges River dolphins. The site also contains an exceptional number of threatened reptiles, including the king cobra and significant populations of the endemic river terrapin, which was once believed to be extinct. The property provides nesting grounds for marine turtles, including the olive ridley, green, and hawksbill. Two of the four species of highly primitive horseshoe crab are found here. The Sajnakhali area, listed as an Important Bird Area, contains a wealth of waterfowl and is of high importance for migratory birds.

It notes, however, that the salinity of the Indian Sundarbans, largely due to the eastward shift of the mouth of the Ganges, is being influenced by upstream diversion of up to 40% of the dry-season flow of the Ganges, the repercussions of which are not clearly understood.

The Sundarbans is also a Ramsar site. The Bangladeshi part was designated in 1992, and the Indian part was recognized in 2019. In its citation for the Bangladeshi part, it has been mentioned that the Sundarbans mangrove forest is a hotspot of biological diversity and supports a unique ecological community, which includes a number of terrestrial, aquatic, amphibian, and avifauna populations, including a rich and diverse plant community.

The Sundarbans wetland is the largest Ramsar site in India. The Ramsar citation mentions that the estuaries and creeks in the mangrove forest of Sundarbans act as the breeding ground as well as the nursery of a large number of fish species, prawns, mollusks, and crabs. The mangrove leaves, which decompose slowly in the water, offer food for the larvae, which migrate from the sea into the mangrove estuary to grow up to the adult stage. Mullets or edible fishes, like Bhetki and Bhangon, depend very much on the mangrove forest to attain their adult stage. The site supports at least 87 species of fish.

### *Impact of salinity*

Reduction in flow to the Sundarbans due to the upstream diversion of water through Farakka Barrage and dams upstream has resulted in increased salinity, causing damage to the forest. The increase in salinity over the years is shown in Figure 45.3 for the Mongla station (Figure 45.1), which is closest to Sundarbans, where long-term salinity data is available.

It is seen from Figure 45.3 that the annual maximum salinity, which usually occurs during April/May, was much lower during the pre-Farakka period, such as in 1968. In the post-Farakka period, such as in 1992, the salinity became very high. It is to be mentioned that in 1992, flow through the Gorai River was effectively zero during the dry season. After the GWT came into effect, the salinity fell somewhat but remains much higher than the pre-Farakka period.

Mirza (1998) established a relationship between the low flow of Gorai and salinity at Khulna. Two salinity thresholds for irrigation in the case of average and worst-case situations, respectively, were considered in estimating the discharge requirements in the Gorai and Ganges rivers. The discharge requirements resulting from the analysis indicate that in order to keep salinity below either

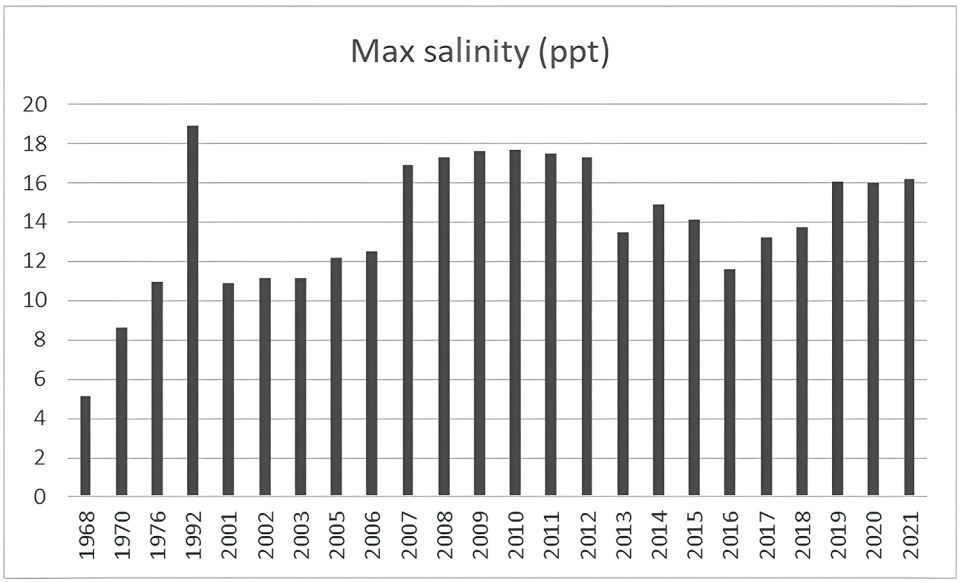



*Figure 45.3* Annual maximum salinity observed at Mongla.
Data courtesy of the Bangladesh Water Development Board; continuous data is available only from 2001.

of the threshold limits at Khulna in the month of April, the Gorai River requires the discharge of 240 cumecs and 158 cumecs, respectively, as opposed to the current 52 cumecs. The estimated requirements are similar to the pre-Farakka mean monthly discharge in the Gorai River.

Haque and Reza (2017) state that in Sundarbans, freshwater-loving species are being replaced by the species of the saline zone. Most of the saline areas are found with small and bushy-typed species that reduce biomass in comparison with their standard volume. The study reveals the effects of salinity intrusion in the Sundarbans, which may affect its compositional, structural, and functional integrity.

Islam and Gnauck (2011) carried out an analysis of salinity for 13 river stations within the Sundarbans of Bangladesh for a time period of 2000 to 2003. Their results showed that only one river exceeded their chosen threshold level in 2000, whereas 11 rivers exceeded the water salinity threshold level in 2003, thus indicating that the river water salinity rate is gradually increasing, and more rivers in the Sundarbans in Bangladesh were affected by rising salinity levels over time.

Rahman (2020) found that Sundari, the pioneer and dominant species, suffers from increased salinity, and its stocks are declining due to intensified "top-dying" disease. Islam and Bhuiyan (2018) found that the top-dying disease of freshwater-dependent species like Sundari has become very common since the 1980s. Thus, top-dying or dieback leads to the death of Sundari trees and consequently to the decline of Sundari in the Sundarbans. This condition starts with a decline or death of foliage and twigs in the upper part of the tree, and gradually the symptoms extend downward. Ahmed et al. (2011) showed that Sundari trees in the northeastern part of the Sundarbans have reduced by 28% from 1989 to 2010.

The Sundarbans forest, while protecting the hinterland from cyclones, gets itself severely damaged. Recovery of the forest depends on various factors. It has been found that recovery depends on salinity also (Billah, 2022). He found that forests in less saline-prone regions regenerate

faster than in higher saline-prone areas. The effect of salinity on forest recovery is very important, especially since cyclones are projected to be more frequent due to climate change.

### *Opportunity for rejuvenation*

In 2011, Bangladesh and India signed a Memorandum of Understanding (MoU) on the conservation of Sundarbans, recognizing Sundarbans as a single ecosystem divided between two countries. The MoU acknowledges that Sundarbans is a World Heritage Site and Ramsar site. Both parties agreed "that an exercise needs to be conducted to identify and catalog the diversity of flora and fauna that are found in the Sundarbans along with their spatial distribution across the countries of Parties. Through this exercise, Parties will determine what areas and species are under pressure, including those facing the threat of endangerment and extinction. The Parties will develop a comprehensive plan to tackle these threats along with a detailed action plan to adapt against perceived threats."

Both parties further agreed to explore joint research and management projects and organize joint tiger estimation at regular intervals. Progress has already been made in this regard, as the first joint assessment of tiger status in the undivided Sundarbans was carried out by scientists from Bangladesh and India in 2016.

There is also global support for joint management. The UNESCO Committee, when it inscribed the Sundarbans of Bangladesh in the World Heritage List, encouraged the authorities of Bangladesh and India to discuss the possibility of creating a trans-frontier site with the adjoining Sundarbans National Park and World Heritage site of India.

During this occasion, the International Union for Conservation of Nature (IUCN) supported the efforts of the Government of Bangladesh to strengthen the management at this site. IUCN reiterated its recommendation for the desirability of combining the Sundarbans World Heritage sites of Bangladesh and India into one single site, which is effectively managed in a coordinated way. IUCN highlighted the "Parks for Peace" initiative, which works on transboundary protected areas and may be applicable in this case.

## Way forward: Road to 2026

The MoU has opened a new window of cooperation between the two countries. Sundarbans is important to both countries, and its most famous inhabitant, the tiger, is the national animal of both countries. But its habitat, the Sundarbans, has degraded significantly, and increased salinity is one of the root causes. It is in the interest of both countries to manage the Ganges flow in such a way as to ensure the sustainability of the forest. There is also global interest as well, as these are globally designated sites.

The cooperation between the two countries is increasing on many fronts. There is now rail transit from the eastern part to the western part of India through Bangladesh. Navigation transit exists from Kolkata to river ports in northeastern India through Meghna, Padma, and Brahmaputra. Bangladesh imports more than 1,000 MW of electricity from India. This is an opportune time to extend cooperation to make this fragile ecosystem sustainable and more resilient.

IUCN (Vasilijević et al., 2015) makes a compelling case for transboundary conservation approaches and promotes an array of innovative methods. The joint tiger count by Bangladesh and India can be taken as an example of transboundary cooperation in conservation. Lee (2015) notes that the institutional framework presented by the Ramsar Convention for the governance of wetlands enables and promotes cooperation, confidence building, and ultimately peace-making between

states sharing transboundary basins through the collaborative management of transboundary wetland ecosystems.

In order to save Sundarbans, adequate water needs to be ensured through the Ganges and, thereby, Gorai in order to check salinity intrusion in the forest. Right now, there is not enough water at Farakka point to meet the dry season's demands of Kolkata port and the Sundarbans. This is why, it is doubtful whether Farakka Barrage has been able to revive Kolkata port. On the contrary, there is now a grievance from upstream states like Bihar about the aggravation of floods due to the barrage, and there are now even demands to demolish the barrage within India (Islam, 2017). Revising the current operation rule for Farakka Barrage under GWT, considering these issues that emerged both upstream and downstream of the barrage since its signing in 1996, has the potential of being a favored solution for both countries. A golden opportunity looms during the expected renewal of the treaty in 2026.

As the GWT expires in 2026, there will be an opportunity to integrate the ecosystem considerations in the negotiation and, hopefully, a new treaty. Various considerations are being suggested. For example, Rahman et al. (2019) suggest the condition of minimum guaranteed share should be removed to reduce the frequency of low-flow events in the future. Pandey (2014) predicts that the future of the Ganges Treaty in 2026 will depend not only on the availability of river water but also on the socioeconomic and political transformation of the region. Samad et al. (2021) advise that during the renegotiation of the treaty in 2026, the needs of dolphins should be considered as the national aquatic animal of India, the Ganges Dolphin, is being affected by the Farakka Barrage. In a similar vein, requirements for Sundarbans and, therefore, tigers can be considered. A closer examination of these considerations and actionable options will create a unique opportunity for mutual gains for both countries by minimizing the damage to the Sundarbans and making it more sustainable. Moreover, the inclusion of Sundarbans – as perhaps the only transboundary ecosystem that has a World Heritage site and Ramsar site on both sides of the boundary – within the upcoming 2026 GWT negotiations can serve as an example of how to operationalize water diplomacy processes and tools for effective transboundary water cooperation.

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## SECTION VII

# Case Studies at the Subnational Scale



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# 46

# URMIA LAKE RESTORATION PROCESS

## Challenges and applicability of water diplomacy framework

*Jalil Salimi and Mahdi Zarghami*

**Key takeaways**

- Political will spurred initial action but couldn't sustain progress through government transitions due to insufficient institutionalization of governance reforms.
- Technical solutions dominated while social and economic programs were underfunded, limiting long-term behavioral change needed for sustainable water management.
- Despite high-level stakeholder engagement, the process remained hierarchical rather than evolving into true network governance with collaborative decision-making at all levels.

### Introduction

The Urmia Lake Basin (ULB) is one of the six major hydrological basins in Iran, covering an area of 51,876 km$^2$ in the northwestern region of the country (37°44′ N, 45°23′ E). This generally mountainous territory ranges from 1202 m to 3751 m in altitude and spans across three provinces, namely East Azerbaijan (43.4%), West Azerbaijan (47.7%), and Southern Kurdistan (9.8%). The basin experiences a cold semi-arid climate (Salimi and Maknoon, 2018a) and comprises 12 sub-basins that are drained by 17 permanent and 12 seasonal rivers. The Urmia Lake (UL), one of the world's largest hypersaline lakes (ranging from 140 g/l to more than 380 g/l; Zeinoddini *et al.*, 2009), is located within the ULB and holds significant ecological importance, designated as a National Park, Ramsar Convention Site (1971), and a UNESCO Biosphere Reserve (1976).

UL experienced a considerable drop (about 8 m) in water level between 1996 and 2016, leading to a 70% loss of lake area (Danesh-Yazdi and Ataie-Ashtiani, 2019). Both anthropogenic activities and natural factors have widely been believed to be the main causes of UL drying (Fathian *et al.*, 2016, Fazel *et al.*, 2018). Long- and short-term climate variabilities such as a trend of increasing temperatures and droughts in the late 1990s and early 2000s affected the lake (Fathian *et al.*, 2016, Fathian, 2019, Azizifard *et al.*, 2020, Dehghani *et al.*, 2020). However, the leading cause for the lake's drying is still controversial; no significant trend in long-term annual precipitation was observed in most stations in the basin (Fazel *et al.*, 2018). Many studies believed that

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anthropogenic factors have caused the decreasing inflow to the lake. These include an expansion of the irrigated agricultural lands and consequently over-exploitation of surface water and groundwater in the agriculture sector; the increasing cultivation of water-intensive crops such as sugar beet and alfalfa; an inefficient irrigation system (about 40%) (Hassanzadeh *et al.*, 2012, Zarghami and AmirRahmani, 2017); excessive dam construction; and the transfer of water from Zarrineh Rood River to Tabriz for drinking water in 1999 (Faramarzi, 2012, Fathian, 2019, Azizifard *et al.*, 2020). In sum, the role of human-related activities and mismanagement in the drying up of the lake exceeds climatic and natural factors, and the crisis of lake shrinkage is therefore a crisis of water governance.

The drying of UL has resulted in severe challenges for the environment, society, and health in the region. These include the desertification of the national park (Hassanzadeh *et al.*, 2012); damage to ULB ecosystem services, such as water availability and local climate regulation (Alizadeh-Choobari *et al.*, 2016); increased salinity affecting the *Artemia urmiana* (Ahmady-Birgani *et al.*, 2020); and aquatic biodiversity loss leading to a decline in the number of local and migratory birds (Hassanzadeh *et al.*, 2012). Additionally, dust storms threaten local inhabitants, Urmia Islands' wildlife, UL biological value, orchards, and agricultural lands near the lake (Schmidt *et al.*, 2021). The drying of the lake also affects the region's socio-economic conditions, causing damage to the tourism sector as well as horticultural and agricultural lands (Ahmadi *et al.*, 2016). The drop of 40 cm in lake's level annually during the period 1994–2013, a drop in level not observed in 3,000 years, combined with the aforementioned reasons, led to public protests. Protesters in the cities of Tabriz and Urmia on August 27 and September 3, 2011, demanded the government take urgent action (Salimi *et al.*, 2019).

In 2013, a national committee comprising all water-related governmental entities and agencies was established to develop a comprehensive roadmap for restoring the lake. After nearly a decade, it is time to evaluate the process and draw lessons from it. This chapter will assess the lake restoration process through the lens of water governance and water diplomacy, looking to answer whether this process has improved water governance in Iran. The chapter will describe the restoration process, evaluate water governance, and discuss water diplomacy during the UL restoration process.

## Urmia Lake restoration process

The continuous drying process of UL and its adverse consequences for inhabitants residing in the neighboring regions led to the signing of a 5-year Urmia Lake Comprehensive Management Plan in 2008. However, despite forming an executive committee, many of the 24 projects to restore the lake had not been implemented by 2013 due to the lack of budget (ULRP, 2016).

The UL restoration process began with the establishment of the Urmia Lake Restoration National Committee (ULRNC) in 2013. This committee brought together all water-related governmental bodies in Iran, including the Management and Planning Organization of Iran (MPO), Department of Environment (DOE), Ministry of Energy (MOE), and Ministry of Agriculture-Jahad (MAJ), to restore the lake. The ULRNC decided that the concerned institutions and organizations should implement the restoration projects, while the Urmia Lake Restoration Program (ULRP) should undertake monitoring and evaluation, facilitate budgeting and planning, and coordinate all executive partners.

The ULRP, as the secretariat of the ULRNC, is responsible for providing the necessary information and data for making decisions by the ULRNC and for monitoring and evaluating the

*Table 46.1* Restoration efforts timeline

| *Year* | *Events* |
|---|---|
| 2008 | Signing the 5-year Urmia Lake Comprehensive Management Plan |
| 2010 | Forming an executive committee |
| | 24 projects came under consideration but had not been implemented by 2013 due to the lack of budget |
| 2011 | Iranian parliament's disagreement with allocating funds to the UL led to social opposition |
| 2013 | Establishing ULRNC and selecting 27 high-priority projects |
| 2014 | Starting the ULRP activities |
| | • Establishing a Planning and Resource Mobilization Unit (PRMU) |
| | • Establishing 6 technical committees and 20 task forces |
| | • Preparing the roadmap |

implementation of the projects by the organizations that are members of the ULRNC. To carry out these tasks, the ULRP established a head office at the Sharif University of Technology, provincial sub-offices in East and West Azerbaijan, six technical committees, and 20 task forces. The ULRP has identified 27 projects that need to be implemented to restore UL, including water transfer from other rivers and dams, increasing agricultural water use efficiency, and promoting sustainable tourism. In 2016, the ULRP reported that only 5 out of the 27 projects had been implemented, while 12 projects were ongoing, and 7 projects had not yet started due to budgetary constraints. Despite these challenges, the ULRP and its partners remain committed to restoring UL and improving the lives of those who depend on it (Table 46.1; ULRP, 2015).

ULRP initiated the development of a restoration roadmap. After gathering input from various experts and taking into account a water level of 1274.1 m above sea level as well as the salinity tolerance threshold for *Artemia* (Abbaspour and Nazaridoust, 2007), the most effective measures were selected as part of the roadmap. The first version of the 10-year program, which includes three phases (Stabilization, Restoration, and Final Restoration), was approved by ULRNC on June 29, 2014. During the Stabilization phase (2014–2015), urgent measures were implemented to halt the lake's drying process, such as ceasing excessive dam construction, monitoring reservoir operations, closing irrigation gates in off-irrigation season to direct water to the lake, reducing water allocation to the agriculture sector by 40% from reservoirs, and dredging the feeding rivers of the lake. The focus of the Restoration phase (2015–2022) was to implement the main measures to gradually raise the UL level. A total of 53 structural projects were executed between 2014 and 2021 to restore the lake. The Final Restoration phase (2022–2023) aims to sustainably stabilize the revived condition. The restoration measures are categorized into six main packages as shown in Table 46.2. Additionally, ULRP estimated the amount of water that would reach the lake and the timeline for each measure's implementation to demonstrate a tangible work process and increase stakeholders' participation. The UL restoration roadmap quantitatively determines each program's contribution to raising the lake's level, which is a novel experience in the country.

At the end of the 12th Iranian government (2021), despite the efforts made by ULRP to restore UL and a slight increase in water level, the desired levels had not been reached, even after implementing numerous restoration programs and spending a considerable amount of money. This suggests that the restoration process has not been successful in achieving its intended goals.

*Table 46.2* UL restoration measures (ULRP, 2014)

| *No.* | *Plans* | |
|---|---|---|
| 1 | Increasing water productivity and 40% reduction of water consumption in the agriculture sector | • Reducing in five years 40% of the allocated ground and surface water to the local farmers by the MOE<br>• Planning for enhancing the productivity of water in the agriculture sector by the MAJ<br>• Allocating funds and supplying required technologies by the government to increase the efficiency of the remaining water usage.<br>• Ban the sale of sugar beet roots to factories outside the province of West Azerbaijan |
| 2 | Water supply from new water resources | • Appropriation of required funds and acceleration of inter-basin water transfer to UL<br>• Transferring treated wastewater into UL from the surrounding towns |
| 3 | Control and reduction of surface and groundwater resources withdrawal in ULB | • Prevention of increasing water consumption and new development projects, especially in the agriculture sector (no new water allocations)<br>• Prevention of unauthorized withdrawal of surface water<br>• Stopping all under-study and under-construction dams (except Cheraghveis and Shahid Madani reservoir) and Irrigation water network projects<br>• Improving the current conditions of the wells in ULB and installing smart water volume counters to record and monitor water withdrawal amounts<br>• Performing the necessary coordination with the judiciary to facilitate and accelerate the law's implementation regarding illegal wells |
| 4 | Studies and software measures | • Conducting a cadastral survey for ULB Lands<br>• Developing and implementing a comprehensive training program, capacity building, raising awareness, and getting public and local community participation to illustrate the consequences of the current critical situation and the necessity of reviving UL<br>• Designing and implementing a comprehensive decision support system (DSS) in ULB<br>• Evaluating Shahid Kalantary causeway's effects on UL ecosystem and providing constructive solutions<br>• Feasibility study on salt mining and industrial utilization considering environmental aspects<br>• Establishment of Urmia Lake Future Research Center (Coordination, Monitoring, and Future studies of UL, which is called "Mahpad" in Persian) by DOE<br>• Assessing the vulnerability of health, hygienic, social, and environmental problems caused by the drying of UL<br>• Preparation of a program to increase employment and alternative livelihoods by the relevant agencies<br>• Feasibility study on new technologies' application for the sake of UL restoration<br>• Feasibility study on inter-basin water transfer from the Caspian Sea to UL |
| 5 | Preventing and mitigating the negative impacts | • Identification of dust sources and their stabilization<br>• Study and implementation of ecological protection programs in Urmia National Park with priority given to the southern part<br>• Identification of halophyte species well-adapted to ULB conditions and planting selected ones to rehabilitate the degraded salt marshes around the lake |

*Table 46.2* (Continued)

| *No.* | *Plans* | |
|---|---|---|
| 6 | Facilitate and increase the volume of water entering the lake through structural measures | • Water transfer from rivers to the lake via releasing water from dams at an appropriate time<br>• Water transfer from Hasanlu reservoir to islands and wetlands located in UL borders and opening waterways feeding southern wetlands<br>• Identification of influential factors affecting major rivers leading to the lake through watershed management to increase the recharge rate from rivers to the lake |

With the change of government and the restructuring of the MOE, there was a notable shift in the approach to lake restoration. This reorganization, including the relocation of the central office of the ULRP from Tehran to the West Azerbaijan Governorate, initially caused a temporary halt in the ongoing restoration initiatives. Consequently, several previously planned projects were put on hold, resulting in a significant setback for the restoration efforts.

As a consequence of these changes, the lake faced a dire situation, currently holding a mere 4% of its original water capacity. This critical reduction has led experts and environmentalists to warn of an impending ecological disaster, with the lake being on the brink of irreversible collapse. Despite this alarming scenario, the government has managed to complete only one significant project amid this restructured approach: the water transfer project aimed at replenishing UL.

This single initiative, while demonstrating the new government's commitment to the restoration cause, remains insufficient in the face of the urgent need for comprehensive action. While this project represents a glimmer of hope for the lake's rejuvenation, the prevailing circumstances underscore the urgent necessity for swift and robust measures to save UL from impending ecological collapse.

However, it is not the aim of this chapter to solely focus on the reasons for governance change. Instead, this chapter seeks to evaluate the water diplomacy process involved in the restoration program. First, the water diplomacy framework will be utilized to explore the process further and identify any strengths and weaknesses. By analyzing these processes, we can gain a better understanding of the challenges faced in managing and restoring the UL and identify potential areas for improvement.

## Water diplomacy framework

Water diplomacy is a framework for managing and resolving water-related conflicts between and within nations. It involves the use of diplomatic strategies and tools to achieve mutually beneficial outcomes and sustainable management of shared water resources. The framework consists of four key components: mapping the problem space, architecting the process, managing the process, and institutionalizing progress (Islam and Susskind, 2012).

1. Mapping the problem space: This component involves understanding the nature and extent of the water-related conflicts and challenges faced by different stakeholders. This includes analyzing the socio-economic, political, legal, and environmental factors that

contribute to the problem. It is important to identify the stakeholders involved and their interests, concerns, and priorities. This step also involves assessing the availability, quality, and quantity of water resources and their management by using joint fact-finding processes.
2. Architecting the process: Once the problem space is mapped, the next step is to design a process for managing and resolving the water-related conflicts. This involves identifying the most appropriate diplomatic strategies and tools to use, such as negotiation, mediation, arbitration, or legal mechanisms. It also involves developing a roadmap for achieving the desired outcomes and defining the roles and responsibilities of different stakeholders.
3. Managing the process: This component involves implementing the water diplomacy process and managing the interactions and negotiations between stakeholders. This includes building trust and relationships, maintaining open communication channels, and fostering a collaborative and cooperative approach. It is important to ensure that the process is transparent, inclusive, and participatory, and that the interests and concerns of all stakeholders are taken into account.
4. Institutionalizing progress: The final component of water diplomacy is to institutionalize the progress made in managing and resolving water-related conflicts. This involves creating formal and informal mechanisms for ongoing dialogue, cooperation, and conflict resolution. It also involves establishing institutions and governance structures that support sustainable management of shared water resources. This includes developing policies, laws, and regulations that promote equitable and efficient allocation and use of water resources, as well as building capacity for monitoring and managing water resources.

In sum, by using this framework, stakeholders can work together to manage and resolve water-related conflicts in a collaborative and sustainable manner.

## Water diplomacy during the Urmia Lake Restoration Program

On July 2–3, 2015, a two-day workshop was held entitled "Can Water Diplomacy Enable a New Future for the Urmia Lake?" It was sponsored by Tufts University's Institute of the Environment, the Geological Survey of Iran, the Massachusetts Institute of Technology (MIT), the University of Tabriz, the ULRP, and the Water Engineering Research Institute of Tarbiat Modares University. During the workshop, participants discussed the importance of water diplomacy in the restoration of the UL. They highlighted the need for a collaborative effort among different stakeholders, including government agencies, non-governmental organizations, and local communities. The participants also discussed the impact of climate change on the lake and the importance of incorporating climate change adaptation strategies into the restoration efforts. Some of the suggestions that were discussed during the workshop are as follows:

1. Build trust among stakeholders: Participants emphasized the importance of building trust among all stakeholders, including government agencies, NGOs, local communities, and businesses, to achieve a sustainable solution for UL.
2. Adopt a holistic approach: A holistic approach that considers the environmental, social, and economic aspects of UL is essential. Participants suggested implementing a collaborative, integrated water management framework that considers the entire river basin and all its stakeholders.

3. Increase public participation: Participants agreed that increased public participation is crucial for the success of any sustainable solution. Stakeholders need to engage with local communities and seek their input and feedback on policies and decisions affecting UL.
4. Foster regional cooperation: Participants emphasized the need for regional cooperation and collaboration to address the challenges facing UL. They suggested establishing an international platform for water diplomacy to bring together all stakeholders and facilitate dialogue and negotiation.
5. Utilize innovative technologies: Participants suggested leveraging innovative technologies, such as satellite imagery, remote sensing, and real-time data, to monitor water levels, track changes in land use, and improve decision-making.

Overall, the workshop concluded that water diplomacy can enable a new future for UL by fostering collaboration and cooperation among all stakeholders and adopting a holistic, integrated approach to water management. The workshop concluded with a call for continued collaboration and the creation of an official committee to focus on water diplomacy in the restoration of the UL. Notwithstanding, upon examining the list of restoration initiatives, it is evident that no formal mechanism for water diplomacy was in place among the UL restoration programs. This workshop was later continued by the University of Tabriz and a newly established NGO, entitled Azerbaijan Water Diplomacy Room. The aim of those meetings was joint fact-finding, networking, and value creation, usually by the attendance of the experts and also stakeholders. However, if we expand our understanding of water diplomacy beyond the official level and focus on the concept of solving water issues through dialogue, we can identify many instances in which water resource management problems were resolved through discourse-oriented mechanisms and various water diplomacy tools during the restoration process of UL. In this chapter, we will describe the water diplomacy-related activities in the restoration program with a view to water diplomacy processes, which includes mapping the problem space, architecting the process, managing it, and institutionalizing progress. We will consider the entire restoration process as an integrated package and take a holistic view of the process.

### *Mapping the problem space*

Before the UL restoration process began, the primary issue was the rapid drying of Lake Urmia. Initially, this was an environmental problem, but the lack of attention caused the destructive effects to harm the economy and people's health. People expressed their dissatisfaction in various ways, and protests related to the drying up of Lake Urmia gradually became a platform to express other political demands, which sometimes conflicted with national security. The government was forced to deal with the protests, and the issue of UL restoration was overshadowed by security concerns. Turning an environmental problem into a national security crisis forced the government to consider drastic actions.

From another perspective, the problem was what had caused the lake to dry up and why the government was unable to organize a response and restore it. Studies have shown that the drying up of the lake was related more to mismanagement and inefficient water governance than climate issues. Despite having almost all the necessary resources and regulations at its disposal, the government lacked the capacity to solve this complex and thorny problem.

It was in this context that the restoration process began, and the 11th government (2013–2017) decided to solve these issues by forming a national committee. This committee became the central

place for water diplomacy and was responsible for collaboratively solving the problems as well as using scientific capacities to design the restoration process.

### *Architecting the process*

The government's primary challenge was to devise a mechanism for the restoration of UL. While the MOE initially took charge, other stakeholders blamed it for inadequate management of water resources, which had resulted in the lake's drying up. These actors believed that the system that had caused the crisis could not resolve it. The president was consulted at various levels to appoint another trustee, and he eventually decided to form an extra-ministerial committee and choose someone from outside the cabinet as the secretary. To hold the ministers accountable, the first vice-president became the head of this committee, which was a first for Iran's water governance regime.

The planning phase lasted around six months based on a participatory planning method. The ULRNC facilitated the participation of universities and international experts by establishing the ULRP and designating Sharif University as the secretariat. This resulted in establishing consensus on some primary issues that different stakeholders had been unable to reach a conclusion and common understanding on for years. This was one of the most significant lessons from a water diplomacy standpoint.

Although there was not much innovation in the plans due to the short planning phase, a restoration roadmap was created. The roadmap included 27 main programs, and various ministries were tasked with implementing these programs. The ULRP was responsible for monitoring and evaluating the ministries' performance, reporting the progress of the work to the ULRNC, and facilitating execution.

### *Managing the process*

After developing the restoration roadmap, the stabilization phase measures were implemented. Measures such as halting the construction of dams, dredging rivers, and connecting the Simineh and Zarrineh rivers were put into action. Thanks to the decent rainfall that occurred in the water year 2013–2014, supplying water to the UL stopped the lake's shrinkage process (ULRP, 2017). The hope for restoration came closer to being realized. This phase witnessed several environmental achievements, including reducing salt storms and dust in the region.

After the initial effective measures in the first phase, during the second phase, approximately 30% of the initially planned budget was allocated for implementation, which caused serious problems (ULRP, 2021). The problems were not limited to the lack of funds; spending budgets for purposes other than restoration, and, in some cases, in contradiction to the executive bodies, as well as a lack of accountability to the ULRP, made the situation more complex. Structural measures were allocated the most funds, and social initiatives received only minor funding. Therefore, social programs aimed at improving the livelihoods of local people were implemented less effectively. Efforts to make changes in patterns of cultivation were not very successful.

However, during this time, some successful programs were also carried out. These included measures to increase water consumption efficiency and reduce water consumption in the agricultural sector in some areas, the protection of wetlands, and the promotion of sustainable livelihoods and alternative employment. The implementation of these successful programs helped stabilize areas prone to desertification and dust production, prevent sugar beet cultivation, and establish the Coordinating Council for the Integrated Water Resources Management in the ULB. This council played a pivotal role in determining the ecological water rights for the lake. The council was

responsible for setting regulations regarding the allocation of water to the lake during both wet and dry years. These regulations outlined specific quotas for water release into the lake, ensuring a sustainable water balance during varying climatic conditions.

Overall, due to different challenges and obstacles in the implementation phase, there was a significant gap between the planned objectives and their actual outcomes (Salimi *et al.*, 2019). The ULRP updated the roadmap in 2020, changing the target to achieving a level of 1271.75 m during 2018–2021, considering water quality, ecology, human health, and economy-based metrics, and setting a short-term objective of managing and controlling more than 95% of the areas within the region that are identified as significant sources of dust production (ULRP, 2021).

### *Institutionalizing progress*

When it comes to institutionalizing and making sustainable changes, the restoration process has not been very successful. The failure to fully implement programs has resulted in the lake still exhibiting high-risk conditions, and the committee's effectiveness has been questioned at the political level.

The perspective of learning loops may provide a better understanding of what happened in the restoration process from an institutionalization standpoint. Pahl-Wostl (2009) proposes a conceptual framework for analyzing adaptive capacity and multi-level learning processes in resource governance regimes. Examining the restoration process through the lens of triple-loop learning may provide a more comprehensive understanding.

The fundamental idea behind triple-loop learning is that learning is not a linear process but a loop, and significant changes occur when we change our paradigms and beliefs. Single-loop learning refers to the continuous improvement of action strategies without questioning underlying assumptions. This type of learning results in minor fixes or adjustments to procedures or rules. Double-loop learning involves revisiting assumptions (such as cause-effect relationships) within a value-normative framework. This type of learning leads to changes in decision-making and a deeper understanding of assumptions, such as redesigning an organizational function or structure. In triple-loop learning, one starts to reconsider underlying values and beliefs, worldviews, and assumptions. This type of learning goes beyond insight and patterns to context and results in enhanced ways of comprehending and changing our purpose, thus developing a better understanding of how to respond to our environment.

During the restoration process, some procedures were modified using the feedback system. For example, changes in supporting and funding drip irrigation or electrification of wells are clear examples of single-loop learning. However, there is little evidence of changes in frameworks or assumptions. The lessons and feedback from ULRP did not improve procedures and structures inside other members of ULRNC. Due to the lack of accountability of executive institutions to ULRP, they did not change their behavior dramatically. An example of double-loop learning is the efforts made to change water allocation mechanisms within the MOE. The main weakness of the restoration process has been the lack of triple-loop learning; despite all available tools, ULRNC has not been able to change underlying conditions. While some small changes and improvements occurred, they were not institutionalized and sustained.

Currently, following the recent change in the Iranian government, there has been a notable alteration in the approach to the restoration process of the lake. Many ongoing initiatives aimed at allocating water rights to the lake by releasing water from dams have been abruptly halted. The mechanisms put in place to make critical water resource management decisions have been frequently discontinued. Consequently, decision-making processes concerning the ULB now

resemble those observed in other water basins across the country. Despite certain infrastructure improvements made during the restoration process, the institutional framework required to ensure the sustained progress of the restoration process has not been reinstated. This shift in governance has resulted in a reversion to the previous water governance regime, reminiscent of the system that initially contributed to the crisis faced by UL.

## UL restoration process diplomacy lessons learned

### *Political willingness is the necessary spark to solve problems*

The restoration process of UL serves as a clear example that without political will for reform, no progress can be made. In Iran, most changes begin from the top down. The UL restoration process began when it was made an election slogan of the 11th government. It was later ratified at the Cabinet's first meeting, and the president established the ULRNC and its secretariat to execute the project. Although the work began from the top, its roots can be traced back to the social movements and protests by the people of the Azerbaijan region prior to the 11th government.

### *Participation is the key to success*

In the realm of water governance, stakeholder participation is widely recognized as the key determinant of successful plan implementation (Akhmouch *et al*., 2018). ULRNC demonstrated remarkable progress in this regard by convening all relevant government stakeholders and fostering a collaborative process to develop a restoration roadmap. The outcomes were impressive, ranging from consensus on crucial issues and data to the identification of restoration initiatives and the division of responsibilities among various governmental bodies.

### *Knowledge is a means of persuasion*

Another lesson that can be learned from the ULRP was related to the extensive presence of experts and scientific reports on different topics. Previously, scientific methods and programs were emphasized, but the restoration process was a practical example that demonstrated how knowledge and expertise could be put into the discourse and convince different stakeholders to reach a consensus.

### *Justice is the keyword for providing win-win solutions*

Justice is the basis of governance and water diplomacy. The absence of justice will lead to unsustainable governance. While the country's water governance system has shortcomings in the area of justice, the UL restoration process made significant efforts toward creating intergenerational justice, which proved vital and instructive. The environmental vision driving the restoration process prioritized long-term interests and consensus-building to safeguard the rights of future generations, even at the expense of short-term gains.

### *We also have a university!*

The restoration process provided another lesson on the utilization of universities' capacity, both in terms of scientific knowledge and monitoring the restoration process. Sharif, Tabriz, and Urmia

universities, from among at least 20 universities, played a central role in a national plan for the first time, demonstrating their exemplary performance. This capacity should be further utilized by the governing system. The research conducted by these universities significantly facilitated the process of reaching agreements between actors involved in the restoration program.

### *Regulating and facilitating the duty of the government*

Governance is a complex system of resources and capabilities used to exert influence over a diverse range of governmental, non-governmental, and transnational actors, and regulation provides the practical context for governance. Government interventions that aim to establish public control over service providers to ensure the public interest constitute regulation, which is one of the primary functions of the modern governance system. Along with other functions such as policymaking, redistribution, and facilitation, and the traditional function of providing goods and services, regulation shapes the macro framework of the modern governance system. Rather than controlling and commanding, the regulatory and facilitator government should regulate relations between actors and facilitate others in their pursuits.

During the restoration process, we saw a reorganization of government actors' relations with the emergence of a new actor. However, this regulation was limited to the restoration process and did not extend to water governance at the basin level or changes in national laws and structures. Another insightful point was the ULRP headquarters' facilitation role as an inter-governmental actor, enabling other government bodies to initiate their plans. The Iranian water governance system lacks regulatory and facilitating institutions with the potential to perform such functions, such as ULRP.

### *Environmental problems have the potential to build a shared vision*

The UL restoration process revealed that an environmental vision can serve as a unifying force among diverse stakeholders and foster a collaborative working environment. As such, environmental crises, despite their negative impacts, can also function as a catalyst for bringing people and institutions together to undertake joint actions.

### *Purposefulness and having a plan are crucial for success*

In the restoration process, the success of each plan was evaluated based on its ability to increase the water flow into the lake. This led to the exclusion of several seemingly good and well-intentioned plans that were deemed ineffective in practice, resulting in cost savings. For instance, before the restoration programs of Lake Urmia, the Iranian government allocated significant funds to transition field irrigation methods toward drip irrigation. The objective was to enhance agricultural productivity and reduce water consumption. However, this initiative primarily resulted in an expansion of cultivated land and an overall increase in water usage. Subsequent investigations during the planning stages of the restoration process revealed that allocating more resources solely to this initiative had no tangible effect on elevating the lake's water level. It became evident that for this program to contribute to increasing the lake's water level, it needed to be integrated with other initiatives.

### *The first step: Solving infrastructure problems*

As a developing country, Iran continues to grapple with infrastructure issues. One of the notable steps taken during the restoration process was the improvement of infrastructure, which

streamlined the water supply to the lake and provided valuable data for informed decision-making. The initiatives aimed at enhancing irrigation networks and expanding treatment plants not only contributed to the restoration efforts but also advanced other regional objectives.

### *Improving coordination is equivalent to improving productivity*

Addressing a complex problem like the drying up of Lake Urmia demands coordinated efforts among various executive bodies. The restoration process fostered coordination in policy and planning. Different organizations collaborated to formulate restoration plans, despite having serious conflicts and blaming each other for the crisis prior to this. Although the improvement in coordination did not lead to the resolution of all conflicts, the restoration process demonstrated that involving various stakeholders at least resulted in a consensus regarding the solution.

### *Let monitoring and evaluation stand outside of the government*

The ULRP was primarily responsible for monitoring and evaluating the restoration process, which was a novel task for an intra-governmental body to oversee other government bodies. Outsourcing some of the oversight to universities, which are independent and have fewer corrupt institutions, was also a valuable experience that could be adopted as a supervisory mode.

### *The administrative machinery of the government needs to be reformed*

The ULRP's supervision of the executive bodies exposed numerous issues within these organizations. Although some of these issues were addressed, the majority of the more profound ones remained unresolved. The administrative process is plagued by inefficiency, slowness, and bureaucracy. Improving agility is a crucial reform that should be taken into account within the water governance system.

### *Accountability: Guarantee of implementation of programs*

Establishing effective accountability mechanisms for executive bodies is crucial to ensure the implementation of programs. Through monitoring and evaluation, the ULRP enhanced the accountability of the executive bodies, although some issues remained. The solutions implemented by the ULRP to improve accountability serve as a valuable lesson for future plans across the country.

### *Improving economic conditions is the key to solving environmental problems*

The national economic challenges resulted in a reduction in the budget allocated for restoration plans, which presented a significant obstacle to achieving restoration objectives. Additionally, the poor economic conditions of local farmers hindered their ability to adopt practices that would have reduced water consumption.

In light of the weak economic conditions, the success of programs was highly unlikely. A significant shortcoming of the restoration process was the private sector's weak involvement and the dependence on government resources for funding. The lesson learned from the restoration process is that sustainable resources should be considered to support programs as much as possible.

### #I_am_Urmia_Lake!

Social campaigns demonstrate the hidden power of civil society. The greater the social capital, the greater the chance of success. Social support, monitoring, and demand can increase accountability and stimulate action among responsible organizations. The "I am Urmia Lake" campaign provides an example of these measures. Environmentalists, local residents, and notable figures such as sports stars and actors came together to raise awareness about the lake's plight. This campaign aimed at collecting nearly one million signatures to oblige the United Nations to take action to restore the world's second-largest saline lake. This example demonstrates that with enough social support, even international organizations can be compelled to help.

### *Capacity building and empowerment of local communities*

The restoration process has taught us valuable lessons about working with local communities and building their capacity. However, it is not enough to simply involve them in the process – we must also empower them to take action. Without empowerment, it is unrealistic to expect any significant behavioral change regarding sustainable practices.

### *Continuous improvement and learning cycles are the keys to sustainability*

Improving governance is an ongoing process that requires constant adjustment and refinement of procedures, rules, and structures. While the restoration process demonstrated single-loop learning and reviewed some procedures, other loops were left incomplete due to resistance. To achieve sustainability, we must continue to learn, adjust, and improve.

### *Improving governance is a political process*

One of the obstacles to properly dealing with water governance issues is the attempt to depoliticize and technicalize water issues. The process of water governance is inherently political, which means that solving water problems requires a constructive dialogue between stakeholders and consultation about interests. Depoliticization and making the issue appear purely technical make pursuing interests informal, behind closed doors, and more likely to be associated with corruption. Therefore, by creating transparent mechanisms to express interests, legitimate interests will be expressed, and actors will avoid making illegitimate demands.

### *Solving wicked problems requires innovation*

The water crisis is an inherently pernicious and entrenched problem. Iran is facing various crises, and the convergence and simultaneity of these issues have made the situation even more complicated. These problems cannot be solved with traditional and classic approaches – innovation is vital in identifying problems, providing solutions, and implementing procedures. The formation of the ULRNC can be considered one of these innovations, but it still has shortcomings in providing new solutions or using creative executive records to solve problems (Salimi and Maknoon, 2018b). The proposed plans for the restoration of Lake Urmia were compiled within a relatively short time frame of six months, essentially summarizing previous restoration proposals. It's imperative to recognize that solving complex problems like the restoration of Lake Urmia demands innovative and newer solutions, ones that surpass the summary of previous plans. The

absence of such innovative approaches during the restoration process highlighted the need for fresh and transformative strategies to truly address the complexities and challenges inherent in reviving the void left by the lake's decline.

### *Foresight is a modern management tool*

In today's "VUCA world" (characterized by volatility, uncertainty, complexity, and ambiguity), foresight and futures studies are critical tools for effective management. Sustainable planning must involve trend analysis, identification of key uncertainties and driving forces, and scenarios for different futures. The restoration process taught us the importance of these tools and techniques.

### *Networking is a prerequisite for the sustainable world*

Network governance is a new form of governance, both as a form of management and as a response to concerns related to the failure of hierarchical and centralized administration mechanisms. Network governance brings with it features such as reform of the hierarchical structure of governance, changes in the concept of politics, systematic automation, and a high capacity to solve public issues. In the framework of network governance, it was accepted that public policies are no longer formulated only by the government, but rather a network of connections among politicians, bureaucrats, private companies, pressure groups, and citizens. Exploring the experience of the restoration process shows the dominance of the hierarchical approach over the network approach, but from the perspective of networking among experts, this process nevertheless yielded practical lessons that can be used to reform the country's water governance system.

### *Populism is the enemy of sustainability*

Water-related issues can be used by populist leaders to achieve political goals, but they often do not offer any specific solutions. Politicians may jump on the bandwagon of pledging to increase water provision to attract the political support of villagers and residents of small towns and newly urbanized rural areas. This approach has led to the excessive construction of dams and the destruction of water resources. Changing this procedure and combating this type of populism are burdens that rest on the shoulders of experts and universities. The restoration process can be considered an attempt to stop this kind of populism. Populism may also manifest itself in slogans such as "If the 11th government was not in charge, Urmia Lake would dry up" or "We will restore the lake at any cost." Such slogans cause a gap in trust between the government and local communities.

### *Reforming governance requires reforming thoughts and paradigms*

Changes in water governance will be sustainable when there is a change in mindsets and behaviors at different levels. This is a protracted and continuous process. The restoration process can be considered as an initial step in water governance reform, which has partially reformed the perspective of governance (for example, considering UL environmental water rights). These changes should be ongoing till everyone (politicians, managers, officials, executives, and water users) changes their thoughts and behavior.

## Conclusion

In conclusion, the dominance of structural approaches to water governance has resulted in a significant weakness in understanding water-related social and environmental issues, leading to social crises. Therefore, serious efforts are needed to address the water crisis and reform water governance in the country. Water-related issues must be made a top national priority, and all resources should be mobilized to resolve them. Development goals should prioritize environmental preservation and climate adaptation, and national negotiations should be initiated to address water-related problems.

The UL restoration process has achieved significant milestones across various areas. First, it ensured the involvement of all governmental stakeholders at the top level, fostering consensus on the restoration roadmap. It also embraced a scientific and participatory approach to planning, fostering agreement on primary data and shaping an environmental vision.

Addressing intergenerational justice was a priority, and a new supervisory mechanism was established to oversee progress. Concurrently, there was marked improvement in the institutional environment for NGOs' activities, fostering a positive impact on the overall process.

Integral to the water governance strategy around the lake were substantial investments in water infrastructure and a push for transparency. Execution facilitation by the ULRP, along with measures to halt the drying process and control salt dust, was paramount achievements.

Furthermore, local issues like curbing excessive sugar beet cultivation, enhancing irrigation networks, and reducing water consumption around Hasanlu Dam played crucial roles in the overall restoration effort.

However, weaknesses and challenges also existed. Issues that hindered progress included the improper distribution of power (governmental and centralized), inconsistency and weakness in the implementation of programs due to a bureaucratic and inefficient administrative system, and shortcomings in the conflict resolution mechanism. Other major challenges to the restoration project ranged from a lack of financial resources and weakness in provision and cost methods to low accountability, insufficient attention to social issues, an inability to amend laws, and low flexibility in programs including dealing with uncertainties.

This chapter concludes that despite the valuable measures and important achievements during the restoration process, these efforts have not yet been institutionalized. The fundamental frameworks and assumptions underpinning the Iranian water governance regime require reform. Changes can only be achieved through continuous inter-institutional dialogue, leading to a common understanding of the issues and joint actions. The ULRNC was the venue for these discussions, but mechanisms to promote these discussions at lower levels were not formed, and the government's actions were still top-down and directive. For example, in the restoration process, the government decided to block illegal wells with the help of the judiciary; it also planned to pay farmers in exchange for not planting. Still, there was no success in these measures until the government succeeded in creating sustainable livelihoods. Without finding alternatives that consume less water, farmers will find a legal or illegal way to exploit water resources. Solving the root problems and achieving win-win solutions can only bear fruit through dialogue and the consideration of the interests of all parties.

This study can be considered the first step in identifying and evaluating the role of water diplomacy in the UL restoration process. Further research is required to provide a multi-dimensional view of understanding water diplomacy. Nevertheless, it is hoped that this chapter has been able to provide an accurate and independent picture of water diplomacy in the UL restoration process

and thus contribute to identifying the steps needed to reform the water governance regime in the country.

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# 47

# INDIGENOUS NATIONS, WATER, AND CONFLICT

*M. Alexander Pearl*

**Key Takeaways**

- Provide a framework for understanding the legal position of Indigenous peoples in the context of water rights and resources.
- Encourage stakeholders to move past binary solutions to resource allocation by engaging in diplomacy approaches that are built upon the respect of Indigenous self-determination.
- Suggest collaborative problem-solving from the ground up, rather than the top down, by engaging Indigenous communities early in the process and conducting meaningful conversations that impact solutions.

## Introduction

To begin, there must be a note on terminology. Throughout this chapter, the terms "peoples," "communities," and "nations" will be used interchangeably as the noun designating an Indigenous group. This is done purely for stylistic purposes and to ease readability rather than to designate a distinction between them. The same can be said for the phrases "Native American"—a uniquely American phrasing—"Tribal," "Native," and "Indigenous." These words refer to the first peoples of a place, distinct from the settlers and colonizers who have arrived over history.

Two things must be understood in thinking about Indigenous communities. First, the historical description or perception of Indigenous peoples as a monolithic, interchangeable, and uncivilized and having no difference across tribal affiliation, culture, or geography must be discarded. Every people and place is different and is deserving of being heard. So often interactions with Indigenous peoples are marked by state actors and powerbrokers not listening to the views and possible contributions of Indigenous peoples. Even worse, those unfamiliar with Indigenous communities frequently begin engagements starting from a place of assumptions and stereotypes about who they are and what they need. Second, Indigenous peoples must be accepted as possessing self-determination, deserving the respect and acknowledgement of other policymakers at the local, national, and international levels. Viewing the first peoples of an area as contributors and active governing actors to solving the problem of sharing scarce water resources rather than seeing them *as the problem* is an essential characteristic of a mindset grounded in water diplomacy.


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In order to understand the policy recommendations contained in this chapter, the starting point must be examining the legal history of the United States' treatment of Indigenous peoples. United States jurisprudence on Indigenous peoples has been powerfully influential not just in other common law nations like Canada and Australia, but also beyond. But, law is not static. Recent changes in the recognition of Indigenous peoples and their rights under international law are an important part of obtaining a broad and contemporary understanding of the legal status of Indigenous groups across the world. The early conflicts in U.S. legal history preview the contemporary challenges facing Indigenous peoples from a legal perspective. However, water conflicts are not just derived from legal disputes but emerge from divergent worldviews and value systems. Given the unique connection between Indigenous peoples and their aboriginal, present, and ancestral places—including water at those locales—some attention must be given to the existence of asymmetrical harms endured by Indigenous communities in times of water scarcity, especially when exacerbated by the climate crisis. Once the legal history of Indigenous peoples is in place and an understanding of the distinctive Indigenous relationship to the land is grasped, the recommendations of how to incorporate Indigenous communities into water conflicts are more naturally apparent.

## Indigenous Peoples and Early United States Legal History

The earliest judicial opinions addressing the legal status of Indigenous Nations under United States law are known as the Marshall Trilogy—*Johnson v. McIntosh* (1823), *Cherokee Nation v. Georgia* (1831), and *Worcester v. Georgia* (1832)—written by Chief Justice John Marshall. These opinions formed the foundation upon which the future determinations of all Tribal rights, including water rights, will rest.[1] In addition, consistent with the major theme in this book, these early cases and the historical circumstances that produced them, demonstrate the significant challenges presented by boundary crossing problems. The conflicts that arose in this early time period between Indian Tribes and States are all examples of boundary crossing problems.

In *Johnson*, the Court determined that Indigenous peoples lacked the full panoply of property rights typically associated with ownership. Upon the "discovery" of the "New World," the Court explains, Indigenous peoples lacked the conception of private property and, furthermore, did not use the land consistently with the labor theory of property derived from the enlightenment philosopher John Locke. The Court, as well as hungry land speculators, saw the presence of Indigenous peoples as an obstacle to complete ownership of the resource-rich lands and eventual settlement of the entire continent. Therefore, the Court determined that Indian Tribes possessed a very limited property right—called Aboriginal Title—and the discovering European sovereign had Ultimate Title, which included the sole and exclusive right to extinguish Aboriginal Title by purchase (via a treaty) or conquest. Nonetheless, the Tribal Nations on the North American continent were implicitly recognized as a separate people from the newly formed United States. Robertson (2005) gives a detailed account of the case.

Less than ten years later, in 1832, the Court heard *Worcester v. Georgia*. This case arose in the middle of significant conflict between the southeastern states, like Georgia, Mississippi, Alabama, and Tennessee, and the Tribal Nations still located in their traditional territories. What prompted the legal case was the enactment of a statute by the Georgia State Legislature purporting to extend state law jurisdiction into the boundaries of the Cherokee Nation. Up until this point, the Cherokee Nation, and all other Indigenous Nations, was seen as separate from states and certainly not subject to the application of state laws. Georgia, along with other southeastern states, grew tired of the Cherokee Nation occupying lands within its political territory and passed a law that ignored

the legal reservation boundaries, which were created by treaties enacted between the Tribe and the United States government. Against this factual background, Justice Marshall wrote the opinion in *Worcester* wherein the Court agreed with the Cherokee Nation and held that state law does not apply to Cherokee lands, thereby invalidating the Georgia law. However, with President Andrew Jackson having already set his sights on removing Indigenous Nations to the not-yet-settled western portion of the United States, the next series of treaties to be negotiated with the Tribal Nations located in those southeastern states resulted in their displacement from their traditional homelands and resettlement in the Indian territory, now called the State of Oklahoma.

### *Relevance of United States Legal History to International Indigenous Scenarios*

It goes without saying that the particular laws of nations all over the globe vary significantly between one another, so it might be initially curious what can be gained from an understanding of one nation's legal history. However, United States legal history has been influential with respect to how many nations' laws treat Indigenous peoples. Regardless of whether a particular nation's laws or judicial system refer to the Marshall Trilogy or other aspects of United States law, the broad outlines of the legal and historical conflict between Indigenous Nations and Settler Nations are similar. In general, the experience of Indigenous communities with the United States is roughly representative given the situation of the parties, which reflects what this handbook has termed boundary crossing problems.

In large part, the experience of Tribal Nations with the United States previews the typical points of conflicts encountered by Indigenous peoples all over the globe with respect to water, environment, and natural resources. These conflicts generally map onto the types of boundary crossing problems described in this handbook. First, the *Worcester* case functions as a clear example of boundary crossing problem in the context of political sovereignty. The actions of a settler state—like Georgia, or other nations all over the globe—attempt to carry out a policy of zero-sum sovereignty: either the Tribal Nation exists or the State, but not both. In addition, the *Johnson* case asserts that Tribal Nations lacked conceptions of private property and were not civilized or sophisticated enough to organize their affairs like the nations of Europe. This is another boundary crossing problem, but a cultural one. The settler nation of the United States assumed the Indigenous peoples were savages because the languages, cultures, religions, and governmental structures were unfamiliar. There was no cultural translation of their existence, and the settler nation likely was uninterested in obtaining a more nuanced understanding of Indigenous groups. These experiences of Tribal Nations located within the present United States will likely resonate with Indigenous groups all over the world. Therefore, no matter the underlying legal treatment of the Indigenous/settler relations, boundary crossing problems of the sort defined here likely marked their early interactions—typically to the significant detriment of Indigenous communities.

### *Contemporary International Law and Indigenous Peoples*

International legal systems, and some national legal systems, increasingly recognize the status of Indigenous peoples as separate communities from the larger polity of domestic nations, thereby opening up various legal fora for possible redress. Second, in parallel to the expansion of access to legal fora, the trajectory of substantive law is moving toward confirming the existence of particular legal rights of Indigenous peoples. Most recently and notably, the United Nations passed the Declaration on the Rights of Indigenous Peoples (UNDRIP). This document specifically addresses the unique existence of Indigenous groups across the globe and is the most recent

product of more than five decades of movement in international law. Prior to the UNDRIP, the first international treaty to distinctively address Indigenous peoples was adopted by the International Labour Organization (ILO) in 1957, convention no. 107 (Carpenter and Riley 2014). Later in 1989, the ILO adopted convention no. 169 that more fully recognized the "social, cultural, religious, and spiritual values and practices" of Indigenous communities (Carpenter and Riley 2014). Beyond that, ILO 169 sought "special measures" to be implemented by states in order to protect these rights of Indigenous communities (Carpenter and Riley 2014). Finally, ILO 169 also put forth an expectation that "due regard" would be given by states for the "customs and customary laws" of Indigenous groups and mandated that to implement this approach, states must consult with those communities (Carpenter and Riley 2014). A host of other international documents and treaties acknowledge the unique, and vulnerable, position of Indigenous peoples vis-à-vis settler nations and private parties. Carpenter and Riley (2014) note that in regard to the rights of Indigenous peoples, some of the most important movements toward embracing strong versions of rights come from regional human rights institutions, like the Organization of American States (OAS), and other entities. They also detail the movement from within domestic settler nations to reform laws that recognize critical—and fundamental—rights, like those grounded in property (Carpenter and Riley 2014). There is a clear trajectory in international law confirming the unique rights of Indigenous peoples and implementing those rights at international and national levels. The increasing legal recognition of Indigenous existence is essential to keep in mind when understanding and addressing the boundary crossing problems involving Indigenous peoples.

### *Relevance of United States Legal History to Water Conflicts*

What does the legal history of the early United States have to do with resolving water conflicts? The development of United States law affecting Tribal Nations since the early years of the founding has brought some equity to the determination of water rights. This shift in favor of increasingly recognizing the rights of Tribal Nations to water began well before the recent focus on Indigenous rights stemming from the international law community.

In 1908, the United States Supreme Court rendered a decision in *Winters v. United States*. Created by an agreement in 1888, the Fort Belknap reservation is located in northern Montana within the aboriginal territories of the Indigenous peoples now living on the reservation. When the agreement was written, it simply reserved the land for the Tribes' use and possession, but it said nothing about water. Cattle ranchers in the area had been using water for some years prior to the creation of the Fort Belknap reservation. In the western United States, most states generally follow a common approach to water rights, called the prior appropriation system. Under that system, the first person to put water to a beneficial use has the better right. Water rights are characterized as "senior" and "junior" in relation to one another. When scarcity occurs and there is not enough water for two or more water right holders, the person or entity with the water right bearing the earliest "priority date" will get their full allocation of water, thereby potentially denying junior water users any water.

In *Winters*, the Fort Belknap reservation was to implement large-scale agricultural projects to help spur a reservation-based economy. The amount of water needed for that project would interfere with the present water uses of the upstream cattle ranchers. Since the cattle ranchers had been putting the water to use before the formal legal creation of the reservation, they argued that they should prevail because they were "first in time" consistent with the doctrine of favoring first users of water. The Supreme Court disagreed. In reviewing the document creating the reservation, the Court noted that it did not expressly reserve water for use by the Tribal Nations, but the Court then

looked at the underlying purpose of creating the reservation. When created, the Court determined that the reservation was to be a "permanent homeland" for the Indigenous peoples. Given that the purpose was to be perpetual and to ensure their livelihood, the Court opted to interpret the reservation as including not just the land but also the water necessary to accomplish the purpose of the reservation—providing a permanent homeland. The outcome rendered all reservations that were created for the purpose of providing a permanent homeland (essentially all of them) the earliest, or one of the earliest, water right holders in the region. This creates significant legal leverage for Tribal Nations by rendering them the senior rights holders.

However, *Winters* did not determine the amount of water necessary to accomplish the purpose of the reservation. In 1963, the Supreme Court made determinations in a huge piece of litigation involving states, Tribes, and the allocation of water in the Colorado River. The decision in *Arizona v. California* is relevant here only because it sets forth how to measure the amount of water to be allocated to the Tribal Nation under *Winters*. Given the typical location of reservations in relatively rural areas, the common use of water is for farming and irrigated agriculture. Therefore, the Court held that the amount of water to be allocated is equal to the "practicable irrigable acreage" (PIA) of the reservation. This is a potentially very large quantity of water, and it is arrived at by a simple calculation. Critique of this PIA is common. Nonetheless, this is the majority rule methodology for arriving at an amount of water to which the Tribal Nation is entitled. In reaction to the challenges created by the PIA standard, the State of Arizona follows a different method of quantification. While the state courts of Arizona must follow federal law—including *Winters*—they have developed an alternative approach for quantification, called the Homeland Standard.

Adopted in 2001 by the Arizona Supreme Court in the *Gila River* water litigation, the Homeland Standard is specific to the "needs, wants, plans, cultural background, and geographic settings of the particular reservation." This approach rejects the single-element method of deriving a water quantity from agricultural use—regardless of whether the Tribal Nation has a history of agriculture or has a plan for implementing agricultural projects. This alternative approach exists in part in response to criticism from non-Indians and non-Indian governmental entities that the PIA standard conferred too much water to Tribes without an evidentiary basis. This multifaceted formula requires the Tribal Nation to make a more particularized showing as to the bases for why they need the amount of water requested. This formula also takes into consideration the needs of non-Indian stakeholders, such as population projections for surrounding communities. Despite the rise of the Homeland Standard, nearly all courts quantifying Indian water rights under the *Winters* doctrine have employed the PIA standard for determining the amount of water.

Having a clear sense of the baseline legal principles and positions of Indigenous peoples accomplishes two goals. The first goal is that it helps arrive at an accurate assessment of the relative positions of leverage or power occupied by the parties, thereby permitting parties to engage with each other with clear and correct understandings. For Tribal Nations in the United States, they likely enjoy a strong legal position to demand ownership of the scarce water in question. The growing body of international law parallels the United States jurisprudence, recognizing an Indigenous right to water on protected lands. The second benefit of having a firm grasp of the law is that it helps to answer the more important question: what does the Indigenous community want or need in the context of water?

## Asymmetrical Impact of the Climate Crisis on Indigenous Peoples

For Indigenous peoples, what each community wants is not always the same from place to place. However, there are some general concepts uniquely common to most, if not all, Indigenous peoples.

Fundamentally, for Indigenous peoples the land and the water are not commodities or bundles of legal entitlements. And while they do produce food and give life, aboriginal lands and waters often hold our stories, cultures, histories, and identities in them. This is why removal and forced relocation are much more than just long, difficult journeys with economic consequences—they are acts of cultural, linguistic, social, religious, and political loss. Even for those Tribal Nations who remain on their homelands, water scarcity and drought risk the health of the ecosystems that depend upon them for existence. While this chapter focuses on water, any discussion of water must necessarily relate to climate change, which, of course, exacerbates water scarcity and security matters.

Examples of these differential effects on Indigenous peoples are plentiful. Nearly 100,000 Saami people live on their aboriginal homelands above the Arctic Circle, crossing many nations, and are being forced to abandon traditional lifeways and customs due to the effects of climate change, like rising temperatures and changing precipitation patterns (Kelman and Warg Naess 2013). When the communal acts that have sustained a people for centuries upon centuries are no longer possible, it is not a matter of simply moving one's family to a more suitable location and carrying on. Abate and Kronk describe myriad other significant disruptions to Indigenous communities from the Amazon Rainforest, all across farmlands in Asia, to the coast of Alaska, which is quickly washing away (Abate and Kronk 2013). These are material and sustained disruptions. In the northern region of the State of California, for centuries the Yurok people have called the Klamath River region their home. When drought and conflicts with farmers reduced the water level in the river and resulted in a massive fish kill, it was more than the loss of a wildlife resource. The then Chairman of the Tribe said, "The Klamath is our grocery store, our church and our main highway. It's our lifeline" (Yurok 2017). These are all water problems—and their consequences for Indigenous communities are underexamined and poorly understood.

An attempted imperfect analogy presented itself in the spring of 2019. In Paris, the Notre-Dame cathedral caught fire. Built in the 12th century, it's among the oldest and most impressive structures in Europe and beloved by Parisians, believers, and architects alike. While it was burning, a photographer was able to capture the emotions on the faces of onlookers watching this cultural force burn. Some wept, others prayed, but what is absolutely clear—especially given the media attention devoted to the event—is that the fire was not just about the potential loss of a building. It was more than a building to the city, the nation, the faith, and the art. For Indigenous peoples across the world, our Notre Dames are many. For one Tribal Nation, it is the Klamath River. For another, it is the historic breeding grounds of reindeer herds, or the mounds where our ancestors were buried, or the oceans that hold the wildlife that tell us our stories. Our sacred places are not necessarily built, but they are equally sacred. The basis for the disconnect in understanding the severity of the effects of water scarcity stems from a cultural boundary crossing problem. Luckily, unlike the problem of water insecurity or climate change, this can be solved much more readily with a will to do so. But the core difficulty in resolving this cultural boundary is in listening to Indigenous peoples and, more importantly, incorporating those viewpoints into policy and action. All too often, settler nations and stakeholders are encouraged to give Indigenous peoples a seat at the table of policy and simply take those viewpoints under advisement or a negotiation commences with promises of tradeoffs, subsidies, or exchanges of resources or lands. The Western notion of monetary fungibility and value cannot dominate these discussions, nor can it operate at the core of defining "value" in water.

## Recommendations

The objective for this chapter is to provide policymakers, stakeholders, and community members with a baseline understanding of the various boundary crossing problems that arise in the context of water disputes with Indigenous peoples and some guiding principles to use in bridging the gap. The law plays a large role in bridging these boundary crossing problems because obliging legal compliance makes short work of asking "why?" Nonetheless, there is value in understanding the basis for how the law has come to be the way that it is—both domestically and internationally. And, given the status of the law and its trajectory, policymakers and stakeholders can make better decisions in identifying solutions to water problems.

Understanding where the law is on Indigenous rights informs, or should inform, how states and other non-Indigenous entities engage with Indigenous Nations. First, the United States law recognizes Tribal rights to water within their lands. Second, international law increasingly furthers the legal recognition of Indigenous peoples as self-determining communities entitled to respect under domestic and international law. Finally, it is clear that the detrimental effects of climate change and water security contribute qualitatively different harms reaching beyond economics.

The legal and cultural knowledge provides a starting point to help bridge some early boundary crossing problems. One of the major problems arising in Indigenous vs. non-Indigenous settings amounts to "zero sum sovereignty." This is the idea that one or the other community is entitled to have political and legal respect, but not both. With shared resources, especially when scarce, "zero sum sovereignty" is oftentimes a reflexive and automatic reaction. This type of reaction rejects the legal standing of Indigenous peoples and ignores the weight and trajectory of international law. Therefore, starting from a point of accepting Indigenous groups as legally valid is essential. This is the foundational building block of what this book seeks to create—water diplomacy.

Diplomacy, especially in the Indigenous context, is about meaningful respect and serious relationship building. Creating relationships is the better way to resolve boundary crossing problems based in politics, culture, or faith. Certainly, as this chapter has detailed, courts and judicial institutions can resolve those problems. But, not only are these differences in worldview better solved through relationship building, judicial resolution is always more expensive, more time consuming, and more fragile. Judicial orders are oftentimes narrowly focused on resolving one particular aspect of an injury or issue. Anyone in the field of water resource management understands that water is one facet of the ecosystem that connects with innumerable other interdependent human-made and natural systems. In addition to the narrow focus of judicial intervention, these types of orders and agreements are more likely to be fixed and rigid. Again, ecosystem management demands flexibility—this is all the more true in the context of moving through a world exacerbated by the effects of climate change. Water is inherently complex, interdependent, and flexible—solving its problems requires diplomacy-based intervention that can meet those varied and multifaceted demands. Diplomacy of this sort must be grounded in respect for an Indigenous community's sovereignty and culture. That must come from a place of listening, rather than speaking.

Before thinking about solutions to the problem perceived by settler communities, it is imperative that all parties conceptualize the problem in the same way. Solutions cannot be unified if the problem is perceived differently. As an example, it's very difficult to solve a problem of water scarcity if the only accessible water for an Indigenous community is of substandard quality. The experience of water is different for everyone, and that needs to be sorted out early—through listening and learning rather than talking and telling. For so long, Indigenous Nations have had all manner of historical interactions with settler representatives—good, bad, ugly, and so on. Anyone seeking to

engage with those communities must realize that they are but the most recent participants in a very long conversation with peoples possessing very long memories. Of course, contemporary settler actors cannot be expected to unmake the past, but they can be expected to know it and refuse to repeat it.

Instead of spending human and financial resources on litigation preparation, judicial hearings, and other adversarial proceedings to determine inflexible allocations of water, these resources could be devoted to creating and strengthening relationships as partners in developing solutions. Where a relationship exists, the parties are better able to shift as needed and respond to other issues that inevitably arise. In addition, any solutions to common pool resource problems will require as much buy-in and compliance from as many people and communities as possible. Diplomacy and relationships, as opposed to adversaries and fights, are much more likely to create long-lasting opportunities for workable solutions that actually get implemented.

## Note

1 Comparative analyses of all three cases can be found in Frickey (1993) and Camden and Fort (2009).

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# 48

# SEEING UNDERGROUND

## Understanding Complexity in the Great Basin Groundwater Grab

*W. Todd Jarvis*

**Key Takeaways**

- Groundwater diplomacy spans many domains and scales because science is at the core of the technical, legal, and spiritual dimensions of groundwater occurrence, groundwater use, and groundwater conservation.
- Scientific mediation is a supplemental tool for groundwater diplomacy because multiple working hypotheses serve as the foundation of groundwater science and engineering, thus complicating durable groundwater agreements.
- Pore space diplomacy is part of the groundwater diplomat's toolbox because aquifer storage is also a flexible resource that can be reused many times for the storage of treated water, storage of waste, and the extraction of heat.

### Introduction

Groundwater stored within the GBCAAS has been targeted for development for over 30 years. Two projects, first initiated by the Southern Nevada Water Authority to provide water supplies to Las Vegas, and currently planned by the Central Iron County Water Conservancy District to supplement groundwater supplies serving Cedar City, Utah, constitute the Great Basin Groundwater Grab (GBGG). The GBGG, either collectively or independently, is projected to cause a significant drawdown in groundwater storage along the shared state boundaries in coming decades (Figure 48.1). Groundwater flow systems for both projects discharge to the Great Salt Lake. Water levels in the Great Salt Lake are declining. The dry lake bed is a concern for dust storms along the Wasatch Front and is considered such a threat to the health and safety of the residents of the Wasatch Front that the State of Utah has proposed the concept of constructing a pipeline from the Pacific Ocean to the Great Salt Lake (Maffly, 2022).

The effects of pumping from the projects could also impact Great Basin National Park, Fish Springs National Wildlife Refuge, public rangelands and habitats for various animals, sacred sites, as well as agricultural lands that constitute the identity of many of the borderland rural residents.

Just about everything related to the GBGG is complex. The Great Basin is where the geologic term chaos structure was coined. The hydrogeology is complicated by wide-ranging data gaps


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related to aquifer and flow system characteristics. While the western US is based on the Prior Appropriation water rights doctrine, the nuances between how the various states implement the water rights scheme are unique to each state. Land ownership is multi-faceted, ranging from the multiple use approach of the federal Bureau of Land Management (BLM), to national parks, fish and wildlife refuges, tribal lands and related sacred grounds, to large holdings of private property by the Church of Jesus Christ of Latter-day Saints (Jones and Mayo, 2023). The complex hydrogeology, coupled with the many stakeholder interests, also leads to another layer of complexity through the dilemma of boundaries. Much of the chaos resulting from these complexities may yield innovative approaches to bilateral water cooperation and governance through examination by the Cynefin device used for making sense of complexity in the business sector.

The Water Diplomacy Framework of Islam and Susskind (2012) finds its most immediate application when (1) water is a source of conflict, (2) water is an incentive for cooperation, and (3) operationalizing adaptive water governance and management. While eastern US states grappled with a transboundary groundwater conflict for over 15 years until a decision was rendered in 2021 by the Supreme Court of the United States (SCOTUS), the GBGG has led to a draft agreement on how to share the groundwater between Nevada and Utah that was ultimately tabled by the governor of Utah. Options for adaptive water governance are manifold, ranging from bulk transfer megaprojects, various forms of markets, to a proposed "Pore Space Diplomacy" approach to supplement the Water Diplomacy Framework.

## The Great Basin Groundwater Grab

### *Overview of the Two Pipelines*

#### *Southern Nevada Water Authority Groundwater Development Project*

The Southern Nevada Water Authority (SNWA) depends on the Colorado River, specifically the Lake Mead reservoir, for about 90 percent of its drinking water. The SNWA is the water purveyor for Las Vegas and has constructed three intakes in Lake Mead, the deepest costing $800 million at 600 feet (183 meters) beneath the lake surface. The SNWA Groundwater Development Project was originally proposed in 1989 to pump 217,655 acre-feet per year (0.268 cubic kilometer – see Figure 48.1). The $15 billion project composed of 44 wells and 250-mile (423 kilometers) pipeline to Las Vegas was cancelled in 2020 after three decades of planning and permitting costing $330 million (Solis, 2020; Jones and Mayo, 2023). The question of whether the project will remain cancelled is unknown as the reservoir levels in Lake Mead dropped below the first of the existing two shallower intakes in 2022.

#### *Pine Valley Water Supply Project*

The Central Iron County Water Conservancy District (CICWCD) services Cedar City and neighboring rural communities in southern Utah. The CICWCD service area is dependent on groundwater derived from seven wells and a spring tapping the Cedar City Valley aquifer. The Utah Division of Water Rights suggests that the Cedar City Valley aquifer is overdrafted and has developed a Groundwater Management Plan to regulate water rights, which will be reduced starting in 2035. Cedar City is located near the proposed terminus of the Cedar Valley Pipeline System, one of the many pipeline alignments associated with the proposed Lake Powell Water Supply project that will derive water from the Colorado River, if constructed. The Pine Valley Water Supply

Project proposed in 2020 by the CICWCD to accommodate growth envisions developing 15,000 acre-feet per year (0.018 cubic kilometers) at a cost of $260 million through 15 wells and approximately 70 miles (113 kilometers) of pipelines (Metz, 2022).

### *Stakeholder Assessment*

As part of the Water Diplomacy Framework, Islam and Susskind (2012) describe a stakeholder assessment as an early step in the consensus-building process that is used to identify appropriate stakeholder groups and their representatives. The stakeholder assessment can be conducted at any time during the course of a conflict.

Large water projects are media darlings, and it is only with the nexus of a prolonged drought and unbridled population growth in arid regions that the issues associated with groundwater are coming to the fore. The press is often thought of as an unbiased source of information and a portal for the exchange of ideas and comments derived from the community through letters to the editor and comments on articles. For example, I followed the SNWA conflict through the media to develop one of the case studies described in Jarvis (2014a). But the press can also fuel conflict through biased reporting, both perceived and real, of interviews and editorial review and content. Preliminary stakeholder assessments completed through an analysis of the media and related reviews of Environmental Impact Statements reveal divides between urban and rural factions, but also competing frames between what academics, civic movement activists, and experts think about water, and where politicians and their everyday politics drive decisions on water.

On the basis of the stakeholder assessment summary listed in Table 48.1, the conflict over the GBCAAS spans many scales. Interpersonal and interagency conflicts are common among the scientists and engineers associated with the states of Nevada and Utah, the federal agencies working under cooperative agreements with the individual states and other federal agencies, as well as private consultants working with the NGOs. The intersectoral conflict extends beyond the boundaries of the Great Basin as different state and tribal agencies and legislative bodies are directly and indirectly involved with reviewing and approving the project permit documents, providing technical and educational resources, funding resources, and institutional resources. The situation touches upon the interstate scale when considering the potential of bulk water transfers, transboundary aquifer agreements, and the possibility of having the court system become an arbiter between feuding states such as the recently decided case of *Mississippi v. Tennessee*.

Negotiations between all parties are at a standstill. The BLM paused the environmental review of the project because additional studies and analyses are needed (Lochhead, 2023). One of the requested studies is unusual for a project of this type – an ethnographic study. Ethnographic studies often focus on observation and interaction with residents in their real-life environment. The scope of the requested ethnographic study remains unknown at this time. However, it is reasonable to speculate the ethnographic study may establish the foundations for the different tracks associated with water diplomacy, ranging from official meetings between the states of Utah, Nevada, and tribal governments typical of Track 1 negotiations; unofficial settings for Track 1.5 negotiations between agricultural users, large-tract landowners, municipalities, and environmental NGOs; Track 2 dialogue between the academies and NGOs regarding the existing interpretations of existing data and potential future data collection; and Track 3 discussions on how residents in the border regions interact with groundwater and groundwater development.

*Table 48.1* Stakeholder Assessment for the Great Basin Groundwater Grab

| *Stakeholder* | *Connection to GBCAAS* | *Ideological Considerations* | *Desired Outcome* | *Alternatives* |
|---|---|---|---|---|
| Southern Nevada Water Authority | Municipal water | Sustainable water supply for large metropolitan area | Water for growth | • Lake Mead Water Supply<br>• Conservation<br>• Water & Aquifer Transactions<br>• Importation through Great Basin Water Way |
| Central Iron County Water Conservancy District | Municipal water | Sustainable water supply for growing rural city | Water for growth | • Learn from other bulk water transfer projects<br>• Conservation<br>• Water & Aquifer Transactions<br>• Importation through Lake Powell Water Supply or Great Basin Water Way |
| Beaver County<br>Wah Wah Co.<br>Iron County | • Water rights<br>• Agricultural water | • Protect established water rights<br>• Preserve agriculturalist way of life | • Status quo<br>• Boundaries for management<br>• Confirmation of population and water demand projections | • Lawsuits<br>• Water Trading<br>• Transboundary Aquifer Agreement<br>• Importation through Great Basin Water Way<br>• Retire Lands |
| State of Nevada | • Water rights<br>• Great Basin National Park (only national park in Nevada)<br>• State Engineer Office expertise | Water for state residents and industries | • Beneficial Use<br>• No impacts on surface water<br>• No impacts on groundwater | • Lawsuits<br>• Transboundary Aquifer Agreement<br>• Water Trading & Auctions<br>• Unitization |

(*Continued*)

*Table 48.1* (Continued)

| *Stakeholder* | *Connection to GBCAAS* | *Ideological Considerations* | *Desired Outcome* | *Alternatives* |
|---|---|---|---|---|
| State of Utah | • Water rights<br>• Utah Geological Survey expertise | Water for state residents and industries | • Beneficial Use<br>• No impacts on surface water<br>• No impacts on groundwater | • Lawsuits<br>• Transboundary Aquifer Agreement<br>• Water Trading & Auctions<br>• Unitization |
| Tribal Governments | • Water rights<br>• Bahsahwahbee (also known as Sacred Water Valley or Swamp Cedars) | • Water for tribal members<br>• Preserve sacred grounds | National Monument status for Bahsahwahbee | • Lobby state legislatures<br>• Form coalitions with NGOs |
| Church of Jesus Christ of Latter-day Saints (NGO) | • Water rights<br>• Agricultural water | Water for church farms & ranches | • Status quo<br>• Fact-based decision-making | • Lobby state legislatures<br>• Form coalitions with other NGOs |
| Environmental NGOs<br>• Great Basin Water Network<br>• Utah Rivers Council<br>• Protect Snake Valley<br>• Center for Biological Diversity | • Residents of region<br>• Water stewardship<br>• Protect regional identity | • Nature-based rights<br>• Identity preservation | • Status quo<br>• Honest dialogue about groundwater development projects<br>• Confirmation of population and water demand projections | • Form coalitions with other NGOs<br>• Lobby state legislatures<br>• Lobby congressional delegations<br>• Appeal to public through media |
| National Environmental Policy Act of 1969 | Land administered by various federal agencies require EIS | Does not ensure environmental protection nor conservation of endangered species or wetlands | Inform decision makers (agency personnel, elected officials, general public) for Record of Decision | Citizen lawsuits |

| *Stakeholder* | *Connection to GBCAAS* | *Ideological Considerations* | *Desired Outcome* | *Alternatives* |
|---|---|---|---|---|
| US Bureau of Land Mgmt. | Springs, lakes, wells | Multiple uses of federal land | Status quo | Permit development |
| US Fish & Wildlife Service | Springs, lakes, wells | Water for fish & wildlife | Status quo | Monitor development |
| US National Park Service | Springs, lakes, wells, caves | Water features at Great Basin NP & Death Valley NP | Status quo | Monitor development |
| Dueling Experts (Federal agency, State agency, Consultants) | Scientific assessments of groundwater boundaries (capture areas & groundwater-dependent ecosystems) | • Multiple working hypotheses<br>• Junk science unacceptable<br>• Normative science unacceptable | Limit scientific debate to EIS, media editorial pages & public meetings | No scientific discourse |
| Press | • Articles, social media & radio reports on groundwater development<br>• Citizen letters to the editor | Unbiased reporting | Sell newspapers and online subscriptions | Editorial board limits stories |

## A Complex Situation: Hydrogeology, Law, and Boundaries

### *Complex Hydrogeologic Setting*

The Great Basin of the US encompasses a 200,000 square mile (518,000 square kilometers) region that spans much of Nevada, half of Utah, and portions of California, Oregon, Idaho, and Wyoming (Figure 48.1). The GBCAAS encompasses an area of 110,000 square miles (285,000 square kilometers) in the Great Basin of the western US (Heilweil and Brooks, 2011). As depicted in Figure 48.1, the aquifer system is primarily shared between Nevada and Utah (Jenkins, 2009).

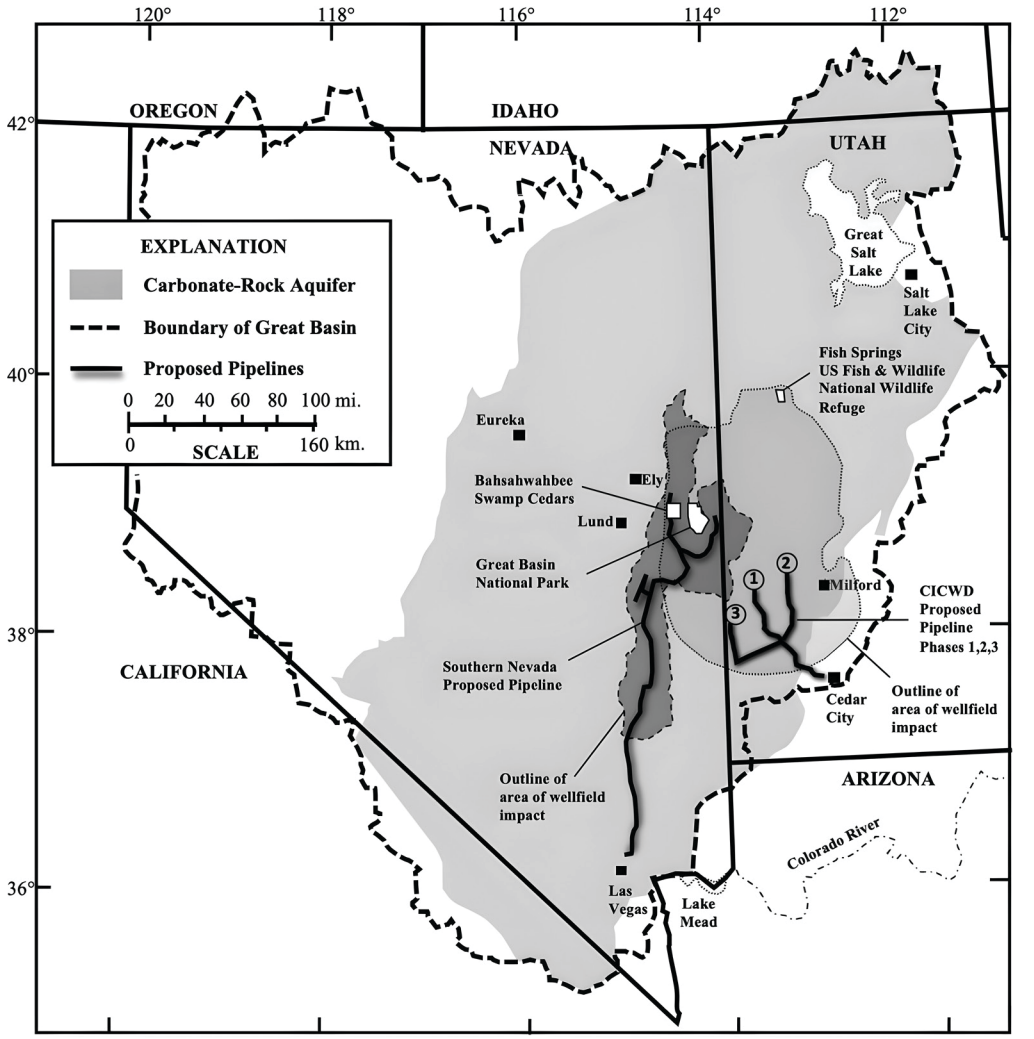



*Figure 48.1* Location map of Great Basin, GBCAAS, and proposed groundwater development projects. Inspired by Jenkins (2009) and supplemented using information available from the US Geological Survey and Environmental Impact Statement documents.

The topography is characterized by hundreds of basins, also referred to as grabens, separated by mountain ranges, sometimes referred to as horsts. Nevada and Utah are the two driest states in the US. The Great Basin hosts many internally drained endorheic lakes such as the Great Salt Lake; no precipitation reaches the ocean because the water either evaporates or recharges the regional aquifers.

When I first started working in the Great Basin 40 years ago, there was more interest in oil and gas exploration than groundwater exploitation. The structural geology is characterized by a thrust belt where panels of rocks have slid over one another, creating large folds that typify "traps" for hydrocarbons, first due to regional compression and later due to regional extension of the Earth's crust. Geologic complexity is an understatement in this region; mountain ranges such as the Confusion Range are named after the complex folding and related topography (Van Cott, 1990). The structural geologic term "chaos" was coined in the Basin and Range Province (Burchfiel, 1987).

While early wildcatters were unsuccessful in locating economic quantities of oil and gas, some noted significant quantities of groundwater discharging from exploration wells, so much so that some made home videos. Water was the bane of the oil and gas wildcatter, and yet, over time, the anecdotal stories garnered the interest of regional water purveyors such as the SNWA in the late 1980s who proposed installing wellfields in northern Nevada and piping the developed groundwater to Las Vegas. In the late 1990s, I learned of one of these watered-out oil exploration wells and watched the home videos. On the basis of the oil well logs and home videos, I recommended targeting the GBCAAS for the newly emerging city of Eagle Mountain located south of Salt Lake City, Utah. The rocks were so fractured that drilling was stopped prior to the target depth to install steel casing to keep the borehole open. Prior to drilling deeper, the test well was pump tested at 800 gallons per minute (gpm – 50 liters per second) with approximately 10 feet (3 meters) change in the pumping water level; the subsequent production well was tested at 2,200 gpm (139 liters per second) with approximately 40 feet (12 meters) change in the pumping water level. The news of the wells spread fast and sparked a drilling frenzy in the region targeting the GBCAAS.

Examination of the outcrops in the mountain ranges, mapping of caves such as the famous Lehman Caves located at Great Basin National Park, and detailed borehole logs of the wildcat oil and gas exploration wells revealed aquifers composed of layered carbonate rocks – limestones and dolomites – that typically have low intrinsic permeability. Fracturing associated with the regional tectonics, along with enhanced groundwater circulation, developed cave systems associated with dissolution of the carbonate rocks, creating a complex groundwater flow system dominated by heterogeneous and anisotropic conduit flow. The basin and range bounding faults sometimes serve as impermeable hydrologic barriers for groundwater flow between the mountains and adjacent basins, or the faults permit interbasin groundwater flow thus creating the regional aquifer system, sometimes referred to as a megawatershed (Bisson and Lehr, 2004). In some basins, the younger sedimentary deposits in the basin fill are in hydrologic communication with the carbonate rocks, and sometimes not, thus underscoring the technical complexity of developing the conceptual models of the hydrogeologic systems that are needed to use numerical models to predict the hydrologic responses to pumping. As a result, the GBCAAS is fertile ground for diverging interpretations of the hydrogeology and hydraulic responses to pumping scenarios, oftentimes leading to a dueling expert situation as described by Jarvis (2014a) and Moore and Jarvis (2020).

### *Complex Legal Setting*

The GBCAAS underlies four western states. With the exception of the State of California that does not host much of the GBCAAS, the following discussion focuses on the states of Idaho, Nevada, and Utah, which follow the Prior Appropriation Doctrine that uses the "first in time, first in right" approach to allocating water rights. It is beyond the scope of this chapter to provide a thorough discussion on water rights in the US; water rights are "states' rights" – there are no federal laws guiding water allocations. And even though the western US states for the most part utilize the Prior Appropriation Doctrine, each state has unique applications to the Prior Appropriation Doctrine. To complicate matters further, the tribal nations in each of the western US states have reserved water rights associated with treaties and compacts. While there are compacts to share surface water from rivers that cross state boundaries such as the Colorado River Compact, there are no transboundary aquifer agreements between states.

While the State of Nevada was prepared to enter into an agreement with the State of Utah to develop the transboundary GBCAAS as part of the SNWA Groundwater Development Project, the governor of Utah refused to sign the agreement in 2013. The projected impacts of the CICWCD Pine Valley Water Supply Project extend into Nevada; however, there appear to be no efforts by the State of Utah to discuss these projected impacts with the State of Nevada at this time (Apgar, 2022).

The SCOTUS issued its first-ever decision in a dispute between two US states over a transboundary aquifer in November 2021 in the case of *Mississippi v. Tennessee.* SCOTUS determined the waters contained in the Middle Claiborne Aquifer underlying both states are subject to "equitable apportionment" (Sweet, 2022). Nonetheless, no such decision has been made regarding the Great Basin.

In addition to a complex water rights system, land management in the region is also complex. Land ownership in the Great Basin is a combination of private, state, county, tribal, and federal land. Federal lands comprise the vast majority, most of which are managed by BLM. Other federal agencies managing lands in the region include the US Forest Service, the US Fish and Wildlife Service, and the National Park Service. The Church of Jesus Christ of Latter-day Saints maintains large farms and ranches in the vicinity of the boundary between Utah and Nevada (Jones and Mayo, 2023). Sacred areas identified by the regional tribes include Bahsahwahbee, or the groundwater-dependent Swamp Cedars, an area that holds spiritual and historical value for indigenous communities and is under consideration for status as a national monument (Solis et al., 2021; Marvar, 2021). Great Basin National Park is the only national park located in Nevada and is famous for the rare and unique cave formations in the Lehman Caves.

Given that the GBGG was scheduled, or will be built, on federal lands, the projects have to undergo Environmental Impact Statements (EIS) pursuant to the National Environmental Policy Act (NEPA). The NEPA process requires public review of the EIS documents and public hearings to gather scoping comments on the proposed projects (Clarke and Peterson, 2015). The management decisions on whether or not to proceed with the projects will be based on science. The management decisions will be challenged by other scientists who work for other federal and state agencies, as well as scientists working for, or retained by, various environmental NGOs, tribal governments, or private landowners (Solis, 2022).

### *Dilemma of Boundaries*

The problem of how boundaries are placed around groundwater and aquifers is commonly referred to as "fuzzy" and impossible to undertake with a reasonable degree of certainty because of the

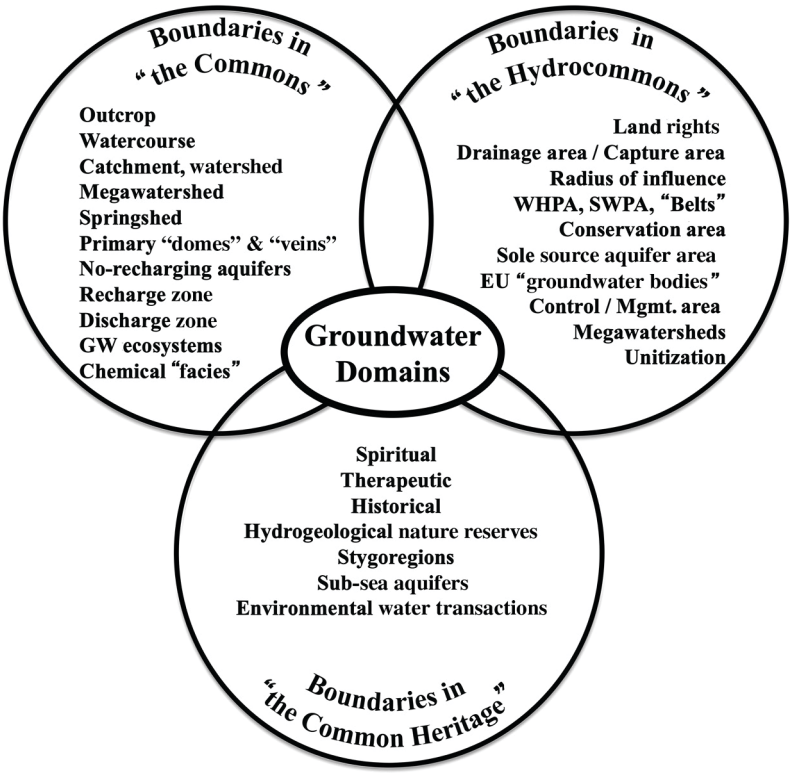



*Figure 48.2* Typology of groundwater domains. Modified after Jarvis (2014a, b).

vagaries in where recharge areas are located, and the hydrologic connection to surface water resources and flow and discharge characteristics that are typically only known at a reconnaissance level. Yet the literature is replete with boundaries for groundwater domains. Jarvis (2014a, b) argued that a transdisciplinary approach to exploring the geopolitics of groundwater yields a typology for groundwater and aquifer boundaries. Groundwater moves from areas of high hydraulic head toward areas of low hydraulic head; in the case of the Great Basin, this is from the highlands surrounding the Great Basin toward the internally drained basins and endorheic lakes like the Great Salt Lake among many others. As depicted in Figure 48.2, traditional approaches to defining groundwater domains focus on predevelopment conditions in the "commons." The outlines of the Great Basin and the GBCAAS system in Figure 48.1 are good examples; likewise, the Fish & Wildlife Refuge and Great Salt Lake serve as good examples of groundwater-dependent ecosystems and regional discharge areas in the hydrologic commons. However, groundwater boundaries remain fluid, changing both in technical and legal definition with time. For example, the Nevada Supreme Court ruled in 2024 that "the state has authority to conjunctively manage surface waters and groundwater and to jointly administer multiple basins and thus was empowered to issue Order 1309." Rothberg (2024) indicates that state regulators can now view surface water and groundwater as a single source, resulting in new maps that may more accurately reflect groundwater flows under the surface in "superbasins" or megawatersheds.

Groundwater development creates new boundaries, where hydrology, hydraulics, property rights, and economics are meshed in the "hydrocommons." Wells drilled into aquifers capture water stored in the aquifer by creating artificial discharge areas by lowering the hydraulic head in the vicinity of the well during pumping. The zone of influence or pressure change surrounding a well is called the radius of influence. Water discharged from a well is derived by capturing water stored in the aquifer. Groundwater flowing toward the well during pumping is derived from storage in the aquifer, is "captured," and the "capture area" can be estimated and mapped. The size of both the radius of influence and the capture area is not only a function of the hydraulic properties of the aquifer but also the pumping rate, the duration of pumping, and how the wellfield is designed. For example, the groundwater capture areas of the proposed GBGG wellfields, or "areas of impact" defined by consultants and NGOs on Figure 48.1, provide examples of these types of boundaries. Note the area of impact of the proposed SNWA project was narrow and oriented parallel to the pipeline. The designed wellfields were not in a single cluster of wells but rather located at strategic locations along the pipeline. Conversely, the phased approach to installing wellfields proposed by the Pine Valley Water Supply Project focuses on three clusters of wells. Collectively, the area of impact depicted in Figure 48.1 was predicted to capture groundwater across a large area.

Groundwater and aquifer users regularly define boundaries that acknowledge social and cultural values of the groundwater resources. Great Basin National Park and the Bahsahwahbee or the "Swamp Cedars" proposed for a national monument are good examples of "common heritage" boundaries. This typology focuses on the notions of "problemsheds" and "policysheds" – the boundaries of a particular problem or policy defined by the groundwater and aquifer users that drive decision-making.

Boundaries matter regardless of whether (1) the technological options to manage groundwater quantity and quality problems employ water transfers, managed recharge, or conjunctive use; or (2) the resource governance solutions include collective or community action, developing instrumental approaches such treaties, agreements, rights, rules, and prices or other incentives, such as preserving the structural and ecological integrity of groundwater systems. As a consequence, politics dictates the desired outcomes. These desired outcomes must be spelled out in proposed agreements for groundwater and aquifers, as the boundaries are an important part of governance, regardless of whether one considers groundwater and aquifers as common pool resources or as an emerging class of assets.

## Understanding Complexity

While referencing Social Ecological Systems (SES) as one means of analyzing complex systems, Nobel Laureate Political Scientist Elinor Ostrom (2009) once said: "Without a common framework to organize findings, isolated knowledge does not accumulate." Building upon the philosophy of SES, Islam and Susskind (2018) hypothesize that "when water challenges stem from complex – interconnected, uncertain, unpredictable, and boundary crossing – system dynamics with feedback, traditional frames for problem solving can be limiting or counter-productive." The Water Diplomacy Framework provides a matrix-based gradient framework for navigating complex problems and related decision-making in simple, complicated, and complex settings. While the value of classifying the types of problems and types of decisions that need to be made cannot be overemphasized, systems thinking is limited to a certain extent by the matrix-based gradient framework. The next step for visualizing potential dynamic solutions to the complex problems is using a supplemental tool – the Cynefin device of Kurtz and Snowden (2003).

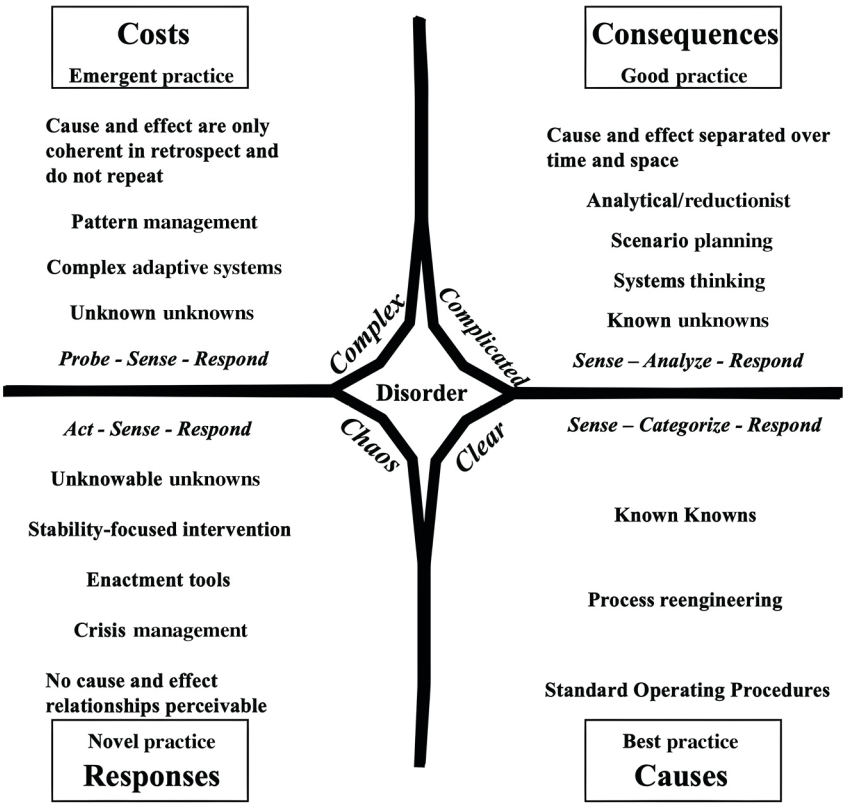



*Figure 48.3* Cynefin domains of Kurtz and Snowden (2003).

### *The Cynefin Device*

Cynefin is a Welsh word that translates as "habitat or place." Cynefin is a sense-making tool that is socially constructed from the experience of the past and anticipated futures of stakeholders. The boundaries within the Cynefin device permit people to see that they need to behave differently in different contexts.

The Cynefin device is a knowledge management heuristic that has been used in a broad spectrum of fields, including transboundary water resources situations in Afghanistan and the Tigris-Euphrates River Basin (Malyar, 2016; Eroglu, 2018). As depicted in Figure 48.3, the Cynefin device has five domains: (1) Clear, which relies on best practice and Standard Operating Procedures to categorize the situation; (2) Complicated, where analysis and expertise are used to assess a path forward; (3) Complex, where there are no good answers and the path forward will be created with each step through experimentation; (4) Chaos, where knowledge developed over a career is only partially useful, so the goal is to take action to get out of the immediate danger zone; and (5) Disorder is located in the center of the diagram because it is critical to the understanding of the conflict among decision makers looking at the same situation from different points of view (Kurtz and Snowden, 2003). For the GBGG, the long-term drought in the western US represents "disorder," leading to conflicts over water resources that can be looked upon through many different points of view.

### Clear Domain

Building upon the famous poem by former Secretary of Defense Donald Rumsfeld, "known knowns" in the form of field manuals and operational procedures occupy the "Clear" domain. The decision model is to (1) sense incoming data, (2) categorize the data, and (3) respond in accordance with predetermined practices. The first "clear" question focuses on the known causes and effects, primarily the origins of the water shortages. Population growth in southern Nevada and Utah has long driven the notions of bulk water transfers in the region over the past 30 years, primarily from Lake Mead, Lake Powell, or wellfields tapping the GBCAAS. The semi-formal water rights are institutions established by state and tribal governments to enforce the "rules." As discussed in previous sections, the US government does not have federal jurisdiction over water beyond water quality standards; water allocations are managed by individual states, as well as tribal governments. Funding, data sharing, and financing of state-level institutions, much less at transboundary scales, lead to fragmented institutions. Both Nevada and Utah utilize the Prior Appropriation system of water rights, with each state implementing the "first in time, first in right" notion of allocation with their own unique modifications of the doctrine common among the other western US states that also use Prior Appropriation. For example, some western US states allow de minimis quantities of water for domestic, stock watering, gardening, or small industries to be used without a water right or permit. Utah does not permit any water use without a water right.

### Complicated Domain

The complicated domain must sense, analyze, and respond to a situation. This is the domain of experts, such as county planners and state and tribal water agencies, who investigate several options and seek trade-offs between finding the right answer and simply making a decision. As depicted in Figure 48.3, one begins the evaluation through Rumsfeldian "known unknowns," that there are actions that experts have confidence in anticipating the impacts associated with groundwater development, such as the strange hydraulics in fractured and karst aquifers, the pushback from other groundwater users in nearby counties and states, and there are some things they do not know what the outcome might be such as ground fissuring and subsidence that is already observed in some areas.

### Complex Domain

In the complex domain, probing through experimentation is used to sense how patterns emerge through the interaction of many agents. Yet, both the number of agents and the number of relationships defy categorization or analytic techniques (Snowden and Boone, 2007). Unknown unknowns is Rumsfeldian for describing "the ones we don't know we don't know" occupy this domain. Modeling is of little use because emergent patterns can only be perceived, not predicted (Figure 48.3). This is where experiments that are safe to fail are conducted.

As depicted in Figure 48.4, there are many experiments that might be conducted to stem a crisis during the GBGG. The concept of bulk water transfers to address water scarcity is common across the globe (Shumilova, 2018). One of the largest bulk water transfer projects proposed in the world since the 1960s is the North America Water and Power Alliance (NAWAPA), which has been pitched in various iterations to address water scarcity in the western US; the most recent proposal focuses on the Great Basin Water Way as part of the NAWAPA XXI project (Kirsch, 2013). A precedent on interstate groundwater conflicts may have been set by the *Mississippi v. Tennessee*

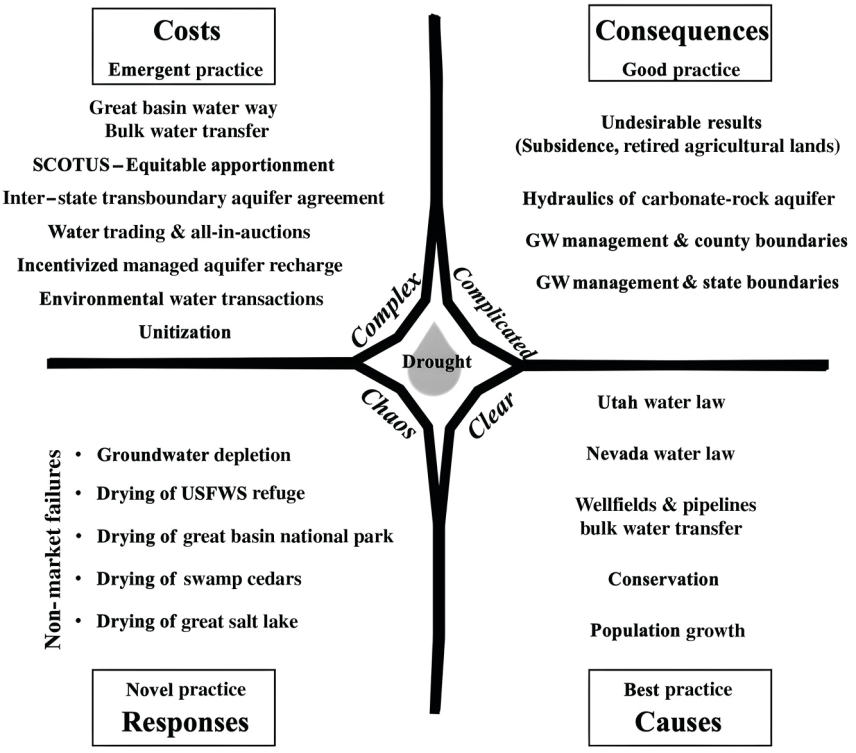



*Figure 48.4* Cynefin domains for the Great Basin Groundwater Grab.

case (Sweet, 2022). Perhaps the new project proposed by the Pine Valley Water Supply Project may provide an opportunity to revisit the interstate transboundary aquifer agreement originally proposed by the State of Nevada during the course of planning the SNWA project, but it was summarily dismissed by the governor of Utah in 2013.

Is there a way to unleash the "invisible hand" of the markets to advance water sharing between counties and states in an age of change? Water trading is not a new concept in global groundwater governance but is an option that is not well developed in the western US (Young, 2015; California Water Commission, 2022). Similarly, water can be stored underground through Managed Aquifer Recharge (MAR) and is applied across the globe in water-scarce regions. Environmental Water Transactions as described by Aylward (2013) are frequently used in surface water situations to negotiate instream flows in the western US, but their use in groundwater situations is not well developed. The economics of climate change and groundwater has increasingly beckoned the call for auctions of scarce and underpriced water resources by visionary economists such as Nordhaus (2021).

### *Chaos Domain*

The relationships between cause and effect are impossible to determine in this domain because they shift constantly and no manageable patterns exist. The chaos domain feeds on Rumsfeldian

"unknowable unknowns" – we just don't know what will work or what will happen (Figure 48.3). The decision model in chaos is to "stanch the bleeding" and act, quickly and decisively, to reduce the turbulence (Kurtz and Snowden, 2003; Snowden and Boone, 2007).

Chaos and turbulence in the GBGG focus primarily on unplanned groundwater depletion and related effects to groundwater-dependent ecosystems. Groundwater depletion in the GBCAAS can be directly monitored through observation wells. What cannot be directly monitored is the hydraulic impact on various groundwater-dependent ecosystems that are part of the commons heritage, such as the drying of the Great Salt Lake; the drying and dying Swamp Cedars, important to tribal history and lore; disappearance of groundwater-dependent ecosystems, such as recognized wildlife refuges; and the impact on ecotourism at Great Basin National Park. Groundwater hydraulic theory dictates that simply stopping pumping of groundwater does not stop growth of the capture areas associated with the wellfields. Recovery of water levels in the GBCAAS following cessation of pumping may take decades, if at all (Formation Environmental, 2021; Roux Associates, Inc., 2021).

### *Cynefin Dynamics*

The Cynefin device permits a reconnaissance-level evaluation of the rational choices that may be considered in a "structured" habitat so that knowledge can accumulate. Use of the Cynefin device permits parties to think of other models of understanding as boundaries are crossed. Kurtz and Snowden (2003) map out many different movements across the Cynefin "habitat." The probable paths for the GBGG depicted in Figure 48.5 are summarized in the following list:

*Incremental Improvement* – Both the SNWA and CICWCD vacillate between Best Practices and Good Practices as these are knowns.

*Exploration* – The SNWA project is cancelled so the CICWCD could learn from the SNWA experience as well as from other large projects. The St. George News (2022) reported the CICWCD conducted a field trip with SNWA.

*Just-in-Time Transfer* – The State of Nevada proposed an interstate agreement in 2013. It is unknown whether the discussions on this agreement can be revitalized. Another option for a "quick" transfer is for one state to file a lawsuit against the other state to be heard by SCOTUS.

*Collapse* – Non-market failures associated with moving from Clear to Chaos are manifold if CICWCD moved forward with the Pine Valley Water Supply Project without a plan to staunch the bleeding. Given the 30-year track record associated with planning and permitting the SNWA project, the lessons learned indicate "wasteful haste" can lead to undesirable results that will be next to impossible to reverse.

*Swarming and/or Entrainment Breaking* – A more likely approach for SNWA & CICWCD over the near term will be what they refer to as "swarming" or "entrainment breaking" or moving clockwise from Chaos, to Complex, to the Complicated, and back again as some of the experiments with legal and business tools are evaluated, and new experiments and business models are developed to determine next steps.

## ***Scientific Mediation***

One of the central premises of the Water Diplomacy Framework of Islam and Susskind (2012) focuses on "joint fact finding" and shared information. This is probably easier said than done in the GBGG (Canon, 2022).

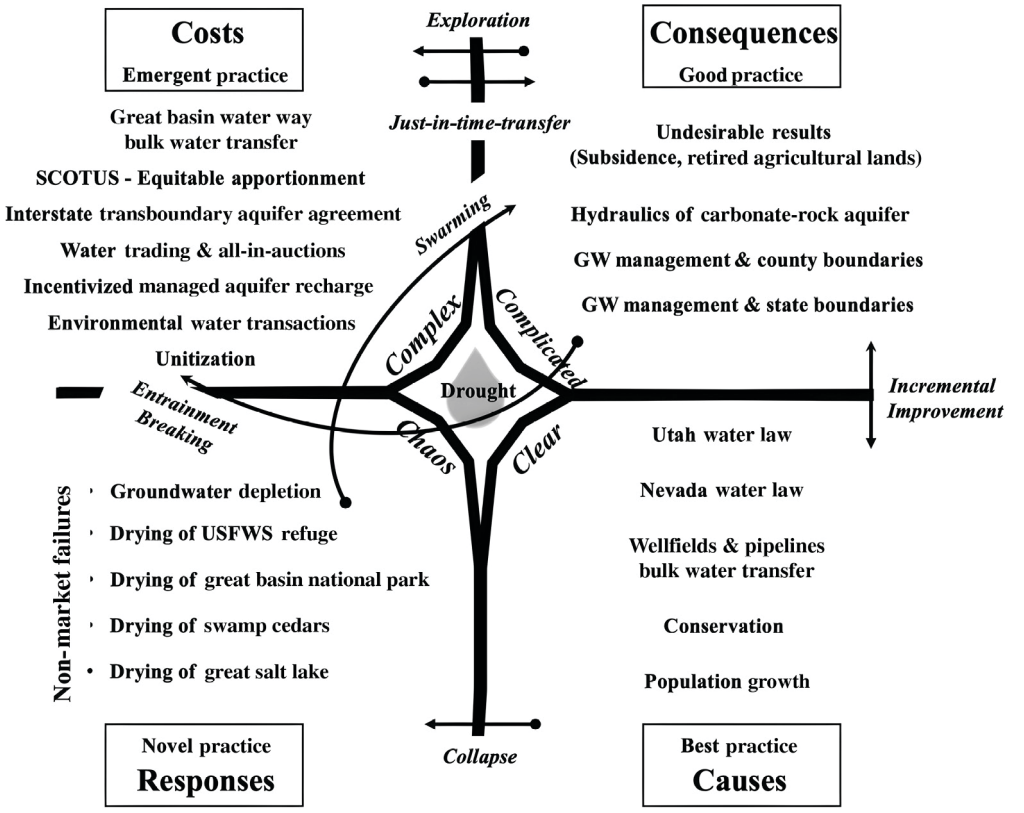



*Figure 48.5* Cynefin dynamics for the Great Basin Groundwater Grab.

But even scientists and engineers don't necessarily get along so well when discussing groundwater and aquifer situations, creating one of the ugly sides of conflicts over groundwater – the dueling expert problem. Water scientists and engineers are trained that the gold standards of science are that it is empirical, unambiguous, and objective. Many practitioners in hydrogeology and groundwater engineering entered the field of study because they enjoy the challenges of discovery and testing hypotheses for new knowledge. The history of these fields is steeped in the notion of multiple working hypotheses, yet scholarly debate can become heated – look no further than the climate change debates – and this is because scientists are people. Science is also used as a tool by policymakers to justify making a decision. Science is often used as a tool for persuading parties to act in one way or another, and as a consequence, science gets caught up in politics.

The triggers for conflict over groundwater are manifold. Data matters are just a minor part of the problem. Scientists and engineers have personal biases, and they identify with their work because coming up with innovative ideas is all they do, and they do it well. And there is a technical divide between scientists and engineers based on not only their academic training but also the history of how their work is completed, which can lead to tense relationships and structural conflicts.

Groundwater and aquifers are conflictive simply because the technical definitions of groundwater and aquifers do not align well with the legal definitions. Conceptual models of the subsurface vary considerably depending on the specific expertise of those working in the subsurface. For

example, what a water dowser thinks about how groundwater is stored and moves underground varies considerably from the interpretations of the isotope geochemist, numerical modeler, or geophysicist based on their specific datasets.

The debates are displayed in the academic literature. For example, the question of who owns groundwater is fertile ground for legal debate because across the globe, groundwater is considered a publicly owned resource, a common pool resource, private property, and an important part of county, state, or national sovereignty. The issue of sustainable use of groundwater receives much attention today, but sustainability is clouded by the question of sustainability for just people, groundwater-dependent ecosystems, or both? Is it possible to assess what is sustainable for long-term pumping (e.g., is the groundwater renewable or non-renewable, and how does one assess sustainable pumping for these types of groundwater?). And, if hydrogeologists can calculate the recharge rate or the volume of groundwater stored underground, is it possible to recover all that water?

These situations become fertile ground for debate, some of it based on the sincere notions of multiple working hypotheses, and for others it is good for beneficiaries of conflict such as dueling experts. In the case of negotiations over groundwater, a common practice is to have the experts prepare a jointly signed explanation. While Bredehoeft and Durbin (2009) acted as consultants to opposing sides of the SNWA project, both parties prepared a peer-reviewed technical paper describing the groundwater modeling predictions. Jones and Mayo (2023) also summarized contested interpretations of groundwater modeling of the SNWA project as consultants to the Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-day Saints. Conversely, Roux Associates (2021) analyzed the EIS documents prepared by Formation Environmental (2021) for the Pine Valley Water Supply Project and opined: "Although the proposed Pine Valley Project is in Utah, the effects of the project are likely to extend well into Nevada." Roux Associates (2021) further challenged the Pine Valley Water Supply Project EIS as unreliable because of substantial, wide-ranging data gaps related to aquifer and flow system characteristics and the nature and extent of groundwater-dependent ecosystems. Dueling experts come in two forms – the parties that are in dispute over a resource and the professional experts hired by the disputing parties. Each conflict beneficiary has predictable behaviors (Jarvis, 2014a). The usual impasse is both experts muttering, "we agree to disagree." But groundwater professionals cannot afford to have the discussion lapse here because policymakers and elected officials value science (Moore and Jarvis, 2020).

"Scientific mediation attempts to tread the path between 'Merchants of Doom' and 'Merchants of Doubt' as 'Merchants of Discourse' using multiple working hypotheses and multiple ways of knowing as their moral compass" (Moore and Jarvis, 2020). Scientific mediation is a conflict resolution tool that attempts to bring the dueling expert situation to a place where rational discourse and collaborative learning can occur. Those in the conflict resolution field know the "groan zone" well; it is that area between divergent and convergent thinking where groups experience confusion and frustration as part of their decision-making process. But the typical approaches to moving around the groan zone using joint fact-finding as suggested by the Water Diplomacy Framework might not be enough.

Entering the groan zone is not bad; it is just part of decision-making on just about any topic. The important thing to consider is it takes time to work through issues, and this can be as early as about two years to as long as over 30 years in the case of the SNWA project. This frustrates elected officials and policymakers because it interferes with election cycles and agency budgets. But rushing through the groan zone backfires, because it only takes 30 seconds to lose the trust between stakeholders. With scientific mediation, the goal is to identify personal or political biases

as the probable merits of the disagreements between the dueling experts. For example, the disagreement between the experts may be the place of their residence, creating a conflict related to the urban-rural divide, or the two experts may be registered in opposing political parties. Once these have been identified and aired, the next step is to address the science itself, with the identified issues of disagreement based just on the science, not the personal or political biases.

### *Pore Space Diplomacy*

The Water Diplomacy Framework of Islam and Susskind (2012) promotes the notion of "One Framework, Three Uses" endorsing the importance of flexibility through the use and reuse of water to enhance water availability:

- When water is a direct source of conflict (diplomacy for water);
- When water is an incentive for cooperation (water for diplomacy); and
- Practicing adaptive water governance and management (diplomacy in water).

A fourth use often overlooked in water diplomacy but integral to groundwater negotiations because one cannot separate groundwater from the aquifer storage is "when water is derived from the subsurface storage (diplomacy of water storage)." One does not have to look far to see the physical connections and "conflict triggers" between groundwater development, subsurface storage, and related ground subsidence occurring in many coastal and inland regions of the world.

Conversely, the concept of multiple use and reuse of aquifer storage was recognized as applicable to water diplomacy and transboundary aquifers in the UN Draft Articles on the Law of Transboundary Aquifers, where Article 2 details the use of terms and indicates "utilization of transboundary aquifers or aquifer system includes extraction of water, heat and minerals, and *storage and disposal of any substance*" (Eckstein, 2017, emphasis added). "Incentivized" MAR goes one step further by monetizing aquifer storage space through Aquifer Recharge Units. Aquifer Recharge Units (ARUs) are fungible, have value, can be bought and sold, and are directly analogous to the space acquired in a surface reservoir (Tuthill and Carlson, 2018).

Unitization of oil fields was developed in the 1930s to protect the "corresponding rights" or "sovereignty" of all pore space owners in the unit and to not waste valuable pore space. As described by Wiley and Jarvis (2022), unitization is an example of a customizable, collaborative, voluntary process for governing complex subterranean resources. Unitization shifts the situation from crisis and conflict to goal-driven, cooperative, and planned resource development.

Unitization is not a new concept to groundwater development in the Great Basin. Clyde (2011) describes how the unitization process was considered in the critical groundwater basins in western Utah. The proposed process mimicked that used in the oil and gas industry, where (1) the State Engineer would need statutory authority to enforce groundwater unitization; (2) a "watermaster" or common unit operator, such as a public district, irrigation district, or a nonprofit corporation formed by the community, would have authority to regulate the pumping of groundwater and use by everyone in the unit; and (3) with technical guidance from the State Engineer who would operate like a state or international oil and gas conservation commission, decisions on production and steps to be taken to protect the reservoir would be made by all owners within the unit. At the time, Clyde (2011) reported that some legislators thought the unitization process to groundwater management "…was too utopian and questioned whether such a system of groundwater management could work." And yet, many other areas in Utah, as

well as across the globe, currently utilize unitization principles for groundwater management (Wiley and Jarvis, 2022).

## Conclusions

The GBGG is an example of applying the key elements of the Water Diplomacy Framework developed by Islam and Susskind (2012) as summarized below.

### *Domains and Scales*

Capture of groundwater from the GBCAAS from either the SNWA project or the CICWCD Pine Valley Water Supply Project impacts multiple domains, ranging from jurisdictional such as county lines, state lines, tribal boundaries, federal and state lands, and private property. Groundwater development across time causes changes in the domains from the commons under static conditions, to the hydrocommons under dynamic conditions, to the commons' heritage acknowledging spirituality, such as sacred grounds, national parks, and fish and wildlife refuges.

### *Water Availability*

Water supplied to either the SNWA project or the Pine Valley Water Supply Project can be acquired through negotiations between the counties and states, as well as through bulk water transfers. Flexibility in competing water demands can be secured through creative use of the aquifer storage properties through "Pore Space Diplomacy."

### *Water Systems*

The hydrologic and political response associated with groundwater development from the GBCAAS is complex. Experience of the past and anticipated futures of the Great Basin stakeholders may be examined through the boundary-crossing Cynefin device, which requires stakeholders to examine behavioral responses under different contexts.

### *Water Management*

The traditional approach to water management in the western US relies upon the Prior Appropriation Doctrine, which is weighted toward water rights that are "first in time, first in right." The challenge with a transboundary groundwater situation in the western US is there are no compacts or agreements like that found for surface water like the Colorado River. Decision-making regarding transboundary groundwater impacts is more prescriptive, relying upon adversarial approaches such as litigation rather than adaptive and collaborative approaches.

### *Key Analytic Tools*

Because much of the land impacted by the GBGG is managed by the federal government, the NEPA process is the first step in developing stakeholder assessments and learning from others through review and commenting on the EIS documents. Given that the EIS documents rely upon

science for some of the decision-making process, the discourse over science becomes fertile ground for dueling experts.

### *Negotiation Theory*

Scientific mediation is one process to dispel dueling expert situations and supplement multi-track negotiations and coalition building given that decision makers want and need to trust science. This is missing from the historical and current approaches to creating value within the GBGG; however, the CICWCD apparently recognized this shortcoming with the Pine Valley Water Supply Project and has initiated meetings with the SNWA, among other regional water purveyors sponsoring large water development projects, to learn from others. Likewise, the BLM paused the CICWCD Pine Valley Water Supply Project to complete an ethnographic study, perhaps the harbinger of forthcoming multi-track negotiations commonly found in international diplomacy, but less commonly practiced in the US.

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## SECTION VIII

# Case Studies at the Community Scale



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# 49

# SUKHOMAJRI WATER MANAGEMENT AS A COUPLED SYSTEM

## Understanding of and Adapting to Evolving Changes in System Dynamics

*Enamul Choudhury and Shafiqul Islam*

**Key Takeaways**

- The evolution of water management in Sukhomajri (a factual context) is conceptually framed as a system; this is different from seeing a context (such as Sukhomajri) as an instance of a global water management model, as is the case with the Integrated Water Resources Management (IWRM) paradigm.
- It asserts that interpreting a case as a micro context of a global paradigm raises the problem of sampling and inference; most case analyses – with such an interpretation – lose credibility in terms of representativeness and generalizability.
- This case analysis of Sukhomajri is not a *representative sample of a generalizable population of cases*, but a way of narrating the evolution of a coupled system – from simple to complicated to complex – to explain what happened in a specific community and what lessons can be learned from the experience that are generalizable.

### Introduction

There are many ways to think about what water management is; what it does and how; and what it accomplishes in specific contexts. IWRM has been a dominant way of thinking about water management. It has shaped – and continues to shape – the water management discourse to produce a vast literature of claims, contentions, and criticisms (e.g., White, 1998; Snellen and Schrevel, 2004; Biswas, 2004; Allan, 2006; Mollinga, 2006; Saravanan et al., 2009; Lenton and Muller, 2009; UNEP, 2010; Gallego-Ayala, 2013; Tortajada, 2014; Giordano and Shah, 2014). However, the literature also attests to the fact that sustainable water management rests on context-specific ways of diagnosing water management problems and devising adaptive intervention and implementation strategies that pay close attention to the constraints imposed by the context (e.g., White, 1998; Biswas, 2008; Saravanan et al., 2009; Giordano and Shah, 2014; Kramer

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and Pahl-Wostl, 2014). In contrast to the IWRM paradigm, attending to the institutional and contextual constraints on water management highlights the contingent meaning of water management in a *specific* context for developing institutional capacities and mitigating constraints. This nuanced understanding points to the need to conceptualize water management in contextual, evolutionary, and systemic terms. Such an understanding allows the examination of different interventions in terms of the phases of system dynamics – first simple to complicated, and then complicated to complex.

Such an examination needs to explore the space for understanding water management as a coupled system with evolving and emergent dynamics. The goal of this chapter is to identify evolving processes of water management in terms of phase changes in a coupled system – from simple to complex. The study also integrates the concept of "water diplomacy" as an important part of the processes and practice of coupling. In more specific terms, the study tracks the phases of system evolution in terms of the "negotiated dispute resolutions" that emerged in the water management processes and practices in Sukhomajri, the problems and constraints that arose there, and the solutions and techniques that emerged in different phases to address them.

The mapping of Sukhomajri in terms of the evolution of a coupled system follows the key ideas discussed in this water diplomacy handbook: The context here is the community scale, where we find problems to overlap and tie multiple boundaries across scales, domains, and sectors. The meaning of boundary is not fixed but shifts with the changes in the interactions of natural and human factors in this coupled system. Thus, boundaries can overlap because of the interactions of Natural (between ecosystems), Political (between jurisdictions), Societal (between communities), and Sectoral (industries and users) factors. Such overlaps occur because the multi-faceted nature of water needs to be understood and interpreted in terms of water as an object of conflict (diplomacy *of* water), water as an incentive for cooperation (water *for* diplomacy), and water as a tool of adaptive management (diplomacy *in* water).

Given these overlaps, we examine water management in Sukhomajri as an evolving coupled system, where different problems and challenges of natural resource management emerged as the case history evolved over time. The problems and challenges included process barriers, scientific uncertainties, lack of representation, incentives and distribution of benefits, and the nature of interventions. While different challenges arose in different phases of the system evolution, and different interventions were implemented, some of these interventions produced desired outcomes while others did not. With a retrospective lens using our phase-evolving framework, we will examine the evolution of Sukhomajri over the last several decades. In the 1980s, the Sukhomajri project became a model for participatory natural resource management and inclusive development. The success of the project led the Indian Central Government to sponsor over 400 integrated watershed-management projects to be developed following the model of Sukhomajri (Agarwal and Narain, 2010). People from over 100 countries have visited this village to learn how community management of natural resources can pull a village out of poverty and make it self-sufficient. Despite this great transformation, Sukhomajri lost almost all its glory by the 2000s. Whether we call it a breakdown of community participation or inherent flaws in intervention programs and incentive structures, we hope to explain and understand what happened in Sukhomajri and what future interventions can learn from the past.

We begin with a conceptual framework – building on several key ideas from this handbook – to theoretically situate the case (as a coupled evolving system). Next, we address the problems of natural resource management at a specific scale (community) and reinterpret the evolving system dynamics in terms of the processes and practices that occurred in its evolution – from simple to complicated to complex – in Sukhomajri. Finally, we discuss and connect the evolving

dynamics of Sukhomajri with some of the water diplomacy concepts and ideas, challenges, and tools discussed in this handbook.

## Conceptual Framework: Evolving Dynamics in a Coupled System

A cursory look around the vast body of literature related to natural resource management shows incredible diversity in terms of ontological and epistemological assumptions, concepts, levels of analysis, research methods, and so on. Clearly, there are important differences among the approaches followed by champions and critics, academics and practitioners, and technical experts and decision-makers, where the breadth and depth of scholarship suggest a comprehensive synthesis may not be attainable. Our purpose is not to seek general propositions that would almost certainly be empty, but to inquire whether significantly different experiences from different natural resource management projects might be traced to what may be called, for the lack of a better term, varied meanings of integration and community participation (Mollinga, 2006; Varis et al., 2014).

Our goal for this chapter and the case study is not to provide a complete description of the multi-faceted reality of natural resource management but to suggest an alternate way (different from IWRM) of understanding water resource management using a *simple-complicated-complex systems lens*. We hope this reframing will allow a better contextual understanding as well as explain how the ideas of integration and community participation may become ineffective as a system evolves due to the coupling of natural and human systems. In this reframing, it is important to point to the meaning of the term system dynamics and its different phases as used in this analysis.

Many arguments using the terms "system" and "system analysis" conflate ontological and epistemological meanings. Many use systems as an ontological category, such as describing entities as systems, for example, mechanical systems, economic systems, and political systems. But when probed, these arguments turn out to be *ways of knowing* or the epistemological meaning of a system, that is, a system is a "concept" about the interactions of elements (variables, processes, actors, and institutions) and phases (simple, complicated, and complex) of any event or phenomenon. Such an epistemological meaning of system allows any phenomenon, event, or context to be studied as a system, along with the system elements and phases and their evolving interactions. Here, our context is the events in Sukhomajri focused on water management.

We examine the evolution of water management in Sukhomajri using the simple-complicated-complex systems lens to understand how different types of problems arise in different phases of an evolving system and, hence, require different types of problem diagnosis and resolutions (Table 49.1 adapted from Islam and Repella, 2015).

*Table 49.1* Different Phases of an Evolving Coupled System with Attributes and (re)Solution Strategies

| *System phase* | *Attributes and (re)solution strategies* |
|---|---|
| Simple | Cause-effect relationships are well understood; best management practices are effective. |
| Complicated | Cause-effect relationships are not well understood; a range of possible solutions are possible for a given management intervention; analysis and intervention require experts with contextual knowledge. |
| Complex | Cause-effect relationships are ambiguous; uncertainty, nonlinearity, and feedback are inherent; emergent properties dominate system behavior and response; and adaptive learning by doing is a preferred (re)solution strategy |

Complex systems are dominated by the interaction of system elements and the emergence of patterns. A complexity science-inspired thinking of system dynamics argues that understanding coupled water management problems and the implementation of interventions are not generalizable. Additionally, a pragmatic actionable approach requires systematic adaptation to the changing interactions of system elements – variables, processes, actors, and institutions – that emerge at different phases as the system dynamics evolve. Based on this thinking, it can be argued that prominent natural resource management approaches, like IWRM, may only work in certain contexts and levels and may not be helpful when applied to different contexts involving different levels with different capacities and constraints. In fact, evidence points both to the relative success of such management practices in specific cases (Lenton and Muller, 2009) and to its failures when applied elsewhere (Biswas, 2004, 2008; Shah and von Koppen, 2006; Saravanan et al., 2009; Giordano and Shah, 2014). Any effective management approach thus needs to continuously learn and adapt to mobilize various stakeholders operating at different levels of a system to agree on different courses of action as system dynamics evolve. Broadly speaking, this approach is now discussed and practiced as an adaptive and collaborative approach to natural resource management (Brunner et al., 2005; O'Leary and Bingham, 2009; Ojha et al., 2013; Emerson and Nabatchi, 2015; Mitchell and Mitchell, 2016).

To account for the relative success and failure of water management approaches in specific contexts, we argue that there is a need to move beyond global paradigms like integrated resource management. We find positive evidence in this regard, as the meaning of sustainable water management is slowly moving away from a technocratic top-down approach and toward a bottom-up network of interacting system elements (Mollinga, 2006). These shifts allow the incorporation of divergent views and values of the affected stakeholders from the very beginning of the policy framing to the exploration of intervention strategies. As the scope of policy changes with changes in the system phases from simple to complex, so do searches for appropriate intervention options.

Before we address the issue of changes in system phases, we need to establish the meaning of the "system" first. A system is an epistemological concept – a way of knowing. Here, water management in Sukhomajri (a factual context) is conceptually framed as a system, followed up with changes in system phases. This is different from seeing a context (such as Sukhomajri) as an instance of a global water management model, as is the case with the IWRM paradigm. Interpreting a case as a micro context of a global paradigm raises the problem of sampling and inference. Most case analyses – with such an interpretation – lose credibility in terms of representativeness and generalizability. The case of Sukhomajri – as discussed here – is not a *representative sample of a generalizable population of cases* but a way of narrating the evolution of a coupled system to explain what happened in a specific community and what lessons can be learned from the experience.

In a coupled system, natural and human processes interact to create emergent phenomena that are unpredictable. Any effective management approach thus needs to continuously learn and adapt to mobilize changing stakeholders to agree on a sustained – not necessarily always fully consensual – course of action. Broadly speaking, this emergent approach is now beginning to be practiced in the adaptive and collaborative approaches to natural resource management (Brunner et al., 2005; O'Leary and Bingham, 2009; Ojha et al., 2013; Emerson and Nabatchi, 2015; Mitchell and Mitchell, 2016; Islam and Choudhury, 2018).

## A Reinterpretation of Sukhomajri Using the Conceptual Framework

Sukhomajri is a well-known case of the early success and later failure of participatory natural resource management and inclusive development. This case has been extensively studied from multiple

perspectives (Franda, 1981; Shahwal and Dahiya, 2002; Khurana, 2005; Raheem, 2006; Lenton and Walkuski, 2009; Agarwal and Narain, 2010; Singh et al., 2011; George et al., 2015). Our analysis here is interpretative; that is, we are reinterpreting the narratives of the case. The choice of a narrative approach rests on the premise that natural resource management is a complex process, and therefore, a global paradigm like IWRM cannot offer solutions to problems in different contexts when phase changes occur due to the interaction of system elements. Furthermore, a narrative analysis provides a better accounting of multiple interpretations (Shanahan et al., 2013; Kaplan, 1986; Global Water Partnership, 2000; Rahaman and Varis, 2005; Mollinga, 2006; Kramer and Pahl-Wostl, 2014).

### *Sukhomajri: A Natural System in Its Simple System Phase*

Sukhomajri is a community at the foothills of the Himalayas located in the district of Haryana State near Punjab in India. Prior to the 1970s, this poor agricultural community – situated in a semi-arid region with significant climatic variability – primarily relied on rain-fed irrigation. The gradual degradation of agricultural lands was forcing farmers to bring more hill slopes under agriculture and grazing. Consequently, their indiscriminate practices of free grazing and land clearance created a vicious cycle of unending land degradation and poverty. The continued degradation of land and increase in sedimentation created problems downstream through the silting of the man-made Sukhna Lake in the city of Chandigarh (Sukhomajri is about 15 kilometers upstream of Chandigarh, a planned city). During the 1970s, it was becoming clear that the fates of Sukhomajri and Chandigarh were intertwined. The recognition of the causal connection between land degradation in Sukhomajri and the silting of the Sukhna Lake in Chandigarh created the notion of interdependencies between Sukhomajri and Chandigarh as a coupled system. The city of Chandigarh was spending over $200,000 per year on dredging operations to keep the Sukhna Lake functional, and this effort was increasing in cost while becoming technologically less effective. In 1975, the city officials turned to the Central Soil and Water Conservation Research and Training Institute (hereafter, the Conservation Institute) for solutions, and the Sukhomajri Program was born.

### *A Phase Change: Coupling of Technical Solutions and Community Participation*

The Conservation Institute treated the situation as a technical problem of downstream sedimentation and siltation and implemented an engineering solution by building erosion control structures in upstream Sukhomajri. However, this structure was insufficient to handle the increased sediment load from Sukhomajri. The increased load was not because of the topography of the Shivalik mountains, but due to the human interventions of the people living in Sukhomajri that gradually depleted the vegetation with their unplanned water use. The recognition of this socio-economic factor and its interaction with the topographical factors led to the attention of the people of Sukhomajri in order to solve the problem of siltation. From the villagers' point of view, they saw no reason to be concerned about the deterioration of the Sukhna Lake. Their principal concern was their economic survival that depended on the continued use of the watershed for agriculture and animal grazing. This created a bottleneck on what to do and how to find a solution for the dying lake. The breakthrough came when the Conservation Institute suggested a small earthen dam to control water and sediment runoff that would also create a reliable source of water for the farmers. In essence, farmers, city officials, and the Conservation Institute found an integrated management option of mutual gain that created flexibility in the use of the existing resources, which was negotiated to create opportunities for a mutually beneficial solution.

This is an example of recognizing and managing a problem as a coupled and connected system. This change in the framing of the problem led to the need to identify a creative mixture of technical, financial, social, and institutional measures to address the water problem in terms of satisfying the competing and conflicting needs of multiple stakeholders. The initial stages of the project transformed people's lives and enhanced the sustainability of the watershed and ecosystem.

When system elements (variables, processes, actors, and institutions) remain stable and their causal relations are specifiable and predictable, we have simple systems. In Sukhomajri, such a simple system existed at the initial stage of intervention when sediment accumulation was significantly reduced by building a dam and enhancing water conservation practices. The initiatives were supported by the city, outside funders, and the collaboration of different governmental departments. Following the success of the Sukhomajri model, the Forest Department of Haryana constructed 102 water harvesting structures in 61 villages. The Sukhomajri shot to fame as a model for watershed management, and the ideas of integrated participatory modeling began to emerge as a generalizable water management practice.

### *Sukhomajri: Evolution from Simple to Complicated System Phase*

As the Sukhomajri system evolved, more variables came into play – either by extending known causal connections or experimenting with new connections – to make the system more efficient. For example, the partnerships forged with the Conservation Institute, with the newly created water user association, constituted an experiment with integration in the local context. Farmers organized and formed a water user association named the Hill Resource Management Society (HRMS). The HRMS was given the authority and autonomy to manage the dam and distribute water to the members. Water allocation by the HRMS was based on two contextual guiding principles – Waterbandi (or water turn) – widely used in northwestern India and Pakistan. *First*, farmers receive considerably less water than they can potentially use (creating a scarcity of supply and thereby encouraging highly efficient water use). *Second*, water is equitably distributed to all landowners. The Sukhomajri Program also introduced another significant innovation: Water rights were given regardless of whether villagers owned land or not. This turned water rights into a tradable commodity and an additional source of income that did not exist before. Thus, everyone had an incentive to participate for benefits. This economic incentive, along with the social equity rule, led to environmental sustainability. This is because villagers now had a stake in keeping the watershed healthy by reducing erosion and minimizing grazing within the watershed. The upstream erosion prevention led to the protection of water infrastructure downstream in the city as well as making the Lake healthy again. While the rise in revenue through better crop yields, the sale of forest produce, the introduction of green fodder, and the expansion of dairy production pulled the village out of poverty (Sukhomajri enjoyed more than double the per capita income of the state of Haryana), it also preserved the Lake downstream. We identify this phase of system evolution in Sukhomajri as a transition from a simple to a complicated system with appropriate integrative innovations and interventions. The reason the interventions worked was that they were contextually relevant and designed through effective community participation.

The initial success of the intervention transformed the lives of people and enhanced the sustainability of the watershed and ecosystem. However, the evolving situation started to affect some of the early gains: *First*, people started using groundwater as an alternative source, thereby reducing or eliminating their stake in preserving the dam and the watershed (without realizing that the dam was partly responsible for raising the groundwater table – which was at 120m in 1979 and came down to 40m in 1981, and then in 2005, after controlled irrigation through additional check dams

were put in place, it went up to 90m). *Second*, the Forestry Department initially allowed their land to be used for growing two types of grass (bhabbar and fodder) by the HRMS with no charge to use the land. Then, the Forestry Department began taxing the sale of grass on harvested land – 25% tax in the late 1980s that was increased to 55% in 1998. This led to a significant loss in income for the HRMS members. To make the situation worse, the demand for the bhabbar went down because the paper industry – a big consumer of bhabbar – started using wood pulp. Thus, the HRMS's reduction in income, combined with the weakened incentives for tube-well irrigators to participate in watershed conservation, changed the system dynamics. These new dynamics led the dams to become silted up, and the downstream flow started experiencing increased sedimentation load.

### *Sukhomajri: Evolution from Complicated to Complex System Phase*

In systems where interacting variables operate at different levels and domains (e.g., imposition of taxes by the Forestry Department on the villagers), their relationship becomes gradually ambiguous and often leads to unpredictable outcomes. These contextual and somewhat unanticipated developments shift the phase of the system from complicated to complex. For example, the increase in the water table coincided with the availability and introduction of shallow tube wells for farmers to extract water for free. This led them to withdraw from the water user association and its collective decision-making process, as well as avoid the payment of fees. Also, the overextraction of groundwater led to the depletion of the source. This development was not intended, nor could it have been anticipated, when the well-intentioned initial interventions were made. This is the time when the diagnosis of the phase changes in system dynamics needs to prompt an examination of the efficacy of the initial interventions and the exploration of other intervention options.

The hope and prosperity of the villagers started fading in part because the Forestry Department decided to divide the 400-hectare hill tract between Sukhomajri and its neighboring village, Dhamala, without any consultation with the community. The villagers of Sukhomajri were no longer allowed to collect fodder from the area demarcated for Dhamala. Apart from ruining the resource management program, this somewhat arbitrary division of land also created social tension in the area. The Dhamala village consists of upper-caste Jats who had influenced the forest department to divide the forest so that they could grab nearly 80% of the grass as it grew in their part of the forest. Before the intervention by the Forestry Department, forest resources were shared by the two villages. With the top-down imposed demarcation, the notion of community-initiated social fencing (self-restraint by villagers to use forest resources) broke down, and the two villages became competitors for fodder instead of collaborators. These interventions changed the system phase to evolve from complicated to complex.

For Sukhomajri, sustainable water management at this stage depended greatly on the decisions that were taken at the village level by individual farmers, the HRMS, and at the higher levels by the Forest Department and the State of Haryana. The disconnect in communications and decision-making at different levels (village level and the higher government level) – without any coordinating mechanisms to deal with changing conditions – led to the failure of creating adaptive learning through negotiation among the stakeholders. For example, the Forestry Department's increased taxation and demarcation of land changed the system dynamics. The effectiveness of the HRMS was reliant on having a steady income stream that was affected by the Forestry Department's changes in policy. A contextual need for institutional integration to be dynamically linked to evolving situations (e.g., increased use of groundwater, decreased demand for the bhabbar grass as the paper industry shifted to using wood pulp, and increased taxation) was not

addressed. Consequently, the initial success of participatory management started deteriorating in Sukhomajri because the tools and interventions that were effective for the simple and complicated system phases started to become ineffective as the system evolved into a complex phase.

## Relationship of Sukhomajri with the Concepts, Ideas, Challenges, and Tools of Water Diplomacy

We discuss and connect the evolving dynamics of Sukhomajri in terms of the handbook's water diplomacy concepts and ideas (Part II), challenges (Part V), and tools (Part VI) as shown in Table 49.2. We remind the reader that the case of Sukhomajri as discussed here is not a *representative sample of a generalizable population of cases*, but a way of narrating the evolution of a coupled system to explain what happened in a specific community and what lessons can be learned from the experience using the concepts, ideas, and tools of water diplomacy discussed in this handbook.

## Concluding Remarks

There have been many ways to think about and analyze water management cases. Our goal here is neither to provide a comprehensive description of multi-faceted aspects of water management problems nor to specify a one-size-fits-all solution. What we are suggesting is that water management approaches are neither exclusively universal nor fully contextual. For certain problems, a best-practice model will work across contexts. However, for complex problems characterized by interconnections, uncertainty, and unpredictability, adopting a best-practice model like the IWRM can be limiting or even counterproductive. We need a different way of thinking, framing, and addressing the problem. In arguing so, we are also not suggesting a middle-ground compromise but proposing a reframing of the narrative of a context as an evolutionary understanding of system dynamics – first, from simple to complicated phase, and then, from complicated to complex phase. As our illustrative example of the Sukhomajri case shows, the coupling and the interaction of system elements – in terms of variables, processes, actors, and institutions – take on different forms as the system evolves from the simple to the complex phase. In this framing, the different phases of the system dynamics require different forms of intervention.

At the initial stage, when the Sukhomajri project was in a simple or complicated phase, a creative mixture of technical, financial, social, and institutional measures designed and supported by community partners and decision-makers worked very well. The desired outcomes of transforming people's lives and enhancing the sustainability of the watershed and ecosystem were celebrated. However, as the interaction of system elements evolved, the effectiveness of initial solutions started to deteriorate. This stage of interventions (like over-taxation and demarcation of lands) failed to achieve closer coordination and communication between the farmers at the village level and the decision-makers at the governmental level. The disconnect in communication and decision-making at different levels hindered adaptive learning. Consequently, the initial success of participatory management started deteriorating because the tools, techniques, and interventions that were effective for the simple and complicated phases did not work as the system evolved into a complex one. To sum up, as we analyze, design, and implement different interventions for desired outcomes, we need to recognize the evolving nature of coupled system dynamics. Additionally, we need to pay particular attention to identifying and implementing different interventions as phase changes occur – from simple to complicated and from complicated to complex.

*Table 49.2* Water Diplomacy in Action as System Dynamics Changes in Sukhomajri

| *Sukhomajri: Water diplomacy in action* | |
|---|---|
| *Linkages to different parts of this water diplomacy handbook* | *Water management in Sukhomajri: Changes in interaction of system elements (variables, processes, actors, and conditions) and evolving dynamics of phases* |
| Concepts and Ideas (Section II)<br>Coupled Natural and Human System<br>Changes in System Phases (simple to complicated to complex)<br>Common Challenges related to Water Diplomacy (Section III)<br>Mapping the problem space and managing the process<br>Scientific uncertainties, lack of representation and incentives, and distribution of benefits. | The Sukhomajri case is characterized as a coupled natural and human system where elements (variables, processes, actors, and institutions) interact and create emergent possibilities that require local, adaptive, and contingent resolution. Changes in interactions of system elements are diagnosed as evolving dynamics of phase changes from simple to complicated to complex. Thus, water problems and policy are shaped through the interaction of scientific facts and social facts.<br>In Sukhomajri, the water management case is examined as an evolving system with changes in the system phase. From an operational perspective, it is important to pay careful attention to changes in the system phase before implementing any intervention.<br>The evolving dynamics of Sukhomajri, from simple to complicated and then from complicated to complex, show how system dynamics can evolve within a single context. This case study exemplifies how different phases of the system dynamics may require different types of management strategies. Due to the changes in the phase of the system, the nature of interventions also needs to change to remain effective. An intervention strategy appropriate for a simple system may not work when the system has evolved into a complex phase.<br>In Sukhomajri, water management began as a simple system, where sediment accumulation was significantly reduced by building check dams and enhancing water conservation practices. As new economic activities and changes took place, more system elements came into play. For example, the partnerships forged with NGOs and the creation of a water user association increased revenue through better crop yields, sale of forest resources, introduction of green fodder, and expansion of dairy production – all pulled the village out of poverty while preserving the downstream lake. This phase is referred to as a complicated system, where the reliance on and improvisation of existing tools and their incremental application were successful. As the system further evolved (through the interaction of system elements), people started using groundwater as an alternative source of water, and the Forestry Department began taxing the sale of grass and demarcating the land to two different communities – the complex phase emerged by weakening the effectiveness of the incentive structure that worked well when the system was in a simple or complicated phase. Consequently, the downstream areas started experiencing increased sedimentation load and the dam silted up again.<br>In Sukhomajri, the increase in the availability of water coincided with the introduction of shallow tube wells for farmers to extract water for free. This led villagers to withdraw from the water user association and its collective decision-making process, as well as avoid the payment of fees (lack of representation and incentives). The subsequent overextraction of groundwater led to the depletion of the groundwater as a resource (scientific uncertainties). This emergence of system dynamics was neither intended nor predictable when the well-intentioned interventions of using tube wells were implemented. The Forestry Department's |

(*Continued*)

*Table 49.2* (Continued)

| *Sukhomajri: Water diplomacy in action* | |
|---|---|
| | increased taxation and demarcation of land also changed the system dynamics. The effectiveness of the HRMS was reliant on having a steady income stream that was affected by the Forestry Department's policy changes, with the HRMS not having any influence on maintaining their income streams. Several evolving situations, like the increased use of groundwater, decreased demand for the bhabbar grass with the paper industry shifting to using wood pulp, increased taxation, and demarcation of land use to two different communities, were not addressed concurrently. Consequently, tools, techniques, and interventions that were effective for the simple and complicated phases started to become ineffective because the system has evolved into a complex phase. |
| Tools of Water Diplomacy (Section IV)<br>Mutual Gains Negotiations; Flexible Institutions and Infrastructure | In Sukhomajri, the rise in revenue through better crop yields, sale of forest resources, the introduction of green fodder, and expansion of dairy production may be understood as mutual gains options jointly designed and implemented by the decision-makers and the community partners. As the system evolved into a complex phase, the sustenance of interventions depended on the policy decisions taken at the village level by individual farmers and the HRMS and at the higher levels by the Forest Department and the State of Haryana. The disconnect in communications and decision-making at different levels (village level and the higher government level) – without any coordinating mechanisms to deal with changing conditions – led to the failure of creating adaptive learning situations.<br>The lack of flexibility in institutional arrangements at different levels and the absence of coordinating mechanisms to deal with changing conditions could not sustain the initial success (when the system was in a simple or complicated phase) as the system evolved into a complex phase, thus failing to generate adaptive knowledge and actions. A key takeaway lesson is that continuous monitoring of evolving situations needs to be addressed with interventions that are consistent with the capacities and constraints of the changing local context. |

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# 50

# THE ROLE OF HERITAGE IN UNDERSTANDING COMMUNITY-SCALE WATER DIPLOMACY

## A Case Study of the Al-Ghab Plain in Syria

*Eva Ziedan*

**Key Takeaways**

- Identify and engage local technical experts and administrators who understand both official policies and informal community practices. They can serve as crucial mediators in water diplomacy efforts during conflicts.
- Acknowledge that water management challenges often stem from historical patterns of settlement, land distribution, and centralized governance that created inequities between regions; understanding these patterns is essential for sustainable solutions.
- Design water diplomacy initiatives that recognize the "vitality of heritage"—treating heritage not as static monuments but as living, evolving practices that communities adapt to meet changing circumstances.

### Introduction

Between Syria's Coastal and Zawiyah mountains lies al-Ghab, a fertile valley fed by the waters of the Orontes River. Over the last decade of armed conflict, the shifting boundaries of control have cut through this region. The effects of this conflict have been devastating, not least because of the conflict's disruption of many agricultural practices essential to local livelihoods.

At times during the conflict, water has been weaponized. Gates used for flood control and irrigation have been intentionally mismanaged. Irrigation facilities and equipment have been vandalized, dismantled, stolen, and sold for scrap. Propaganda on both sides has celebrated the destruction of essential infrastructure on the pretext that it was "regime property" or "incubators of terrorism."

While some in the region celebrated this destruction, others dedicated themselves to activating and mobilizing community resources to mitigate the conflict's effects on everyday life. Despite enormous obstacles, these individuals leveraged their positions to draw attention to common interests and to negotiate for improvements to humanitarian conditions and the restoration of essential infrastructure.

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The challenges and successes of these instances of community-scale water diplomacy are best understood by examining the vitality and plurality of the region's heritage. By vitality, I mean a living view of heritage that acknowledges the need for communities to pragmatically connect their histories and ambitions to the essential needs of the present. By calling attention to plural heritage (Whitehead, Schofield, and Bozoğlu 2021), we acknowledge the role of the region's diverse heritages in influencing people's perception of themselves and the formation of their ambitions and grievances.

This chapter explores the importance of these two aspects of heritage through two case studies that explore community resilience in the context of the ongoing armed conflict. I chose the period of the conflict because, despite all its catastrophic effects, it offers an important moment to observe the dynamics of community resilience and diplomacy.

The chapter begins with general geographic and demographic background on al-Ghab, including a brief history of how it was diversely settled and later became the object of modernization by the central government. It explores how patterns of bureaucracy, clientelism, and neglect before the conflict set the stage for the particular adaptations and mobilization of key actors that would later emerge as forces for local diplomacy. Specific examples of these local diplomatic efforts are provided in two cases focused on the Qalaat al-Madiq and Ziyara areas of the al-Ghab. The chapter closes with some key lessons and recommendations on the role of living heritage in understanding water development and diplomacy issues.

## Notes on Methodology

This research covers the last 150 years, from the late 19th century century until now. This period was selected because it has witnessed important changes directly related to the understanding of the current context in the al-Ghab area.

Since the late eighteenth century, al-Ghab has witnessed the exodus of various groups from the eastern steppe and the coastal mountains of Syria as a result of political, social, economic, and climatic factors. In the middle of the twentieth century, the region witnessed radical structural interventions by the central government. These interventions played a major role in changing the landscape, whether at the climatic, environmental, demographic, infrastructure, or legal levels, and new villages arose. Finally, in the current crisis that erupted in 2011, al-Ghab has become a laboratory that shows the impact of the past on the present and the importance of following local human patterns and practices to better understand the dynamics of community resilience, diplomacy, and sustainable interventions.

Local key primary sources prompted my desire to conduct this research, drawing from my practical experience and fieldwork in development and cultural projects related to local heritage. In fact, since 2016, I have been in daily contact with some local actors in the al-Ghab area.

It was a learning process for me as well. My archaeological academic background has been re-kindled and enriched through the lenses of this research. I began considering heritage processes as an attempt to understand the cultural identities and social values and their renegotiation and reworking for contemporary consumption (Howard et al. 2008, 106).

All this prompted me to begin writing this chapter in early 2022. As for the firsthand accounts, I visited the areas of Suqaylabiyah, Qalaat al-Madiq, and Hama, which are under the control of the Government of Syria (GoS), between January and March 2022, and conducted open and semi-structured interviews with many of its stakeholders, including farmers and administrators.

The political circumstances and the military division of the country prevented me from meeting people in the areas that are located on the other side, that is, the side under the control of the

Non-State Actors (NSA). Thus, the interviews were conducted via WhatsApp and email with members of agricultural associations or former administrators and displaced people from the al-Ghab area currently residing in the refugee camps on the Syria–Turkey border.

As for the secondary sources, I relied on a few ethnographic and social oriental studies written by French and Syrian authors dating to the initial period of the French Mandate of Syria (1920–1946).

In addition, I relied on a large number of studies, technical and academic research, and contemporary reports that focused on the post-agrarian reform period and the project to drain the al-Ghab swamps, government policies, and then the crisis of 2011 and its consequences on soil, water, and population.

## Al-Ghab Context

The al-Ghab region is like any other area: to understand its current context, we need to seek multidisciplinary perspectives on its geographical, historical, social, economic, and governance aspects.

The Ghab is a fertile depression located in the middle of the Orontes Basin, bordered by the Coastal Mountain Range to the west and Jabal al-Zawiya in the east, and extends from Jisr al-Shughur in the north to Masyaf in the south. It is 60–70 km long and 12–15 km wide. Al-Ghab is roughly divided into two main areas: the swamp (*al-mustanqaat*) in the north and the fertile hilly land in the south.

Most of the lands of al-Ghab (middle and upper areas) were flooded and formed a large swamp of the Orontes River that crosses the area. Since the 1950s, a huge project has been undertaken to drain, reclaim, and invest in the plain. The southern part of the plain represents the natural extent of the swamps and contains fertile lands suitable for agriculture, most of them owned by absentee residents in cities like Hama (Sadiddin 2004, 14).

Archaeological studies have shown that for thousands of years, the area of the Orontes Basin and the Ghab Plain, in particular, has been subject to intensive agricultural activity and, therefore, also to operations related to water management. Many sites flourished near the river, such as Tell Qarqur, Tell Asharineh, Apamea, Qalaat al-Madiq, and Qalaat Shayzar, many of which are still inhabited.

During the Roman–Byzantine period, the area between Apamea, Rastan, and Salamiyeh, in particular, had intensive and varied water-supply systems such as irrigation channels, qanats (subterranean wells connected by gently sloping tunnels), and norias (waterwheels) (Wessels 2011, al Dbiyat 2009). Some of these ancient irrigation facilities have been rehabilitated and reused, while others have been discontinued (e.g., norias).

### *Settling Al-Ghab, the Last 150 Years*

Over the last 150 years, the role of geography, environment, and culture has had a strong relationship with the formation of the demographic structure of the area, as well as its current socioeconomic and political dynamics.

Overall, the literature on the subject is sparse. However, there is an interesting proliferation of writings on al-Ghab in the 1930s. During the French mandate, a French soldier, Thoumin (1936)[1]; a French geographer, Dussaud (1927)[2]; and a Syrian historian, Zakariya (1934),[3] dealt with the question with different sensitivities.

Dussaud and Zakaria limit themselves to describing the people of al-Ghab in a derogatory way, considering them "strange people."[4] Thoumin is less derogatory but adopts an almost exclusively Orientalist lens, emphasizing to the point of excess a sectarian vision.

In contrast to this exclusively sectarian vision,[5] I would argue that we can visualize al-Ghab in a certain period as a refuge, gathering different classes for different reasons. I want to emphasize that the villagers in each category settled, not because they did or did not like the other villages in the region, but because each group came from a different place and settled in its place of arrival.

Therefore, I suggest the following categorization of the main settlers of al-Ghab area: (1) ancient settlers, (2) Mawali villages, (3) nomad swamp villages, and (4) the villages of those coming from the coastal mountains,[6] as shown in Figure 50.1.
More specifically:

1 The villages of the ancient settlers claimed an important geographical location: far from the swamps and on the hills or the foot of the hills, such as Suqaylabiyah, Muhardah, Qalaat al-Madiq, and Shaizar. All these villages are located in the south and southeast part of al-Ghab, so they had the good and suitable lands for agriculture.
2 Mawali villages: At the beginning of the twentieth century, Mawali Bedouin villages were formed (e.g., in Jelmeh and Hayaleen). These Bedouin coming from the east began to settle near the swamp and work on the lands of the owners residing in Hama.
3 Swamp villages: They were formed by nomads (not related to the Mawali Bedouins) in Tweineh, Kareem, Shariaah, and Jamasat Udayat. They inhabited the swamps and lived by means of fishing, raising buffaloes, and cultivating the lands of rich owners who mainly resided in big cities. They lived in extreme poverty.
4 Villages of those coming from the coastal mountains (Thoumin called them "Nousairis"[7]): A group of villages distributed both in the south of al-Ghab in the villages of the ancient settlers and in new villages such as Tal Salhab and in the north in the swamps such as Rasif and Jayyid. The second group settled on the left bank of the river, near the foot of the west mountain from which they came.

Each category of residents had different reasons for resorting to this region, its culture, the way their people dressed, and its different house typology. Most importantly, each category carried different but interesting socio-economic and political issues that have shaped the cultural landscape of the Orontes Valley.

### *The al-Ghab Irrigation Development Plans and the Land Agrarian Reform Law*

The basin has witnessed the restoration and rehabilitation of its old canals and irrigation systems since the 1920s, when Syria was under the French mandate. The al-Ghab Irrigation Development Plan (GIDP) was initiated in the 1950s, but was completed after the Ba'ath Party took power in 1963 (Saadé-Sbeih et al. 2018, 667). The work included blowing up the basaltic lock located in Qarqur, draining the swamps, and building the two dams (Rastan and Muhardah).

This was followed by a process of the Land Agrarian Reform Law (LARL) issued in 1958 and last amended in 2004 (The Syria Report, 2022). The LARL included the expropriation of parts of private lands and their distribution to farmers who had been working as farmers on the same lands. The new lands resulting from the draining were distributed to the farmers who were working in the area and to farmers from other places who came to work in the area from Idlib, Hama, and the coast, and thus new villages arose (see Figure 50.2).

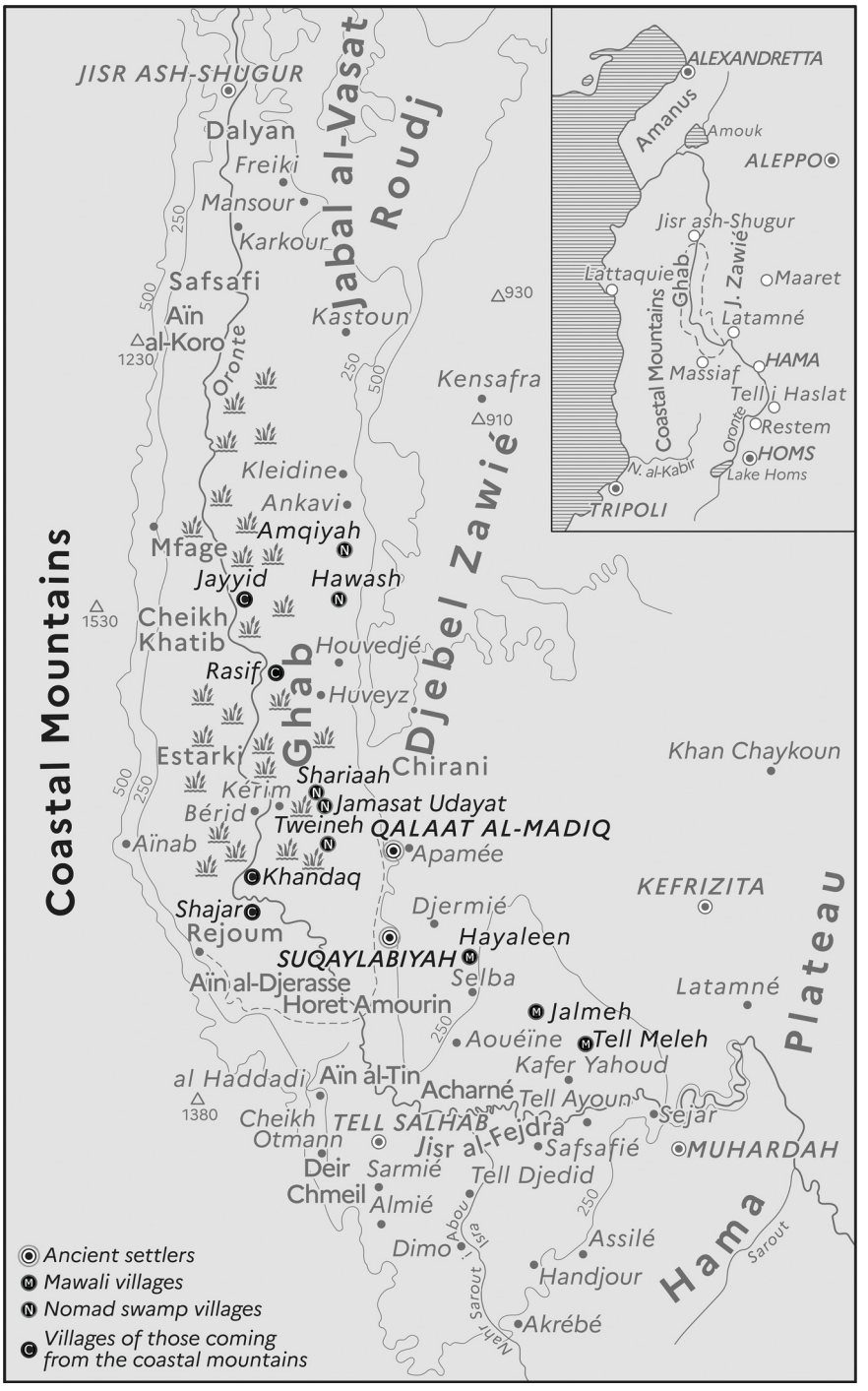



*Figure 50.1* Al-Ghab Plain. Conceptualization: the author. Cartographic elaboration in collaboration with Luca Mazzali based on Thoumin (1936).

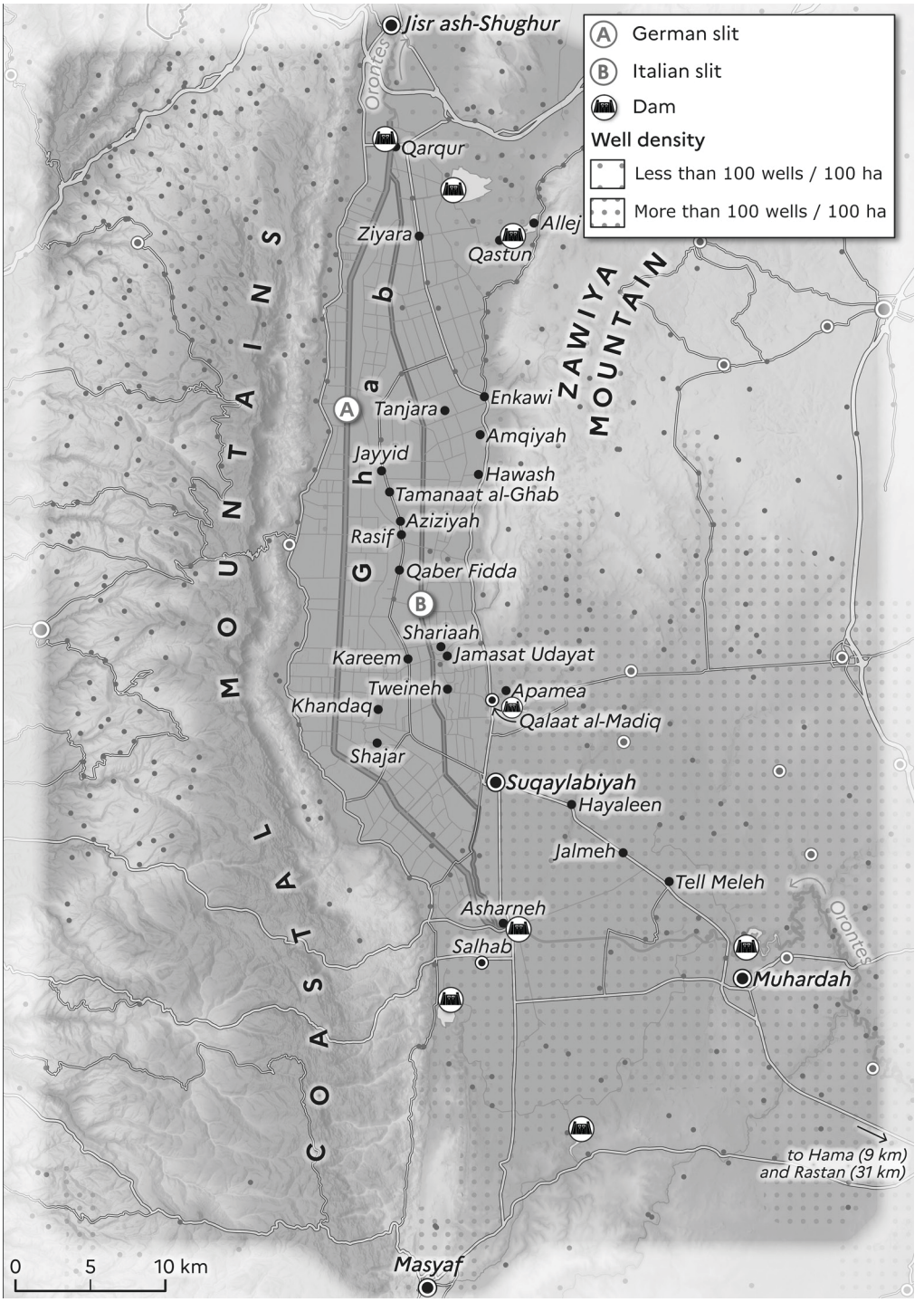



*Figure 50.2* Al-Ghab. Irrigation Development Plans. Conceptualization: the author. Cartographic elaboration in collaboration with Luca Mazzali.

As one of the key local sources described the interventions at that time (see Box 50.1), there were two distinct foreign contractor companies working on the ground: Italian and German companies. This distinction inevitably marked the fate of the land and its people for several decades longer.

**Box 50.1 Testimony of a Local Historian and Artist Who Grew Up in the Land Included in the Project of al-Ghab Irrigation Development in the 1950s**

A camp was built of wood and pebbles, and its roof (gabled) in the current house of Abd al-Karim al-Hamidi, south of the museum, to the east of the main road. There were two drying companies, one Italian and the other German, and to this day people say (German slit) and (Italian slit), and they are the two huge, straight, parallel irrigation lines that the Orontes stream turned into.

Draining led to the emergence of large agricultural lands that were distributed to farmers, in the form of tenures (licenses). This led to the emergence of new villages close to the lands of the original owners of the land, who were brought from the eastern and western villages. Some of them transferred the name of their main village to call it the new village, such as Tamanaat al-Ghab and Aziziyah, and others, … and some of them gave what was possible to their gathering, which became a village, such as Khirba, Tanjara and Qaber Fidda, … etc.

(Mustafa Raadun, artist from Apamea)

As pointed out by Wattenbach, *"*al Ghab is most dependent among all Syrian farming systems on government decisions on the processing factory of sugar beet or the purchase conditions of cotton" (Wattenbach 2006, 98). Despite the establishment of agricultural cooperatives and unions, agriculture extension units, and institutions specifically concerned with agricultural development and water management in the al-Ghab Plain, decision-making and the establishment of agrarian plans were in the hands of the state.

Damascus, the centralized capital of Syria, had control of the entire process through the Ministry of Agriculture and Agrarian Reform (MAAR) and its institutions and directorates. These institutions oversaw all aspects of agriculture in the region, including distributing tenures to farmers, arranging water distribution within irrigation networks, licensing wells, and determining prices for crops, as well as subsidies for fuel, fertilizers, and pesticides.

As part of the GIDP, the northern and middle regions of al-Ghab (i.e., the swamp area) were drained and outfitted with irrigation channels. These newly drained and irrigated lands were distributed to qualified farmers in tenures of 25 dunums. In the southern region, private agricultural lands originally belonging to ancient settlers and absentee owners (Sadiddin 2004, 68) were reallocated. Compared to the northern region, qualified farmers in the southern region received larger tenures (between 45 and 50 dunums) to compensate for the lack of irrigation.

The main crops cultivated in the plain were cotton, sugar beet, and wheat. These three crops were considered strategic for the government, organized by the MAAR through agricultural plans, and supervised at the local level by the agricultural extension units (Syrian Arab Republic and United Nations 2010).

### *The Legacy of Centralized Control*

The GIDP and LARL initiatives had a substantial impact on the geographic, political, and social landscape of the al-Ghab. The centralized decision-making was often far from the dynamics and requirements of the local level and often led to transgression. Sometimes this was reflected in a form of societal support, such as the local administrations turning a blind eye to a hidden market. At other times, it was reflected as clientelism, such as in the uncounted numbers of wells licensed. Altogether, these centralized policies have created notable and persistent challenges at the community scale (Saadé-Sbeih et al. 2018, Barnes 2009, Wattenbach 2006, Sadiddin 2004) with differential impacts on the northern and southern regions.

#### *Northern Region*

The swamp villages in the northern region (whether the nomads or those who escaped from the western mountains) were the most crowded and poorest families and villages. After the draining, their lands were irrigated by the public canal network. However, subsidies led to dependence on chemical fertilizers, which contributed to "soil deterioration, especially in the northern part of the system" (Sadiddin 2004, 36). The abundance of water also encouraged detrimental flood irrigation methods, constituting "about 88% of the total irrigated area" (Sadiddin 2004, 13).

Overall, the tenures granted under LARL did not take into consideration that the land would be inherited by the sons in the next generation. Since the average number of children in each family is between five and six, these reduced tenures are seldom enough to support an entire family. This situation impacted both regions, but the smaller irrigated tenures in the north made this particularly troublesome.

Moreover, until 2004, there was no ability to buy and sell agricultural reclamation tenures because they were considered reform lands. This created great difficulties in management and encouraged an uncontrolled active land market.[8] Many northern families relied on these markets, as well as other informal methods, to settle their affairs. This includes selling and dividing land, as well as mortgaging or selling their animals to secure farming expenses.

These villages were originally marginalized, and the state's centralized policies continued to marginalize them or, at best, did not try to develop them. Agriculture was the main source of income, and there was limited interest in education. Few had state jobs or positions, meaning there was a limited representation of the villages' interests and practically no access to nepotism or high clientelism.

#### *Southern Region*

The inhabitants of the southern region of al-Ghab, in turn, have larger rain-fed tenures. Some of them were original owners of private lands that were not fully acquired by the agrarian reform.

Their previous circumstances and their good social and financial situation qualified them to pursue education and to specialize in agricultural technologies and industries. They became the individuals who ran the region's institutions, which strengthened their position and opened up other sources of income.

Another important factor in "favor" of the southern region was the initial use of pumps. Starting in the 1980s, the lands also became irrigated by wells. This allowed families to temporarily increase their income, although the long-term effects of over-pumping have significantly lowered the water table.

### *The Importance of Integrating Social and Technical Perspectives*

Technical and policy interventions in the region will continue to perpetuate inequities and environmental degradation unless they become responsive to local socio-economic legacies, dynamics, and practices. Understanding the role of central government and international funding in promoting economic liberalization reforms is critical and crucial, but it is only a partial story. The local response to such policies can only be understood by examining the role of local people, their strategies for coping, their alliances, rivalries, and roles in administrative structures. Neglecting these aspects portrays people as passive recipients and submissive victims of events. This is what we will discuss and contradict in the following case studies.

## *Al-Ghab during the 2011 Crisis*

The last decade of armed conflict in Syria has had a devastating impact on al-Ghab as a territory and as a population. To fully understand the impact on the region, it is critical to adopt a socio-technical lens.

During the armed conflict period from 2011 until now, the boundaries of control between the conflicting forces have been changing, and the al-Ghab area has been a battlefield for the final points of control for both parties.[9]

During the conflict, many state institutions were transformed into military points. Water and irrigation facilities were sometimes weaponized. Others were dismantled, stolen, and sold as raw materials. Most of the bridges linking the villages were targeted by military clashes. As a result, roads linking people to their farms or to the rest of the villages were often cut off.

Many villagers were attracted to the financial benefit and social recognition of joining a militia. However, there were also those who carefully used their positions, knowledge, and negotiation skills to protect the shared interests of the villages and cities of the area. We will explore these stories through the case studies of the Qalaat al-Madiq and Ziyara areas.

## Qalaat al-Madiq Case Study

Occupying the medieval fortification on the western slope of the Ghab Plain, overlooking the archaeological site of Apamea on the Orontes, is the modern town of Qalaat al-Madiq. Administratively, the town belongs to the Qalaat al-Madiq district, which includes a group of 23 villages characterized by its social and cultural diversity, as is the case with the entire Ghab Plain area.

Along with its social and cultural diversity, there are also ancient Islamic fortifications, the archaeological site of Apamea, and the Apamea Museum with a specialization in mosaics. Moreover, there are vital facilities such as grain silos, the Directorate of Fish, dams, and ancient and modern irrigation facilities.

As mentioned in detail in Introduction, the neglect of the area for decades and its socio-economic mismanagement played a major role in transforming cultural diversity into a conflict that has been used in fueling and severing the social and cultural ties that linked the al-Ghab area as a whole.

In fact, from 2012 until 2019, Qalaat al-Madiq was the last control point of the NSA, situated four kilometers from the city of Suqaylabiyah, which was under the GoS control. Both these areas became crossings for the transit of goods and people between the two different military controls (see Figure 50.3).

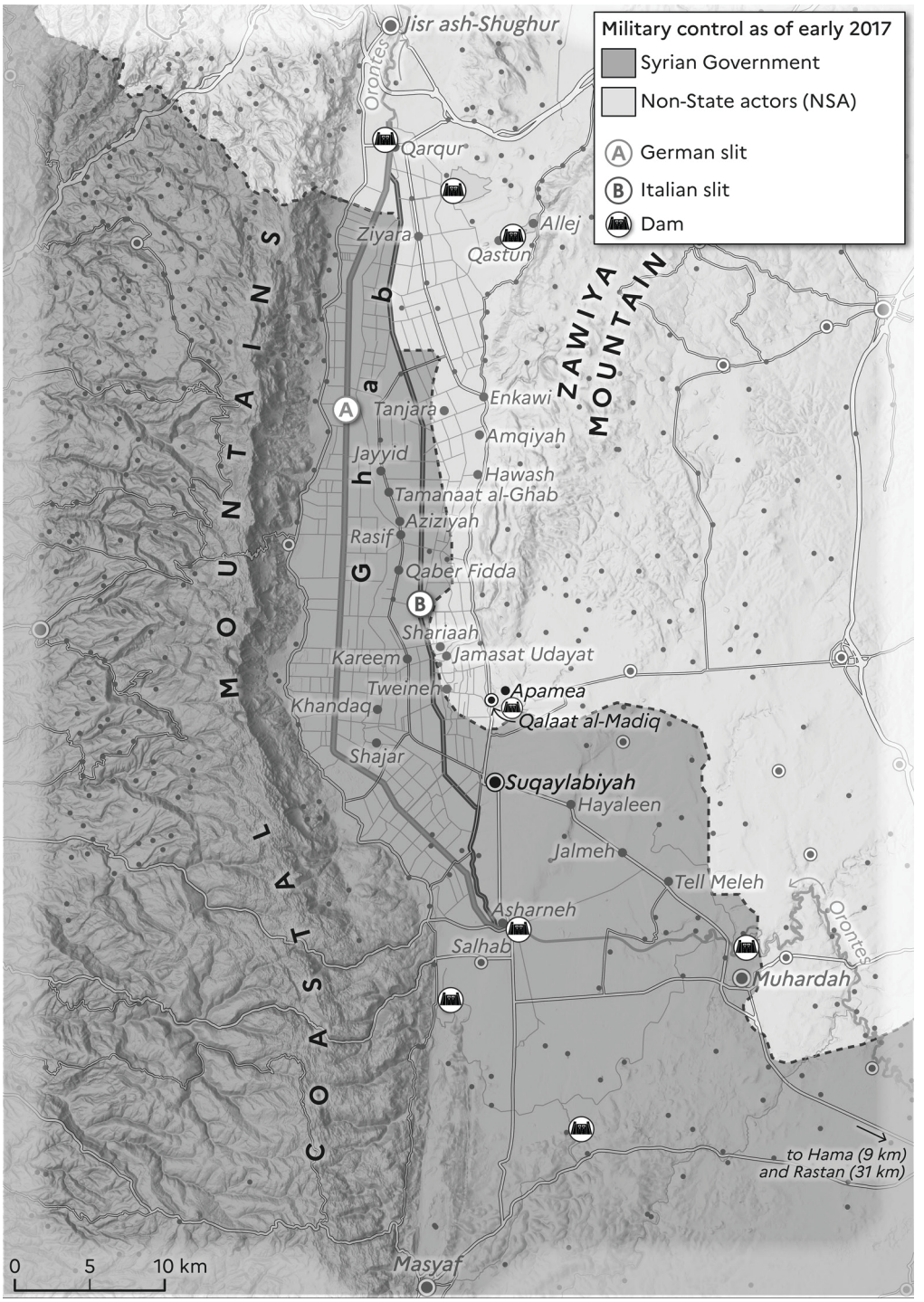



*Figure 50.3* Qalaat al-Madiq 2017. Conceptualization: the author. Cartographic elaboration in collaboration with Luca Mazzali.

Some local actors[10] in both the al-Madiq and Suqaylabiyah areas played an important role in maintaining contact among communities in these areas despite the presence of military checkpoints and warlords on both sides.

These actors made use of their shared cultural and socio-economic local practices in the negotiations with the controlling parties for various humanitarian issues, such as limiting the kidnapping of people, the possibility of employees in the directorates in the GoS area crossing and returning to their homes under the control of the opposition, and delivering wheat from the silos of al-Madiq to Suqaylabiyah. Most importantly, they were able to obtain permits from the local authorities (in both NSA and GoS) to clean some of the irrigation channels in the contested areas and maintain the water pumps.

What distinguished this area from other crossing areas is the high level of local community trust. Dating from before the conflict, this trust, in many cases, utilized the law, overlooked parts of it, or took advantage of its flexibility to support local needs. In these cases, the local administrative or technical class played a crucial role that was not available during the intense centralization in Damascus prior to 2011.

The strength of this role lay in its ability to foster local trust, technical and social practice knowledge, and the ability to influence local decision-making. In other cases, these local technicians and administrators confronted the local militants and negotiated with them. They preserved the remaining infrastructure and refused to politicize it, in light of war media celebrating the theft of pumps and demolishing bridges on the Orontes, on the pretext that they were "regime" property, or on the other hand, that they were "incubators of terrorism."

Although these local negotiations were based on trust, common needs, and socio-economic relationships, the achievements of these local negotiations were limited to a form of temporary reduction of hostility between the parties in conflict during the execution of the work. The continuation of the armed conflict, especially the escalation in 2018, which was directly linked to international and regional pressures, did not consider the potentiality of the local negotiations as an opportunity or an asset for a possible truce.

In fact, regional and international negotiations led to finding an unarmed solution that guaranteed the residents could stay in their areas even if the area was back under GoS control from the NSA (with the so-called Russian guarantee obligating the government to give relative autonomy to the local administration, as was the case of Rastan). However, the negotiations failed in the case of Qalaat al-Madiq to find a peaceful solution.

It was a purely military operation backed by Russian support, and a decline in Turkish support led to the displacement of most of the residents of Qalaat al-Madiq in 2019 to the northwestern areas, which were under the control of the Turkish-backed Hayaat Tahrir al-Sham (HTS).

After 2019, the borders separating the dominant military forces were shifted to the north, to the Ziyara area (see Figure 50.4).

Al-Madiq is now called a "military deployment area," although it did not differ from the neighboring areas except for the fact that it was not subjected to a settlement deal but rather to a military invasion. Consequently, even the people of Qalaat al-Madiq, who had been displaced to other areas under government control during the conflict, would face different treatment from the neighboring areas that were settled and were now called "safe areas."

The state allowed whoever was under its control and belonged to the Qalaat al-Madiq area to work on their own land. As for the lands of the displaced—refugees, diaspora, detainees, and the deceased—the state opened them up for investment by public auction.

Whereas in the neighboring areas that were subject to a settlement deal, the state allowed the first- through fourth-degree relatives[11] (only on the father's side and not on the mother's side) to

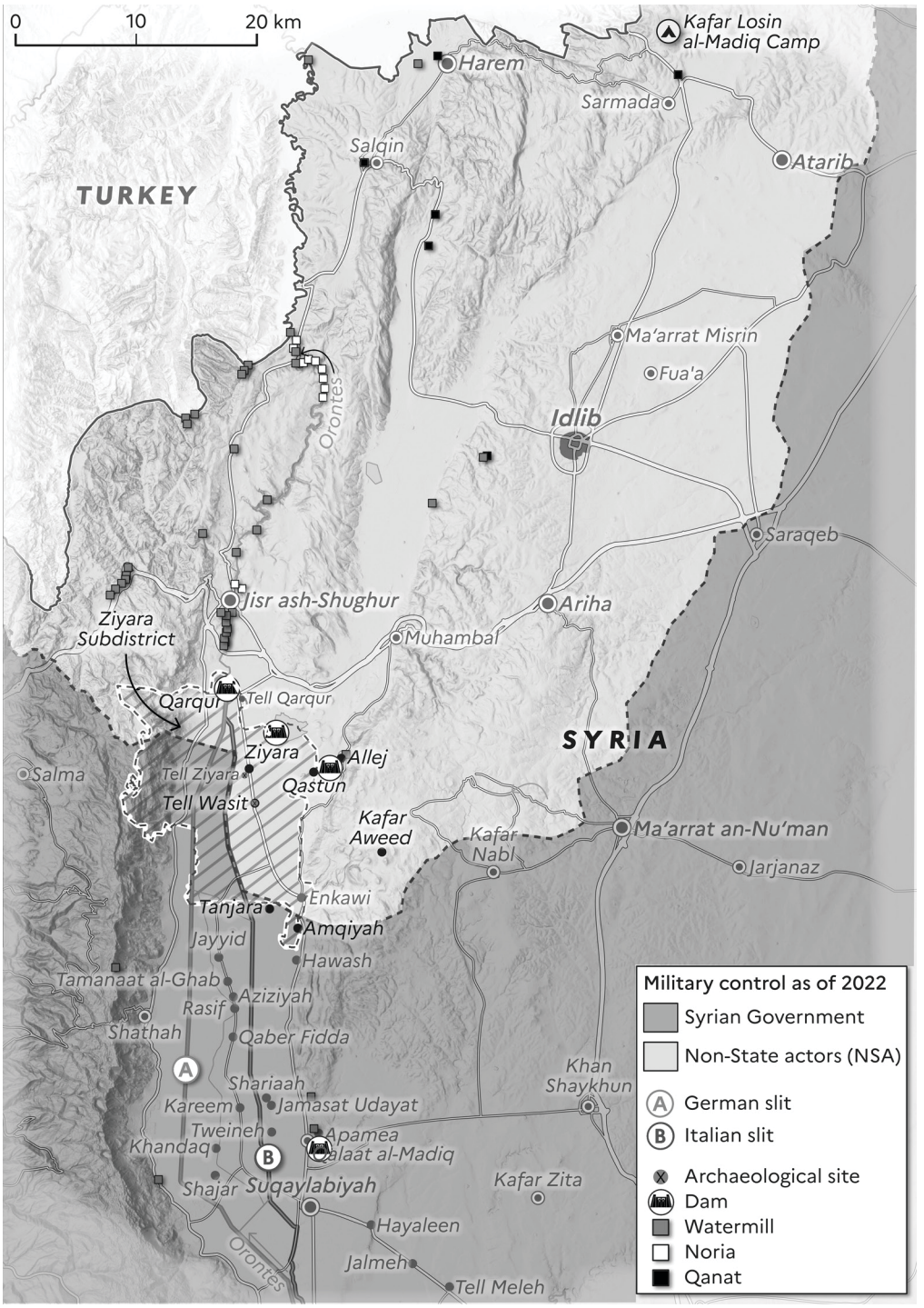



*Figure 50.4* Ziyara Area 2022. Conceptualization: the author. Cartographic elaboration in collaboration with Luca Mazzali.

invest in the lands of their relatives if they were provided powers of attorney by the landowners. Last, in the Qalaat al-Madiq area (which is considered a military deployment area), only the owner of the land is allowed to work on their land.[12]

When it comes to the absentee lands, they are sold at public auctions of property seized by local militias in the Ghab Plain and militias from other areas.

Sometimes, in both the "safe areas" and the "military deployment area," it occurred that the owners of the land were present, but the militia also wanted their land. Even if, by law, the owners had the right to cultivate their own land, the militia was vindicated and stole the crop by force or burnt the land before the harvest. On the other hand, the farmer may be forced to burn his land with his crop if the law does not give him his right. Or, he would have to pay a percentage of the crop ranging from 30% to 50% from his crop to the armed militias.

Cultivations in Qalaat al-Madiq lands are limited to rain-fed crops (wheat, nigella, and cumin), as, due to the lack of electricity and the high cost of fuel, the pumps cannot be activated in the wells, and most of the irrigation water network is not rehabilitated. Therefore, it is not possible to rely on irrigated agriculture. And since the area is within a military deployment area, international organizations and UN agencies are not allowed to operate there.

*"If they allow us to come back and live safely, we will return tomorrow,"* explained a farmer from Qalaat al-Madiq, who is now one of the internally displaced persons in the Kafr Losin al-Madiq Camp.

## Ziyara Area Case Study

The subdistrict Ziyara is located in the northern part of the Ghab Plain in the Suqaylabiyah district in Hama. Currently, it is a border area between the NSA led by HTS supported by Turkey in the northeast and the central (GoS) forces supported by Russia and Iran in the southwest.

The subdistrict includes the town of Ziyara and more than 20 villages characterized by social and cultural diversity. The lands are distributed between a former private property of the al-Ghab draining project and lands that were reclaimed and distributed after draining the al-Ghab swamp. Therefore, these villages depend mainly on agriculture for their livelihood. The cultivated area is irrigated from dam water through a network of irrigation and drainage canals. As with the whole area of al-Ghab, Ziyara is considered a region rich in natural resources. It contains the Allej and al-Amiqah springs, in addition to modern facilities and dams such as the Qastun, Qarqur, and Zayzun dams. There are several archaeological sites, such as Tell Qarqur, Tell Wasit, and Tell Ziyara.

Before the conflict, the area had a reputation for the illicit trafficking of antiquities, and after the crisis, it witnessed illegal excavations and trade in antiquities.

The drainage Channel A, which is locally called the "German slit," is entirely under the control of government forces. The parallel channel is Channel B, called the "Italian slit," which extends until the village of Tanjara under the control of GoS and continues from Tanjara to the Qarqur Dam with another local name "Syrian slit" (where Syria continued to dig Channel B), under the control of the HTS, where the two canals flow into the Qarqur Dam.

Ziyara is considered an unsafe area, and it is difficult for farmers to return to their lands and cultivate them because the lands are on the border between the two control areas (80% under HTS and 20% under GoS control) and are subject to armed clashes despite the ceasefire agreement signed by the guarantor countries, Russia and Turkey, in March of 2020 (see Figure 50.4).

Armed militias have used water as a weapon against people during various stages of the conflict: The Syrian branch of the Turkistan Islamic Party (TIP) in the HTS control area dismantled the Zayzun power stations and sold most of its equipment in 2019. In 2020, TIP removed the

pipelines of the irrigation systems in the region, which more than 2,000 dunums (equivalent to 200 hectares) of land planted with vegetables relied on for irrigation (STJ 2020).

Furthermore, according to some farmers in the region, in 2020, TIP refused to open and close the gates of the Qarqur Dam, which either caused the drying of the canals or the flooding of lands, and the response from the government forces was a threat to blow up the dam if the TIP continues to control the dam.

The armed militias' control of the irrigation systems in the area made life difficult and impossible for the residents. On the one hand, the deterioration of the irrigation and drainage networks and the inability to maintain them have led to a lot of damage, including the impact on the farmers' incomes, who have been forced to depend on rain-fed agriculture and to transition from irrigated wheat and sugar beet to the winter agriculture season, mainly wheat and barley. It also led to the deterioration of the soil as a result of the lack of good drainage, which in turn led to the elimination of some types of crops, such as the nigella crop, which is a new cultivation that did not exist in the area before (Abdul Jawad 2018).

On the other hand, the high cost of fertilizers and pesticides (which farmers were forced to buy when they were subsidized by the Syrian government through agricultural cooperative banks prior to 2011) is an additional obstacle to the feasibility of continuing working in agriculture. Currently, there is no support for farmers in the Ghab Plain. International organizations in the HTS-controlled areas do not want to work in the area because it is considered a "military hot area" (Abdul Jawad 2022), thereby leading to the decline of agriculture and some farmers abandoning their land and searching for other work. In addition, the section under the control of GoS is considered a military deployment area, and therefore, its farmers suffer from the situation mentioned in the Qalaat al-Madiq area.

However, the interdependence of the geographical and historical extension of the area and the Ghab Plain, as a whole, including the impact of the armed conflict, confirms the impossibility of severing its links even though it is a border area of conflict; the damage to the infrastructure of water resources and soil in any part of the area will consequently affect the other side.

This socio-economic interdependence in the area has led to the emergence of a communitarian need from both sides to find solutions to the problems that hinder their work and to reconnect the divided areas. For instance, problems could arise in practicing agriculture in border areas and harvesting crops, selling crops (especially to the GoS control areas as the Turkish borders do not allow the entry of any Syrian product, and therefore the market for those areas is limited to government areas), water security and maintenance of irrigation channels linked to each other, and the presence of food industry factories in the GoS area (in case they will be reactivated).

Throughout this process, a local role emerged for some notables who held positions as members of cooperative farmers associations (CFA) or employees in the official departments of Syrian institutions before the conflict, and they became reappointed by local communities as local representatives and negotiators after the area was no longer under control of government forces.

Before the conflict, the CFA members were the link between farmers and agricultural cooperative banks, and through them, grain, fertilizer, and seed were received, and crops were delivered. They used to have the necessary knowledge of agricultural laws and techniques, administrative procedures, and, most importantly, local credibility. After the conflict, together with some other ex-employees, they maintained their relationships with their colleagues in the government-controlled areas, with whom they either had a long-term collegial relationship when they worked together in the state directorates before the conflict or because some of the employees or the CFA members

who work in the state directorates are originally from the Ziyara area, largely under opposition control.

This made them mediators in both areas in terms of agricultural work, in particular, but also in terms of other informal aspects such as coordinating the delivery of humanitarian aid and negotiating hostages between the two parties of the conflict, as well as other critical functions. These representatives have been playing an important role in the ability of some farmers, whose lands are located in opposition-controlled areas and close to the line of military engagement, to cultivate and sell their crops (see Box 50.2).

**Box 50.2 Testimony of a Farmer Working the Land in a Cross-line Territory between GoS and NSA Forces**

Mr. H. M. from the village of Kafr Oweid, located in Idlib, in the north of the Ghab Plain, has agricultural lands in the al-Ghab (because he was among those who acquired lands during the agrarian reform period).

Last year, in 2021, he was able to cultivate 40 hectares of wheat, reaping the crops and selling them to the GoS area.

This year, in 2022, he was able to invest and work the land of other farmers who could not buy seeds, grains, and fertilizers and is currently preparing for the harvest. The process was carried out by some employees of the agricultural directorates in the area under government control.

They were able to negotiate and coordinate with an officer of the government forces, who gave assurance that no individual action would take place by the local militia at the checkpoints, in return for a sum of money paid by Mr. H. M. at the time of harvest ($10 per hectare).

He cultivated a rain-fed wheat only in the winter that needs little water, which is available from the Syrian canal in the winter.

Negotiations are also continuing through CFA members to secure the cleaning of the Syrian canal connecting Qarqur Dam to the Italian slit (B) without being subjected to sniping by the conflicted parties since the canal and people's lands are in the area of the military conflict.

## Analysis of the Two Case Studies

In this chapter, I discussed how the local agricultural heritage of the Ghab Plain area is central to understanding community resilience and the success of community-scale water diplomacy efforts during an armed conflict.

With the term "local agricultural heritage," I focus on two intertwined aspects of heritage: the issue of heritage vitality and continuity, on the one hand, and its plurality within single villages or the context of the Ghab Plain and its surrounding area, on the other hand.

Regarding the first aspect, which is the vitality of heritage or living heritage, I want to delve into the examples of negotiations that communities conduct to access water and resources (Smith 2022, Howard et al. 2008).

The vitality of the heritage forces us to face the practical aspects of the practice, including understanding irrigation techniques and the means of community negotiation. This vitality compels

us not to limit our approaches to preserving the physical aspects of the remaining monuments of ancient water facility systems (ICOMOS 2015).

Instead, heritage vitality invites us to understand the soil deterioration conditions and the governance of the process as a whole, from developing agricultural policies to finding ways to understand, apply, and circumvent such policies.

As for the second aspect, which is plural heritage (see Whitehead, Schofield, and Bozoğlu 2021), I focused my argument on the importance of understanding the variety of heritages in influencing people's perception of themselves and the formation of their ambitions and grievances. This attempt has been made by recalling pasts and linking those pasts to the behavior of the people during the armed conflict.

As claimed in several technical studies, the Ghab Plain may appear to constitute a homogeneous area whose villages are governed by similar conditions geographically and administratively (draining of swamps, similarities to the allocations for agricultural reclamation, subjection to the same agricultural policies and irrigation systems). Yet, al-Ghab inhabitants are not a unified and harmonized community, and here I stress again that these dissonances are not limited to place, sect, or ethnicity but are spread across places and communities.

This was clearly reflected in the strength of people's social solidarity to solve problems (across multiple places as well as within one place) and in its negative power when it came to the use of weapons and the destruction of infrastructure.

The two case studies presented here (Qalaat al-Madiq and Ziyara) encourage us to see the extent to which heritage impacts daily community practices. These practices have been reinforced over time and stimulated informal, customary patterns that allow communities to circumvent top-down, centralized policies, especially irrational ones.

Box 50.3 provides simple examples that are renewed daily, and the extent of their depth and severity varies from one case to another.

**Box 50.3 Fragments of Conversations between the Author and Sources on the Ground Regarding the Challenges of Coping with the Normative Framework**

> As a farmer, how can my neighbor have the right to dig a well in his land because the right to a license included him at a certain time, and I have land next to him and I could not dig a well in it because I am out of time?
>
> (a farmer from Qalaat al-Madiq area)

> How can I, as an employee, uproot some kind of tree in one farmer's land because it is not designated for this type of tree?
>
> (employee at the Directorate of Agriculture in Hama)

> Why should I care about good water drainage for fear of soil and groundwater pollution if its current use increases my crops?
>
> (another farmer from Qalaat al-Madiq area)

Indeed, as also described in the two case studies, neglecting the area's plural and living heritage has been one of the main factors in water mismanagement before the conflict and, later, by fueling and reverberating it.

The two case studies show us that local individuals are not passive recipients of planning and technical recommendations, or inactive entities, unskilled and with no role, almost completely unable to understand the top-down policies or as unaware victims of long-term water mismanagement.

As described in pre-2011 conditions, there were individuals across the region who worked at the local administration level, understood the policies, and had been trying to find a way to implement or circumvent them for the benefit of the people.

There were also individuals who exploited the bureaucracy of these policies to further corruption, while other employees were there just to obtain the "fixed job" in the state without a desire to know more or to play an active role.

Subsequently, the post-2011 armed conflict constituted favorable circumstances to transform the previous situation that had neglected social issues and was undermined by the centralization of the state into a destructive war.

In this phase, the administrators and technicians across the region, who were and still are employees in state institutions, have been playing an essential and preventative role in possessing knowledge and communities' credibility.

Despite the enormous obstacles, these individuals have been able to protect some of the common interests in their areas and exploit their ability to negotiate, find solutions, and mitigate the severity of the fragmentation.

Other individuals in the region destroyed infrastructure, stole their machinery, turned institutions into military bases, used water and agriculture as weapons, and turned the accumulated long-term neglect, marginalization, and ignorance across the region into time bombs.

## Conclusions

This chapter has focused on how plural and living heritage play a critical role in understanding community-scale water diplomacy practices. Attending to the plural and living heritage of the al-Ghab requires attention to its deep histories, the centralized agricultural reforms in the recent past, as well as the ongoing armed conflict. Attention to heritage is essential not only for understanding community-scale water diplomacy but also for understanding community resilience and for designing sustainable development interventions. In closing, I provide some preliminary but not exhaustive suggestions.

### *Trace and Understand Memory Signals and Deep Practices*

We are called to connect the memory signals that carry what the past has been generating continuously into the present day. For instance, we can start from the communities that settled al-Ghab before its drainage. Or, for example, we can recall the sociopolitical-economic conditions that led to the isolation of some of these groups from participating in public affairs: for instance, the employment of some groups in the state without others, the inclusion of others to be part of the army, and most importantly, the consequences of agricultural reform, central agricultural policies, and tenure problems.

Therefore, we need to put aside the superficial readings, those analyzing, for instance, the current conflict map of the al-Ghab area, and conclude that the conflict is a sectarian one, as it is between the Sunni villages located east of the Italian slit (NSA control) and the Alawite villages

that lie west of the Italian slit (GoS control). As we have seen, the situation is far more complex than these representations.

### *Conflicts Do Not Produce Healthy Decentralization*

Some observers consider that the state's inability to follow up as before on the increased centralization means greater freedom or autonomy for localities, and therefore, it is a positive point. It may be so in the short term, but decades of centralization and dependence on the state for every aspect cannot provide an instant healthy local transition in the long term. Decentralization is a process that requires careful construction that does not risk the fragmentation of regions.

There is still a societal desire to have a role for the state and to activate its institutions. After talking about the need for water and electricity and the additional demands, most of the interviewees agree that safety is the main element in establishing trust between people and the state and is an essential element before they can return to their homes.

In this case, the state's inability to control the region's security and leave some of its institutions under the control of the militants is a continuation of the conflict and a loss of the remaining opportunities for life to continue in the region.

### *Capitalize on Technical and Administrative Key Figures*

Throughout the chapter, I emphasize how important the role of the administrators and technicians is across places that were and/or are still employees in state institutions. These individuals were able, despite the enormous obstacles, to protect some of the interests of their communities. They used their ability to understand the context, their negotiation skills, and their relations to find local solutions that consequently contributed to alleviating the severity of the fragmentation. Development planners, policymakers, international non-governmental organizations (INGOs), and state institutions need to involve these people from the initial planning and decision-making step.

### *UN Agencies, International and Regional Powers' Roles, and Responsibilities*

With Syria isolated from the West due to the conflict and the imposition of economic sanctions, the role of United Nations agencies is emerging as pivotal. Not only because it provides funding for basic services that the state can no longer provide but also because it can positively or negatively affect development, clientelism, and social cohesion, among others.

The case studies have also proven that there is a key role for external countries that participated directly or indirectly in the conflict in Syria. It is important to have studies that show the role of these countries in igniting the conflict or supporting extremist groups, the implications of external countries' role in the right to water, and the negative impact on the environment.

In this context, it is known that some of these UN agencies and INGOs (whether because they are bound by national political orientations or sometimes committed to what the donor countries want) work in some villages and not others. Usually, the pretext is that other villages "participated in the bloody conflict." As we have seen, violence was not associated with a place or a sect, nor did it arise out of the blue.

Therefore, and as the socio-economic context has proven, any plan or project that does not consider the socio-economic value chains and relationships of the region as a whole—no matter how beneficial it is to one village in the short term—will be very harmful to the whole region in the medium and long term.

## Notes

1 Richard Thoumin (1897–1972) was a geographer, historian, and officer of the French Army dispatched to Syria in 1930s.
2 René Dussaud (1868–1958) was a French geographer, archaeologist, and epigrapher.
3 Ahmad Wasfi Zakaria (1889–1964) is a Syrian writer, researcher, traveler, and agricultural expert.
4 Dussaud described the inhabitants of al-Ghab as "Gabenoi descent," a mix of Arab "Bedouins," and farmers who lived in miserable villages with fever and insects (Dussaud 1927, 233). Wasfi Zakaria visited the area in the 1930s and wrote: "People there have yellow faces and sick bodies, traveling like Central Africans in boats" (Zakariya 1934, 144).
5 I would like to suggest a modification in the method Thoumin had classified the categories of villages, which is essentially sectarian, as the orientalists used to see the regions in the past, and as the current conflict in Syria sometimes becomes interpreted. The objective of canceling the sectarian dimensions of the villages is not to ignore or deny sectarian differences, but to emphasize the other common and different aspects inside each group/community and among these communities. These aspects in our case are more relevant than sectarian differences. Furthermore, we know, by being part of the context, that the differences among communities are more cultural than religious or sectarian.
6 I elaborated on this categorization initially inspired by the inputs provided by both Thoumin (1936, 528–538) and Zakaria (1984, 144). My suggestion, however, took consideration of the many other factors quoted above in the text and intends to overcome the strong emphasis on the sectarian belonging of the al-Ghab people.
7 Most of the "Nousairi" mentioned by Thoumin (1936, 528–538) were actually Murshidites. The protesting movement of the Murshidites is particularly significant for studying the socio-economic and political dynamics of the Orontes Valley. Although it is not possible to deal with it in depth here, it is important to note that the uprising of Suleiman al Murshidi is part of a broader story.
8 As pointed out by Wattenbach: *"Nevertheless, even land reform land is openly sold within the villages in other cases to circumvent burning problems of land distribution with the consent of the village authorities, effectively demonstrating that market forces are progressing more rapidly than the documented legal process seems to indicate"* (Wattenbach 2006, 106).
9 In the districts and subdistricts of al-Ghab Plain considered for this article, in almost one decade, between March 2011 and March 2020, it is estimated that hundreds of thousands of people were forcefully displaced from their places (see the March 2020 updated Monitoring IDP Sites Matrix elaborated by the Global Camp Coordination and Camp Management [CCCM Cluster 2020]). In calculating these estimates, we need to consider that most of the available data are aggregated and organized by international humanitarian agencies according to the present Syrian administrative division. However, this administrative division and the related aggregated data do not necessarily reflect the de facto territorial unity of al-Ghab's localities considered in this article. Thus, the estimates could not be fully accurate but are the result of a partial count based on the available data extracted by the CCCM's matrices in each district and subdistrict in both Idlib and Hama regions.
10 These local actors could be former or present teachers, drivers, and employees in government institutions. Many of them were able to carry out their work in the government-held area and then come back the same day to the NSA-held area where they live. Officially these were the only people who could pass through the checkpoints (with the exceptions of the various warlords). See Ziedan (2021, 326).
11 Circular issued by the Governor of Hama on May 12, 2022.
12 Circular issued by the head of the Military and Security Committee in Hama Governorate on October 28, 2021.

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## SECTION IX

# Reflections



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# 51

# GROUND RULES FOR WATER DIPLOMACY NEGOTIATORS

*Zodwa Dlamini*

**Key Takeaways**

- This chapter provides practical lessons from a practitioner for negotiators on conducting effective transboundary negotiations for countries already at the negotiating table and those still seeking to do so.
- The chapter identifies common mistakes, such as forgoing preparatory meetings and failing to establish the terms of engagement adequately.
- The chapter identifies important strategies, such as going beyond understanding what your counterpart seeks in the deal to identify additional sources of mutual value that can be gained without disadvantaging your team's mandate.

## Introduction

This chapter provides a detailed discussion of strategies and approaches to effective transboundary and water diplomacy negotiation. With many years of experience as a transboundary practitioner and negotiator as well as involvement in education and labor relations earlier in my career, I have had many successes and challenges during my tenure. Reflecting on those successes and, yes, failures has afforded me the opportunity to share with other practitioners, scholars, and academics some of the best practices I used to enhance my successes and, more importantly, avoid subsequent failures. Throughout this chapter, I refer to these strategies and approaches in water diplomacy as ground rules that are part of my "go-to" toolkit. As already indicated, I used these ground rules successfully to negotiate with labor in my previous life and later in water diplomacy, while negotiating the Lesotho Highlands Water Project (LHWP) Phase II Agreement,[1] Energy Memorandum of Understanding, and other subsequent agreements. It is essential to note that these ground rules are also applicable to those parties that have not yet made it to the negotiating table, considering that a lot of legwork has to be done before the parties sit around the table. Please note that ground rules addressed here are generic even though they are targeting water diplomacy negotiators from a water diplomacy practitioner's perspective and are project-specific.

## What Are Ground Rules?

I define ground rules as a set of tools that assist in managing the process, be it negotiation or governance at all levels, and provide a roadmap to navigate and dictate the behavior and management

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of negotiation processes. Similarly, organizations are also governed by ground rules, which distinguish them from other similar organizations and define their organizational culture. Roger Schwarz (2016), in Meeting Management, argues that behavioral ground rules are more useful, since they explicitly describe actions that team members should adhere to in order to act effectively within the set timeframes and boundaries.

As already stated, this chapter explores some best practices in ground rules that should come in handy when engaging in water diplomacy negotiations, especially because transboundary challenges are diverse and complex in nature (Susskind and Islam 2012). Consequently, practices and ground rules should be rooted in principles of transparency, humility, flexibility, and authenticity by piggybacking on the body of knowledge developed by water diplomacy practitioners over the years. I have also used various ground rules during negotiations and yielded positive results, even though achieving the final goal was not always smooth sailing.

What is always paramount in transboundary and water diplomacy is the fact that food, water, and energy security are always at the core of the negotiation; hence, the ground rules become the facilitator to promptly achieve the agreement. As such, interdependence and humanity-based ground rules are paramount. As a lead water diplomacy convener and negotiator together with my team, our strategy was to always use a win-win rather than a winner-takes-all approach using the legal frameworks as the guideline. These ground rules are arranged into four categories: Personal Preparation, Planning, Proceedings, and Procedures.

## Personal Preparations

### *Understanding Your Mandate*

As the chief negotiator for a team of 20 professionals representing South Africa in Lesotho, including technical team members, it was imperative to understand what I was meant to negotiate and my overall mandate for this task. I relied on my appointment letter detailing the task I was charged with and the related power they bestowed upon me for this specific assignment. The expected timeframes to achieve our goal and the budget allocation informed my engagement with my counterparts. Points of clarification and concerns are raised here should there be any. Knowing your power and the extent thereof will assist in ensuring your task is achieved in a timely manner. For example, choosing your negotiating team, proposing a realistic budget, and clarifying reporting lines are some of the powers being referred to and critical to achieving the goal.

### *Establishing Reporting Lines*

The objective of a clear mandate resolves the issue of reporting lines, especially when urgent decisions are required. During major negotiations, I always had access to the Minister and the Director General, and that direct access eliminated delays. Similarly, this access and openness were extended to my team to report on their progress, including challenges, so we could together find lasting solutions. Invariably, reporting lines will differ depending on where the assignment was commissioned and the significance thereof.

### *Budget*

In order to ensure successful negotiation, it is essential that a realistic budget is allocated as part of the mandate. When negotiating the LHWP Phase II agreement, the budget included research

studies, travel, and accommodation including consultancy fees. In transboundary water diplomacy, it is common to host meetings in various locations and neutral countries depending on the complexity of the issues being negotiated. Budget monitoring is critical to ensure that, should there be a need for an unexpected increase, I am prepared to negotiate and defend my request. Do not exceed your budget – your reputation as an effective negotiator is also based on your ability to make efficient use of scarce financial resources.

## Planning for the Negotiations

Negotiation is a project in itself, and some negotiations take less time while others extend beyond a year or more, depending on the complexity of the issues being negotiated; hence, efficient and thorough planning is imperative. Harappa Diaries (2020) argues that planning is a basic component of project management. Negotiation planning means "creating a roadmap to decide which actions need to be taken to achieve a specific goal." The following are critical steps in planning negotiation.

- Step 1: Conduct a feasibility study or/and review all the existing studies regarding what you are about to negotiate in order to familiarize yourself and the team with the overall issues.
- Step 2: If you have no relations with your counterpart/s, conduct an investigation to get the following facts: what is their negotiation track record, who is likely to be the chief negotiator, and what kind of person are they.
- Step 3: What is their take on the proposal – detail the benefits that can accrue for their side; ensure you fully understand the country context. This information gathering is fundamental for your planning as well as preparing for anticipated curveballs during negotiations.
- Step 4: Establish a good rapport by creating networks with your counterparts to gather as much information as necessary.

### *Team Selection*

Since team selection is always task specific, it is essential to establish a recruitment plan that will identify members who will add value to the team and complement each other. On the technical side, ensure that your team has skilled individuals at the cutting edge of technological innovation in their field, practitioners to provide practical knowledge operationally, and goal- and result-oriented individuals who are self-driven and good communicators. Let me also flag the importance of including the following during selection: character, behavioral personalities including their temperament since these characteristics have the potential to derail negotiations if unchecked, and integrity. By nature negotiations are unpredictable; hence, it is advisable to select calm members who will manage volatile situations during negotiation posturing.

### *Accuracy of Data*

Earlier on in my career, my mentor advised me to always get the facts/data right first regarding what I am requested to negotiate because he contended facts backed up by solid research will usually ensure positive results and expedite the negotiation process. I have never looked back; having facts/data is one of my go-to ground rules in my toolbox. Since transboundary negotiations and agreements are multifaceted and complex at times, it is essential that an alignment with implementation is ensured. This is where facts and data play a crucial role in answering the

question, have you been successful in using the facts or data effectively for successful implementation? A case in point is when the Republic of South Africa entered into LHWP Phase II negotiations; South Africa conducted various simulation studies to review how much water would be needed by 2050, taking into consideration the anticipated industrial, economic growth and climate change. This information became critical in our negotiations especially because various existing variables such as climate change, population growth, and funding had to be taken into consideration for both upstream and downstream countries. Meanwhile, unbeknownst to us, as we later learned, our counterparts also conducted their own research on our needs as part of their preparatory planning. In the spirit of transparency, we presented the simulation study and results to assure them of good faith.

### *Meeting of the Parties' Principals*

From the practitioner's point of view, this is a very strategic meeting where parties, especially the Principals (be it ministers or heads of states/presidents) and chief negotiators, meet to broach the negotiations and provide clarifications on their proposal. The parties represented by the heads of states will instruct their ministers to explore this issue and engage the officials to take the matter further to the negotiation stage. The proposing party prepares a detailed presentation specifying its proposal and benefits to the counterparts and the region depending on the circumstances. Once the parties agree to proceed with negotiations, the Memorandum of Understanding (MoU) is drafted and agreed upon, and the recording of the proceedings is captured as reference for the officials who will proceed with negotiations.

### *Choosing Negotiation Secretary*

During the LHWP negotiations, we used the Lesotho Highlands Water Commission's (comprising officials from both countries based in Lesotho) Secretary who was from neither of the two countries but funded by both parties. The appointment contract should specify the code of conduct and emphasize integrity as critical. I found this appointment to have been the best because of how matters were reported during deliberations, but, most importantly, because of the integrity with which he carried out his duties at all times. It is therefore my contention that based on the complexity of the issue to be negotiated, it is advisable to appoint the secretary, preferably a neutral person, to ascertain fairness. The secretary will ensure that accurate, copious minutes are taken and convene meetings on the recommendations of the parties. The secretary will also keep track of meetings and minutes of the technical teams.

## Negotiation Proceedings

### *Negotiation Commencement*

This is the commencement of the negotiations where the MoU is adopted and clarifications made on issues to be negotiated. This meeting further lays explicitly the foundation for what parties are about to embark on and the way forward. It is essential to note that each project being negotiated will have its own peculiarities. This meeting may be comprised of skeletal negotiating teams or the entire team, depending on the complexity of the issue to be negotiated. The minutes of the meeting of the heads of states and ministers and the MoU will form the gist of the meeting. The party that has initially made the proposal will further elaborate on their proposal and provide further

clarification on the MoU should that be necessary. Finally, the commencement of the negotiations will be declared.

### *Negotiation Agenda*

The agenda is the heart of the negotiations for cementing transparency and good faith; hence, parties will compile and adopt it. Its objective is to guide the negotiation proceedings to reach their ultimate goal, being the agreement. It is essential to note that not all negotiations yield an agreement; some will agree on an MoU that will detail the way forward.

### *Code of Conduct*

Code of conduct is central to negotiation, and members will agree and sign off on those regarding both individual and collective behavior. According to the Institute for Operations Research and Management Sciences (INFORMS) code of conduct, all participants are required to conduct themselves during activities in a professional manner that is welcoming to all participants and free from any form of discrimination and undermining (INFORMS 2021). It is not unusual to experience unbecoming behavior during negotiations, ranging from parties storming out of the meeting to deciding to have forgotten an issue discussed and agreed upon. Should any of this subtle intimidation behavior crop up, it is essential to focus on the task; this is part of the negotiation tactics.

### *Communication*

Effective communication ensures that negotiating parties adopt a goal-oriented as opposed to a position approach. Drs A. Wolf, T. Jarvis, and R. Kunjappan (2014) contend that "the tools, methods and approaches encourage parties to move beyond positional bargaining and the claim/counter claim process." During the LHWP Phase II negotiation, the issue of position versus goal was discussed thoroughly, coupled with flexibility. Another essential aspect of communication is the language used during negotiations since oftentimes parties involved may be second or third language speakers while also being very different culturally. Language use during negotiation is critical, and it is always advisable to request clarification where necessary. For instance, during the LHWP Phase II negotiations there was an impasse regarding the wording our counterparts insisted that we use – South Africa "*shall provide* Lesotho …" However, after weeks of consultations, "*facilitate*" was proposed and subsequently adopted. South Africa could have agreed for expediency's sake to *provide* while knowing there were no such intentions. Of course this would have been deceitful and marred the relations between parties at a later stage when they couldn't deliver on the promise.

### *Joint Reporting to Principals*

It is critical that the Principals are kept in the loop regarding the negotiations through detailed reports. During LHWP Phase II negotiations, both parties had agreed to schedule quarterly progress meetings with Principals. These meetings ensured that Principals were abreast of the issues because of the presentations made and could jointly raise issues to the negotiating teams should it be necessary. Joint visits to the proposed project sites were undertaken and assisted in fostering understanding and appreciation by parties. Since reporting takes place at various levels during negotiations, it is essential to note that these written reports form the foundation of the agreement.

### *Time Frames*

A pragmatic timeframe is proposed by parties while guided by the technical teams' implementation schedules based on the urgency and complexity of issues being negotiated. I found the use of instruments such as the Gantt chart, flow chart, and Microsoft Project practical and helpful in highlighting the milestones and adherence to the schedule. As already stated earlier, time in water diplomacy negotiation is of the essence. For instance, when negotiating infrastructure construction, it is a very fluid situation with price escalations often based on unpredictable volatile global markets. Unnecessary delays will cause negative repercussions in the form of price escalations if timeframes are not adhered to.

### *Legal Framework*

Understanding of the geographical context and the various transboundary, regional, and international laws, existing treaties, protocols, and policies provides the legal backbone of the negotiations. For instance, in the South African Development Community (SADC) region, we rely on the SADC Protocol on Shared Watercourses of 2000, while the LHWP is guided by the Treaty of 1986 between the Kingdom of Lesotho and the Government of the Republic of South Africa on the Implementation of Lesotho Highlands Water Project. Similarly, since the Black Volta is the border between Ghana and the Ivory Coast, it assumes the international stature and the same holds true for the Orange and Nile Rivers. Legal framework provides trustworthiness among partners.

## Negotiation Procedures

### *Confidentiality*

Confidentiality is one of the fundamental ground rules of negotiations and essential for all negotiating members to be well informed with this aspect. Since the South African team was composed of officials from different government departments who would only be present during a particular issue (e.g., taxation), the Chatham House Rule would be invoked. However, for all other members confidentiality agreements were signed before negotiations commenced. The objective of confidentiality is to ensure sanctity of the negotiations and safety of the negotiating teams. Sometimes depending on the circumstances under which these negotiations are taking place, the location may remain confidential.

### *Signing off on Minutes, Resolutions, and Agreements*

Effective negotiation is the end result of agreements made during dialogue. It is therefore critical that all meetings and deliberations are well documented and disseminated to all parties while ensuring that they are signed off. From previous experience as well as the advice from my mentor, I was acutely aware of the importance of signing off on minutes, resolutions, and agreements every time an agreement was reached. It is part of negotiation strategy for some to conveniently forget what they have agreed upon and demand to reopen the issue for negotiation, so signing off on documentation ensures that parties do not renege on agreed decisions and consequently delay proceedings. This is one ground rule I live by.

### *Recess from Negotiations*

Negotiation by its nature is perceived as an unpleasant affair; hence, it is essential that as the chief you are always alert to the situation in the room and promote a sense of comradery among participants. However, there are situations that become very intense and a bit volatile; as the convener, you will strategically call for a recess. This break will afford parties an opportunity to review issues away from the situation with a fresh perspective. If there is an existing relationship, this break may be used for informal talks to seek convergence of minds by having lunch together or tea. There were times I used the existing relationship I enjoyed with the other side's senior members to resolve some issues.

### *Transparency*

There is an inherent perception that negotiation by nature has this element of distrust and withholding information. However, in water diplomacy and transboundary collaboration, the establishment of joint commissions managing shared water resources has addressed this aspect. In furtherance of transparency in the LHWP, we conducted joint feasibility studies, a trend observed also in the Komati Basin Water Authority (KOBWA), the Nile Basin Initiative (NBI), and the Jordan–Israel agreement. The upstream countries of Botswana and Namibia were not part of the LHWP Phase II. They were, however, fully informed of the countries' intention through the invocation of the prior notification to develop Phase II on the Orange River. In response both countries provided a no-objection agreement. Similarly, in 2007, Burkina Faso and Ghana conducted a joint water audit aimed at understanding the water availability, demand, and predictions of impacts of various uses to ensure transparency (Welling et al. 2014).

### *Good Faith*

Good faith is an intention to be sincere, honest, fair, and open, regardless of the outcomes of the interaction, without which an agreement cannot be reached. As the negotiating team, good faith played a prominent role and was even included in the final agreement as a section. This is all to state that all the proceedings will be conducted honorably and truthfully without untruths and exaggeration or misrepresentation of facts used to benefit therefrom. Once parties agree, the negotiation process is expedited.

## Conclusion

As indicated earlier, I have applied these principles effectively to successfully represent, negotiate, and reach agreements for South Africa. These ground rules I consider as best practices that any negotiator may apply, including transboundary ones. The water diplomacy space is complex, multifaceted, and fluid in nature, and water diplomat negotiators need to be vigilant and strategic in the face of diminishing resources to ensure positive agreements are achieved. Using these ground rules will increase your probability for success while ensuring water security for humanity is guaranteed.

## Note

1 The Agreement on Phase II of the Lesotho Highlands Water Project between the government of the Kingdom of Lesotho and the government of the Republic of South Africa was signed at Maseru, August 11, 2011.

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# 52

# WATER DIPLOMACY AND TRANSBOUNDARY WATERCOURSES

## Obstacles and related issues in some middle eastern cases

*Hassan Janabi*

**Key takeaways**

- A clearly mandated negotiating team is more likely to succeed in resolving disputes than a less authorized team that seeks high-level approval for every negotiated step.
- Tangible results in terms of signed agreement, for instance, may be hard to achieve, but intangible results are equally important.
- Things like keeping the channels of communication open, getting to know the stakeholders better, and agreeing to schedule a next step are important intangible results for trust building.
- While it is very important to make your negotiating position eloquently clear, it is equally important to understand fully the position of others; recognition of the rights and views of others at the table is a strong incentive to get your rights and views recognized.

### Introduction

Global interest in freshwater issues began to intensify at the turn of the twentieth century. Prior to this period, freshwater allocation was not a major concern for humanity, as water resources were generally abundant relative to demand (allowing, of course, for localized shortages). During this time, the borders of new nations were neither linked to topography nor the hydrology of rivers and lakes but rather to colonial interests, geopolitical power dynamics, and sectarian considerations.

With economic and population growth, the need for freshwater increased. Competition among nations to control water, especially transboundary water, has intensified. The 1997 United Nations Convention on the Law of Non-Navigational Uses of International Watercourses defines an international watercourse as a watercourse, parts of which are situated in different states, which is the case in most major rivers in the Middle East and elsewhere (UNGA 1997). Therefore, the international watercourse, which usually represents one unit hydrologically, is subject to contradictory administrative, legal, and political circumstances.

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More than two-thirds of the United Nations (UN) Member States share one or more water resources with one or more countries, and 60% of the world's freshwater is shared among multiple nations. In its World Water Development Report 2020, the UN noted that demand for water increases at a rate of 1% per year (UNESCO 2020). This creates fertile conditions for conflicts and problems of an international nature.

Conflicts over water have become more severe due to the advances that have allowed for the widespread construction of large dams. In the second half of the twentieth century, policies promoting the construction of major hydraulic structures were prevalent. The "invention" of dams opened a wide scope for countries to perceive dams as an achievement of "effective" development and management of water resources in a relatively short period! Hence, the world witnessed a "revolution" in the construction of dams. The International Commission on Large Dams maintains the "World Registry of Dams," a database that contains official information on more than 55,000 large dams.[1] The capacity to control water is one aspect of potential conflict. Other aspects include water diversion, excessive extraction, water quality degradation and pollution, changed flow regimes, untimely water releases, and many other social, economic, environmental, and political consequences. Water diplomacy is a set of tools that allow existing or emerging conflicts to be addressed through peaceful dialogue. It is a choice to protect the water interests of the country in a broader context while maintaining peace and stability.

Water diplomacy is not a solution to water scarcity. Rather, it is a concept and an instrument linking foreign policy with diplomacy to defuse conflicts over shared water. Like any bilateral or multilateral agreements, water diplomacy will not add extra water to existing rivers to satisfy riparian countries' escalating and dispute-generating needs. It is a conflict-preventive process and collection of dispute-settling mechanisms with the potential to secure long-term agreements on shared water, including its flexible use.

Using diplomatic mechanisms is neither an automatic solution for transboundary water disputes nor a guarantee to achieve the desired outcome. The process itself requires overcoming internal and external challenges, including political and security dynamics in a complex national and regional setting. As such, there are many ways in which the process can be "spoiled," leading to further delay or jeopardizing potential agreements. In this chapter, we focus on obstacles and spoilers that are especially prevalent in the context of the Middle East.

## Obstacles and related issues

### *Storing more water creates more trouble*

One of the major problems facing the management of transboundary watercourses is the installed storage capacities of the constructed dams. In most cases, the installed capacity exceeds the annual average yield of the relevant river. Especially during the "golden age" of large dams, adverse consequences on the downstream riparian countries were mostly neglected during dam design, construction, and operations. Large dams allow unfair control of the river's hydrology, and consequently, the economic, social, and cultural well-being of downstream societies are often impacted.

As an example, the storage capacity of Lake Nasser upstream of the Aswan High Dam is 169 billion cubic meters (BCM), which is more than double the annual flows of the Nile in Egypt (The Editors of Encyclopedia Britannica 2024). Because Egypt is the most downstream country in the Nile Basin, the impact of the dam is less problematic. The Grand Ethiopian Renaissance Dam is expected to store more than 70 BCM of the Blue Nile upon its completion (NS Energy 2020).

Obviously, it is more troublesome for downstream neighbors. The same applies to the Euphrates River. In Turkey alone, five dams were constructed on the river in less than three decades: the Keban, Karakaya, Atatürk, Karkamış, and Birecik. The total storage capacity of these dams is estimated to be 92 BCM, while the average annual discharge of the Euphrates River is around 30 BCM (Partow 2001, p. 9, Janabi 2010).

Large dams built on the Karun and Karkheh rivers in Iran have enabled Iran to control the entire flow of the two rivers and completely cut off water from discharging into its natural and historical estuaries in Iraqi territories, namely Shatt Al-Arab and Hawizeh Marsh, respectively. The total storage capacity on the Tigris and Euphrates rivers in the four countries, Turkey, Syria, Iraq, and Iran, is about 170 BCM, which is more than twice the annual average flow of the two rivers and their tributaries.

While storing large volumes of water is intended to ensure economic development and mitigate risks of severe drought or floods, doing so comes at the expense of combating desertification and preserving wetlands and biodiversity, especially as these face growing threats from climate change. Moreover, establishing total control over water is problematic, as it creates conditions where transboundary water becomes a source of conflict. Especially in the absence of binding agreements or operational arrangements, the physical capability to control a river's flow enables unilateral action by one country to the detriment of others. Even before such actions are taken, the anticipation of unilateral action creates stress, apprehension, mistrust, and collective animosity among the riparians.

### *Dams alter the pattern of seasonal floods*

Storing water is a strategic way of meeting one country's needs, but it negatively impacts the downstream country's activities, especially those with time-dependent water requirements, such as the seasonal cultivation of strategic crops. Typically, upstream structures hold water during flood seasons and then control its release in the other seasons. This practice shifts the flow of the river across time and alters the pattern of non-destructive seasonal floods.

Seasonal floods are life-giving in river valleys. They renew land fertility, enhance biodiversity, increase green cover, prevent desertification, develop agricultural production, encourage the survival of local communities in their traditional places, preserve wetlands, revitalize traditional industries, etc. Apart from unintentional impacts, this dependency could be exploited by unjust water flow control during certain seasons.

In Iraq, water needs to be available from November to December to cultivate wheat and barley. Rice cultivation, a very ancient practice in Mesopotamia, requires water during the June–July season. Alteration in seasonal water flow results in a devastating effect on the production of these vital crops, threatening the very existence of rural communities known for their dependency on rice or wheat cultivation.

Human settlement in and around lowland marsh areas started 5,000 years ago in Iraq. Seasonal floodwater in spring every year has been the lifeline of this ancient civilization. Cutting off seasonal floods from the marshes during the process of filling upstream storages on a yearly basis is devastating for this World Heritage Site. The Marsh dwellers' unique lifestyle is threatened dangerously, as their adaptability to water scarcity is very low. They are completely dependent on balanced ecosystem processes that have prevailed for millennia.

Forcibly preventing the natural flow of water during the seasons of water abundance creates social, economic, and political crises greater than the short-term benefits of major dams.

### *Unilateralism*

Unilateralism is a narrow-focused approach that pays no attention to consequences outside the national borders. Political borders, which are not natural barriers in most cases, become the real hurdle in managing shared water resources.

The case of the Tigris–Euphrates basins is a striking example of unilateral actions in constructing major dams. Iraq started building its network of hydraulic structures in the first half of the twentieth century. No prior notification to its riparians was required because Iraq is the most downstream country in the basin. Many decades later, Turkey, Iran, and Syria started doing massive projects in the basin unilaterally. However, their actions have resulted in a devastating impact downstream in Iraq.

Turkey completed its controversial Ilisu Dam on the Tigris 60 km north of the Iraqi border. The filling of the dam started at the worst possible time for Iraq, in the spring of 2018. It was a time of severe drought. To make things worse, a contamination incident broke out in Basra, affecting more than 100,000 people. Naturally, Iraq receives its highest inflows in the spring of each year, enabling it to store the excess water for use in the drier seasons. I visited Turkey with an urgent request not to augment the dam in springtime to avoid harming Iraq significantly.

The Turkish argument was that a delay in augmenting the dam would mean a potential loss of $400 million per year, which was expected to be generated from hydropower. I argued that the Iraq–Turkey trade exchange was more than $16 billion, and 95% of it favored Turkey. Bringing Iraq to its knees by cutting off the Tigris water during the then-prevailing drought would result in more losses to both countries financially, in addition to the human costs. A few weeks later, the Turkish side postponed the dam filling, which was a good temporary gesture.

### *You can't jointly manage what you can't jointly measure*

In the absence of valid protocols or a basic understanding between riparian countries, the simplest requirements of Integrated Water Resources Management (IWRM), which is the exchange of information or joint monitoring projects, are hard to fulfill. This simple technical measure becomes a source of tension diplomatically.

Measuring water parameters, such as the flow, is technically easy. Establishing a data exchange protocol is simple and straightforward, too. However, in certain circumstances, environmental data monitored by the government that should be freely accessible gets treated as a state secret by adding a political dimension. Thus, a country's environmental data comes to be seen as a tool for scoring points in an endless upper-hand versus lower-hand discussion rather than as an asset for coming to a negotiated agreement. I have personally seen this "spoiling attitude" during my terms in office in different capacities, discussing issues related to the Tigris–Euphrates River basins.

For instance, to avoid discrepancies in the data that used to be provided to Iraq by Turkey and Syria regarding the Euphrates River flows at the Turkish-Syrian border, I suggested that the gauging station at the border be monitored remotely instead. The proposal was simple, involving the installation of a water data logger, data transmitter, and three servers to be placed in Baghdad, Damascus, and Ankara. Real-time data could then be downloaded simultaneously in the three capitals. This practical solution to a long-lasting dispute over data exchange has not yet been implemented.

Mid-level bureaucrats tend to be hardliners, usually for selfish reasons. In most cases, unresolved and controversial international disputes offer them chances of travel, self-significance, and perceived deciding power in some instances. I witnessed an incident where one of them, a genuine

spoiler, stated "confidently" that there was no such thing as "shared water," explaining further that water is variable and, therefore, can't be shared or negotiated!

Water requirements for development have been wrongly expressed in the form of full control of river flow. Little or no consideration was given to issues like the environment, sustainability, respect for existing uses, the fragility of wetlands, and Indigenous settlements further downstream, as is the case in the marshland areas in Iraq, for instance.

### *Climate impacts are coupled with local human-induced hydrological changes*

The impact of climate change is not confined to any country's national borders. It has a global and regional dimension. These changes to climate are coupled with more localized human-induced impacts from infrastructure development, land-use change, water extraction, industrialization, etc. Such impacts can change the hydrological cycle dramatically and exacerbate the local effects of climate change. This coupling creates uncertainty in determining which impacts are attributable to climate and which to management practices.

For example, due to dwindling inflows to Iraq in the last four decades and irresponsible policies in Iraq in the 1990s to drain the vast marshland in southern Iraq, the recorded average temperature has risen by at least 2 degrees in the last 30 years compared to the prior period. The uninformed population, including some higher-level politicians, attributed the visible changes in the flow and the elevated surface temperatures solely to climate change, overlooking the impact of human-induced measures. It is easy to pass the blame for poor decision-making by associating observed outcomes only with climate change rather than this combination of factors.

Combinations of climate and human-induced changes create temporal and spatial uncertainties. Prolonged drought conditions and heat waves dominated weather conditions in the last 20 years. It is a case that aggravated disputes, incited accusations, and the use of water in internal political skirmishes locally, but it also represents a regional threat in the context of transboundary rivers. I personally had the honor to address the UN Security Council on the risks associated with climate-related security risks in Iraq and the region.[2]

Although the regional challenges, including water scarcity, are transnational, countries' responses remain country-focused and are not coordinated at a regional level. Some of these individual responses and remedies are based on using previously observed hydrological data to forecast the future behavior of transboundary water. Considering climate change and the human-induced changes to the hydrological cycles, the current knowledge of hydrology no longer supports that approach. Future variability and uncertainties are greater than ever before, and this classic way of forecasting hydrology needs to be reviewed.

### *Agricultural decline and virtual water imports*

The water in Iraqi rivers has been deteriorating in quality and decreasing in quantity due mainly to the dams upstream. Water emerged as a real problem, and with time, the already weakened agricultural sector faced total failure, particularly in areas dependent on flood irrigation, which is the very ancient irrigation practice in Mesopotamia that continues to this day due to water abundance in the past.

Over one-third of the Iraqi population lives in rural areas where agriculture is the main economic activity. Failed agriculture, due to lack of water, is a fast track to widespread poverty and mass displacement of people. Food-producing people become food insecure, which has a double impact on societal cohesion and stability.

Historically, the free-flowing rivers entering Iraq made it a water-rich country with sufficient food production. Waters that previously flowed to Iraq have now been seized/stored in neighboring countries and used in the production of crops and livestock, whose products are exported to Iraq to fill the shortage in the market due to the reduced flows. Put another way, Iraq has started virtually importing its own water by importing nearly 70% of its food needs. This is a very serious issue that has not yet received the required attention of the government and society but that needs to be brought to the negotiating table.

### *Disinformation and the politicization of water*

Politicizing water usually puts more pressure on the individuals and organizations responsible for maintaining peace and cooperation with riparian countries on shared waters. In countries with limited governance capacity and weaker water institutions, social media plays a role in spreading misinformation regarding the water situation. The use of media to spread misinformation has never been easier. In Iraq, for instance, every minister, high-level government official, or politician has their information office, spreading unscrutinized information.

Some politicians often make opportunistic statements in crisis times by using water and livelihood insecurity for political advantage. In some instances, purely technical water issues are turned into a political contest, changing the relatively easy-to-agree-upon action into a real hurdle. Ultranationalist and extremist politicians play a similar role by projecting some historical events onto a different reality, using water scarcity as an entry point to mislead uninformed persons. By jeopardizing national interest in pursuing peaceful dialogue with neighbors, those politicians become true spoilers of the diplomacy process. The impact of such disinformation is discussed in more detail in Chapter 18.

Undoubtedly, political will at the top level of government is a crucial key to resolving conflicts when negotiators are not properly authorized to progress forward in settling disputes. High-level politicians need to be kept focused on basin-wide approaches that require a strategic, eagle-eyed outlook that sees beyond immediate benefits toward long-term sustainability. For this to be feasible, mid-level technical personnel must rise above their narrow and sometimes shortsighted operational views.

In my term in office as Minister of Water Resources, I strived to keep the public and main political players informed. I used social media extensively through recorded messages to explain how the water system worked and how citizens should deal responsibly with this increasingly scarce resource. A well-informed society is less susceptible to misinformation and disinformation and is better positioned to adapt to water scarcity. I held meetings with political blocs and their leaders during the water crisis that Iraq witnessed in 2018 (*Basra is Thirsty* 2019). I did the same, appearing in front of the Iraqi Council of Representatives (the Parliament) during a heated debate on water shortage and the contamination incident in Basra to address their concerns directly.

As for the riparian aspect of the water issues, I visited Turkey five times in less than two years. I held lengthy, fruitful discussions with my counterpart.[3] I think the Turkish side came a long way in having a more realistic approach toward Iraq's water concerns. Unfortunately, my successor in the ministry, who came from a political bloc with an unfriendly attitude toward Turkey, spoiled the cooperative approach that took years to develop. Regarding Iran, I was less successful due to the hardline approach by the Iranian side. I was able to meet my Iranian counterpart twice, only during international events, but I never got invited to Tehran.[4] Iran kept doing its own water control projects unilaterally. Proactive engagement is the right way to counterbalance politicizing water, but it requires reciprocity.

### *Governance mismatch*

Water governance challenges must be addressed at the appropriate scale and with the appropriate institutions. For example, localized disputes between upstream and downstream users of water within a country are best addressed through local customs in rural societies or direct intervention by local governments if that fails. When the wrong governance approaches are applied, the outcomes are often ineffective in the long term. This rule applies at every scale.

At the international scale, water diplomacy and transboundary governance should be the domain of the Ministry of Foreign Affairs (MoFA). In Iraq, the Ministry of Water Resources (MoWR), which technically manages the raw water systems inside the country, has taken the responsibility of negotiating with Iraq's neighbors on transboundary waters. This has not been successful. While the combination of "diplomatic" and "technical" tools benefits negotiators, water diplomats from MoFA are more qualified to use diplomatic means than their MoWR's technical colleagues.

### *Political transformation*

A changed political system is yet another hurdle in negotiation efforts. Iraq, Turkey, and Iran have reached satisfactory agreements on water in the past. However, when political systems have changed, disagreements have prevailed. While Iraq has shifted to a parliamentary form of government, replacing the highly centralized system that controlled the country for decades, Turkey has gone the other way, moving from a parliamentary system to a presidential system.

This necessitated a change in the ratification processes of agreements. For instance, the Iraqi–Turkish Memorandum of Understanding (MoU) on water cooperation was signed in 2014. Due to the constitutional changes in Turkey, the MoU was not validated until 2020. It has become necessary for MoUs to be ratified by Parliament and then signed by the Turkish President afterward. On the other hand, in 2009, Iraq's parliament rejected about 40 Iraqi–Turkish MoUs on strategic economic cooperation between the two countries because of the lack of an MoU on shared water.

Iran witnessed dramatic changes in its political system, including transitioning from a secular to a religious government. These changes brought more issues, usually of a political nature, into the question of water-sharing negotiations. Political transformation in riparian countries changes the internal processes regarding international cooperation. They could make past agreements hard to implement and new agreements even harder to achieve.

Political transformation also gives space for the emergence of conflict, such as the Grand Ethiopian Renaissance Dam (GERD) crisis. Indeed, until the crisis, there was some sort of self-assurance that Egypt's previous agreements regarding the division of the Nile waters were sufficient to preserve Egyptian rights in the Nile River basin. Agreements signed by the colonial powers at the time, Britain, Italy, France, and Belgium, from 1891 until the milestone agreement with Sudan in 1959 and beyond, had served their purposes, guaranteeing stable access to the Nile and maintaining peace in the Basin. This assurance fell away with Ethiopia's launch of the GERD project shortly after the 2011 Egyptian revolution.

The crisis has shaken the region's stability and brought it to the brink of war. Diplomatic means have been utilized to a great extent at the level of the League of Arab States, the African Union, and the UN Security Council. The war has been averted compared to the beginning of the crisis, although there could be some hidden tension. The Renaissance Dam crisis showed the sensitivity of transboundary water and the potential of sliding into a devastating war.

### *Terrorism and weaponizing water*

The so-called Islamic State of Iraq and Syria (ISIS), the terrorist organization, used water as a means of war against the people and government forces in Iraq. The terrorists destroyed major irrigation facilities, and the largest dam in Iraq, the Mosul Dam on the Tigris River, came under their control until their defeat and evacuation from the site. In addition to the "occupation" of Mosul Dam on the Tigris, ISIS controlled the Syrian "Tabqa Dam" on the Euphrates River too for several years. As a result, water infrastructure operations were disrupted in Syria and Iraq. Operators and site employees were subjected to indescribable psychological and physical stress and torture.

After the defeat of ISIS, and luckily under my term in office as Minister of Water Resources in Iraq, enormous rehabilitation and reconstruction efforts have been put in place. However, the whole water system suffered a major setback. The effects of wars and terrorism in Iraq (as well as in Syria) have weakened the country's capabilities in all sectors, including the water sector.

### *Overcoming a history of recent conflict*

The Middle East faces multiple recent and ongoing regional challenges. Some countries, such as Syria and Iraq, have struggled with existential challenges due to wars and terrorism. For these countries, issues of shared waters have often ended up near the bottom of the list of priorities. This has had a remarkable impact on the ability of these countries to "catch up" and re-establish lasting relationships over shared waters in recent decades.

Iraq is a "model" country for local, national, and international water challenges. The transition from a country of water abundance and floods throughout history to a state of harsh, extended, frequently recurring water scarcity over a relatively short period of time is a painful experience. This did not happen naturally or accidentally. It resulted from combined human interventions, military conflicts, and climatic factors.

For nearly 40 years, the inflows of the two rivers have been declining, causing a continual concern in Iraqi society. The main reason for the gradual decline in the rivers' inflows was the construction of dams, the first of which was the 31-BCM-storage-capacity Keban dam in 1975 in Turkey at the upper reaches of the Euphrates River. Consecutively, several other major dams were constructed in the following years, which put the flow of the Euphrates River completely under Turkish control. Syria did the same, constructing Tabqa Dam in 1975 with a 12 BCM capacity. The same approach was followed in Iran with its first Dez Dam on the Karun River in 1962 and a capacity of 3.5 BCM. It continued the same practices, constructing more than 20 BCM on the Karun and Karkheh rivers, which used to flow entirely into Iraq.

Iraq has been on the receiving side, busy conducting unwinnable wars with its neighbors and others and facing the tragic consequences of its own actions and the single-handed actions of its neighbors. Currently, every drop of water flowing to Iraq's territories is practically controlled. Historically, neighboring countries were more forthcoming in dealing with transboundary water problems. In the second half of the last century, political alliances and the effect of the Cold War played an obstructive role in the implementation of bilateral agreements between Iraq and its neighbors.

The most remarkable agreement was with Turkey in 1946. The Treaty of Friendship and Neighborly Relations-1946 has a unique protocol on shared water, stipulating all the necessary measures, including monitoring, data collection and information exchange, site visits, surveying and mapping, construction of gauging stations, financing, etc. After nearly 80 years, this outstanding

bilateral agreement has been archived due to political divergence in the past. Currently, the issue of shared water between the two countries is stagnant nearly in square one, at a time when rivers' discharges are at their historical low at the Iraqi borders. In recent years, an MoU on technical cooperation has been activated, and contact at the highest political levels continues. However, mid-level technocrats on both sides must depart from their hardline positions to reach a satisfactory long-term agreement.

The twentieth century witnessed the signing of three agreements between Iraq and Iran. The first was the Constantinople Protocol of 1913, when Iraq was under the Ottoman Empire; the second was in 1937, when Iraq was under British influence; and the last was in 1975.

Iraq signed an agreement in 1990 on sharing the Euphrates River's water with Syria. It was a simple but vital agreement stipulating that Syria would keep 42% of whatever quantity of water crossing its border from Turkey, leaving 58% of the flow to Iraq (Başer and Akinci 2019). Since then, water relations with Syria have been very cooperative.

### *The limits of international law*

Downstream countries are the weakest link, hydrologically speaking. They are disadvantaged because of their geographical locations. The responsibility of upstream countries, despite their "comfortable" geographical and hydrological status, is not minor. Those that are member states of the UN have obligations stemming from that membership. So do parties of international agreements, such as the Framework Convention on Climate Change (UNFCCC), the Convention for the Protection of Biological Diversity (UNCBD), the Convention to Combat Desertification (UNCCD), the Ramsar Convention for the Protection of Wetlands, and others. However, not signing or not ratifying an international convention does not relieve the state from its obligations under the principles of international law because the latter is based mainly on customary law. Still, this does not necessarily translate to action on the part of upstream countries.

### *Resistance to third-party engagement*

Neighboring countries depend on each other in sectors like trade, agriculture, energy, food, tourism, education, security, etc. There are many bilateral issues that countries can deal with easily and swiftly without third-party involvement. While not a totally separate concern from these other interests, issues more directly associated with transboundary water tend to be more complex and problematic. In such cases, third-party facilitators could be useful. See Chapters 10 and 33 for more information on the role of third parties and third-party organizations in water diplomacy.

The problem is that upstream countries, such as Turkey and Iran in the case of the Euphrates and the Tigris, often reject any role of a third party in the matter. The 1975 Iraq–Iran Agreement specified a conflict resolution mechanism involving third parties. However, it was never invoked, even as the two countries entered into a devastating military confrontation a few years after the signing of the agreement. The entire agreement, including its "conflict resolution" mechanism, has been in jeopardy since then.

Iraq's choices are limited. Past agreements with neighbors have no chance of getting implemented, i.e., the 1946 treaty with Turkey and the transboundary water arrangements within the 1975 agreement with Iran. It is, therefore, ready to move forward to a new idea that favors a peaceful resolution of disputes over water, including the participation of a neutral third-party facilitator or mediator.

## Some practical thoughts to deal with obstacles

### *Have persistence and good intentions*

Water diplomacy is a process, and negotiation is the main part of it. Negotiations on transboundary issues are challenging and mostly tedious. Historical events, political alliances, economic interests, internal and external factors, past experiences, and many other factors can impact its progress (or the lack thereof). In the case of bilateral negotiations, and to achieve satisfactory outcomes, it is necessary that they are carried out persistently. An essential requirement for any success is that stakeholders sitting around the negotiating table are equal partners, not a powerful upstream versus a vulnerable downstream country.

While it is very important to make your negotiating position eloquently clear, it is equally important to understand fully the position of others. The assumption that your side is right and that the rest at the negotiating table are wrong is a recipe for undue failure. Recognition of the rights of others at the table is a good incentive to get your rights recognized. Referring to international conventions where riparian countries are member states can also be a gentle reminder of international obligations. However, due care needs to be taken when leveraging water rights to settle disputes in other sectors, especially to avoid politicizing water in the same way other issues are treated.

### *Seek creative options, but be realistic*

Water diplomacy is a responsible, forward-looking, and pragmatic choice to deal with issues related to transboundary water through negotiations and peaceful means. The process may secure a peaceful resolution of water conflicts but will not increase the total river discharge to satisfy every stakeholder's rising demands. This means looking for opportunities for mutual gains (see Chapter 22) and quantifying intangible and indirect benefits (Chapter 16) beyond just available water quantities. Every single river in the world is unique. Alas, transboundary rivers are no different, with additional challenges due to the imposed borders that often have no relation to the river's natural behavior. This creates challenges and opportunities for finding creative options for reaching an agreement.

Theoretically, no single strategy or solution fits all transboundary water disputes. Practically, many lessons can be drawn from successful transboundary water treaties from across the globe. However, for these lessons to be useful, the parties must first commit to conducting their negotiations constructively and in a timely way. Then, it becomes possible to explore together how the lessons from other agreements can be translated to the parties' specific circumstances to create mutually advantageous outcomes. Creating these win–win situations is easy to say and hard to achieve. Sometimes, the best outcome to hope for is an agreement that diligently addresses all parties' concerns and balances the win–lose equation among them.

### *Keep talking*

Water diplomacy focuses on a long-term arrangement with perhaps many rounds of (sometimes tough) negotiations. What may be considered failed negotiations often reveals weaknesses or the unpreparedness of a negotiating team that should be rectified for future rounds. Tangible results in terms of a signed agreement, for instance, may be hard to achieve, but intangible results are

equally important. Keeping the channels of communication open, getting to know the stakeholders better, and agreeing to schedule a next step are important intangible results for trust building.

Short-term fixes are important, but they are more of a technical nature rather than the holistic approach required by long-term agreements. For example, in the Tigris–Euphrates basin, demands have been made for extra water release in specific cases. The positive responses to these occasional demands were good-intentioned measures, but they didn't solve the wider issue of water sharing in the area. Focus must be kept on reaching a lasting agreement rather than dealing with irregular demands.

### *Don't rule out simple agreements*

Transboundary water-sharing agreements don't have to be too complicated; they could be very simple. The best example of this is the 1990 Iraqi–Syrian agreement to proportionally share the Euphrates River's flow at the Turkish–Syrian border. The half-page-long agreement between the two countries specified that 42% of the flow is allowed to be kept or used in Syria, allowing 58% to flow to Iraq. Since adopting that simple agreement, the two countries have raised no related concerns. This agreement could be generalized for any watercourse by defining a location where the flow is representative of the hydrology of the relevant catchment area, and, therefore, observed flow at the specified location would be shared uniformly based on agreed-upon percentages. I personally have raised this approach to resolve the disputes on the Tigris after the construction of the Ilisu Dam in Turkey. My Turkish counterpart then found the idea useful but felt he was not authorized to adopt it formally. He needed the endorsement of his president. Things have stopped there since my Turkish counterpart and I left our offices.

The exchange of data has been needlessly a sticking point in all rounds of negotiation on the Tigris and Euphrates river basins. To put up with this spoiler's trick once and for all, gauging stations should have been monitored remotely; all water parameter data would be transmitted to all relevant offices simultaneously to avoid disagreement regarding data exchange.

### *Have a mandate and be prepared*

A clearly mandated negotiating team is more likely to succeed in resolving disputes than a less authorized team that must seek high-level approval for every negotiated step. A consolidated negotiating team representing relevant national actors is important. Generally, the smaller the number sitting around the negotiation table, the better, but all must be well-prepared. Science-based arguments on water are powerful. Knowing the subject technically is a great asset in moving the process forward. This can be demonstrated by showing care when addressing your domestic issues. Ensuring that smart water policies and programs are in place nationally and working well can be a solid basis for negotiations and making your case.

## Notes

1 See The World Register of Dams can be accessed here: www.icold-cigb.org/GB/world_register/world_register_of_dams.asp.
2 Documentation of the event can be found here: https://media.un.org/photo/en/asset/oun7/oun789175.
3 Prof. Veysel Eroglu, Minister of Forestry.
4 Dr. Reza Ardakanian, Minister of Energy, who is a well-known former UN Water employee.

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# 53

# HYDRODIPLOMACY

## The Case of Post-Independence Namibia

*Richard Meissner, Piet Heyns, Jeroen Warner, and Jo-Ansie van Wyk*

**Key Takeaways**

- Changing political boundaries create unique challenges for water diplomacy.
- Technical commissions can create space for practical transboundary water management to occur despite political differences.
- In the absence of joint projects and commissions, relatively inconsequential sections of border rivers can quickly become a myopic political and, eventually, military focus.

### Introduction

While currently considered to be part of environmental diplomacy, water diplomacy far predates environmental consciousness (Ballabio et al. 2015). An early milestone in transboundary river management is the water treaty concluded between the Sumerian cities of Lagash and Umma on the Tigris, 2500 BC. Since then, the number and composition of diplomatic entities has changed and continue to change, such that we now have over 300 transboundary rivers shared by sovereign states.

Namibia, a former German colony (*Südwestafrika*) then occupied by South Africa, only started life as an independent state in 1990. The state was occupied by the Union of South Africa during the First World War and remained under a South African military administration. Under the Treaty of Versailles, the colony became a mandate of the new international peacekeeping body, the League of Nations, which put it under South African administration. Despite South Africa's failure to administrate the territory to the satisfaction of the United Nations (UN) and a decision in 1966 to take away South Africa's mandate, Namibia de facto remained under South African rule. This situation sparked a 24-year war of liberation waged by the People's Liberation Army of Namibia (PLAN).

The governing South West Africa People's Organisation (SWAPO), stemming from the liberation movement, sought alignment with the Southern African Development Community Conference (SADCC), the organization of "frontline states," which transformed into the Southern African Development Community (SADC) including post-apartheid South Africa in 1994 (Mushelenga and van Wyk 2017).

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When a new state enters the fray, it is supposed to succeed to existing treaties it inherits: the Vienna Convention on State Succession in respect of Treaties stipulates that treaties concluded under colonial rule should be respected after independence. But in practice, it may immediately encounter problems as it inherits colonial decisions – as we shall see, these include the Orange River's borders defined under colonial times, leaving the access to and mobility on the river of Namibian citizens at the mercy of the then British dominion of South Africa. There has therefore been a strong difference of opinion on the issue of whether all inherited international obligations should be integrally adopted (the theory of universal succession), or whether independence should be treated as a blank slate (*tabula rasa*) – as did Algeria, Upper-Volta (Burkina Faso), and Guinea-Bissau. A middle ground was covered by the *ipso jure* or Nyerere Doctrine, after Tanzania's first president, rejecting universalism of succession and accepting only those absolutely necessary for continuity of international relations without abrupt disruption (notifying the UN Secretary-General which ones the newly independent state considered binding on a case-by-case basis).

As Namibia was going to be a future test case, both SWAPO and the UN Commissioner for Namibia were invited to participate with full powers in the deliberations on the Vienna Convention and, backed by the non-aligned states, had a declaration adopted that denied South Africa's rights as a predecessor state for Namibia and affirmed the territorial integrity of Namibia including Walvis Bay (Rembe 1984).

In this contribution, we examine from a practitioner perspective what diplomacy is and does, in the context of a relatively new state. We will argue that transboundary water diplomacy, whether we like it or not, is political and subject to politics despite the pragmatism in establishing transboundary technical commissions, which is a political exercise practiced by political institutions and administrators – "shared water as subject of political consideration with the help of diplomatic methods" (Keskinen et al. 2021).

The current Ukraine conflict reminds us that amoral "Realpolitik" and (threats of) violence are still a reality in interstate relations, and in our case, we also easily perceive a military pillar, although one that is not as aggressively extensive as in Ukraine's case. While much of the literature talks about diplomacy as a positive, goal-oriented activity for conflict resolution, we need to talk about processual and technical intricacies and power sensitivities.

While we would bracket out the assumption of universally collaborative intentions in diplomacy, we can agree on definitions that mainly see diplomacy representation as communication with a foreign community, as "the process by which direct relations with people in a country are pursued to advance the interests and extend the values of those being represented" (Sharp, quoted in Melissen 2005, p. 11) or "as an established process for a country to communicate and collaborate with as well as influence foreign governments and peoples across multiple diplomacy tracks" (Keskinen et al. 2021). It is furthermore performative in that diplomats "enable a state to appear to others as a *social actor* pursuing interests and capable of negotiating" (Mitzen 2015, pp. 112–113, emphasis added) and capable of cooperation as a trusted actor.

Most of all, we find that diplomacy is about building long-term relationships with others in a dynamic environment. Diplomacy is "rarely linear" but "evolves in dynamic, cyclical ways" (Keskinen et al. 2021). It is a marathon, with occasional short spurts, with "multiple uphill and downhills" taking place in an evolving environment. Like marathon runners, the participants in diplomacy also need to be well prepared and experts in their respective fields.

As we'll see, while Namibia managed to sidestep many border issues, some issues are dormant, while others (Kasikili/Sedudu Island) have become so contentious as to merit arbitration by the International Court of Justice (ICJ) in The Hague (Hangula 2010).

*Table 53.1* Water Diplomacy's Integrative Aspects

| *Water diplomacy aspects* | *Examples of related key approaches, frameworks and mechanisms* |
|---|---|
| *Political:* inherently political process that goes far beyond water per se; part of wider diplomatic setting and geopolitics | The most strongly political track: critical hydropolitics; geopolitics; foreign policy; regional cooperation |
| *Preventive:* peace mediation and conflict prevention | Preventive diplomacy; peace mediation and peace building; conflict resolution multitrack diplomacy |
| *Integrative:* connecting multiple forms and levels of institutions and stakeholders and the different types of knowledge | Integrative diplomacy; integrated water resources management; knowledge co-production |
| *Cooperative:* cooperation and good governance to promote reasonable and equitable water use | Cooperative arrangements; benefit- sharing approaches; international agreements on shared waters; sustainability |
| *Technical:* providing an information basis for the diplomacy about water, related resources and the environment | The most strongly technical track: information on hydrology, water quantity, quality, and timing; knowledge production and products such as hydrological models and impact assessments |

*Source:* From Keskinen et al. (2021).

## Developments in Diplomacy

As the "old" gin-and-tonic diplomacy morphed into the "new diplomacy," focusing on public diplomacy, the actor base of diplomacy has seen a widening, and new formal and informal actors have found their way into multitrack diplomacy, such as academics, journalists, and non-governmental organizations (NGOs). Keskinen et al. (2021) call this the integrative dimension (Table 53.1). At times non-state actors may be involved with and "mimic" formal diplomacy roles (McConnell et al. 2012; Meissner and Warner 2021).

Water diplomacy can be seen as the "intersect of science, policy and practice" that requires a "synergy between the technical and social science knowledge" (Klimes et al. 2019). An important diplomatic role is taken by water experts and river basin managers, well placed to supply specialized technical knowledge to solve collective-action problems. The technical Track 2, however, is not necessarily isolated from the political Track 1; it is political as well. Mirumachi (2020) notes that multitrack diplomacy allows informal exchange without interference of official state representatives (Mirumachi 2020), and, as such, it can be an alternative knowledge channel to feed Track 1, and government representatives may attend in an unofficial capacity (Mirumachi 2020). However, this is not to say that politics can influence Track 2 diplomacy because of its inherent political nature and interaction with Track 1 efforts.

The Namibia case we will discuss here illustrates the importance of this in transboundary technical commissions. In this contribution, we will highlight some of the realities of relationship building and politics as narrated from long-standing practice.

## Namibia's Water Diplomacy

Piet Heyns, one of the co-authors, had been working in Namibia since the 1970s with extensive knowledge on the country's domestic and shared water resources. As a civil engineer, he also has

the technical knowledge on water management, and as head of the water division in Namibia's Department of Agriculture, Water and Forestry, he was also closely connected to Track 1 diplomatic efforts to position Namibia in bilateral and multilateral water management efforts. He can be considered the architect of the agreement to establish the SADC's Revised Protocol on Shared Watercourses (SADC 2000) and the Orange-Senqu River Commission in 2000.

The state of Namibia is the legal owner of the water flowing on its territory. How did state succession after independence work out in Namibian practice? In some cases, relatively smoothly – in another case, it led to conflict that merited arbitration by the International Court of Justice (ICJ) in The Hague.

In this section, we leverage Heyns' experience to reflect on why some efforts succeeded and others failed. We link many of Namibia's successes to the effectiveness of transboundary technical commissions, which create spaces where technical experts and engineers can collaborate effectively across borders with minimal political overhead. In these spaces, direct conversations and informal agreements lubricate the critical everyday joint operations of large transboundary infrastructure projects. Moreover, these joint projects pragmatically blurred disputed borders without threatening sovereignty. In the absence of joint projects and commissions, governments are more likely to assert riverine borders too rigidly or forcefully than their natural swelling and recession allows. In such cases, politicization can quickly turn to militarization, and much is risked with limited tangible upside.

## *Transboundary Technical Commissions and Everyday Diplomacy*

Namibia inherited several joint infrastructure projects post-independence. The everyday operations of these projects impacted livelihoods on both sides of the border, so keeping them operational was of critical importance. The primary mechanism facilitating the continued operation of these projects was transboundary technical commissions.

### *Kunene and Chobe-Linyanti Rivers*

Shortly after independence, water managers realized that the best way to get the large Ruacana hydro-electric scheme on the Kunene River in northwest Namibia working properly again after years of war was to reinstate the agreements signed between the colonial powers that held sway over Angola and Namibia, respectively. The Kunene River was managed bilaterally by the Permanent Joint Technical Commission (PJTC). A commission also existed for the Chobe-Linyanti system shared between Botswana and Namibia. In this system hyacinths were causing fish deaths. Through Track 2 diplomacy, both countries addressed the problem through the commission, allowing communication with Heyns's counterpart in Botswana that the problem needed solving as a matter of mutual interest. Through informal discussions, officials from both countries realized the hyacinths were problematic and the problem had to be addressed; a joint project to tackle this issue never became a formal diplomatic affair.

### *Okavango River*

The Namibian government also had plans to abstract water from the Okavango River. The first step was to have a meeting with the commission established for the river. Heyns suggested to his superiors that a tripartite agreement with Angola and Botswana was necessary since Botswana, as the downstream riparian to the Okavango Delta, had a huge interest. Angola's interest was less

pronounced due to the civil war still raging in the early 1990s, stymieing irrigation development in southeast Angola, the origin of the Okavango River. The purpose of the agreement was for Namibia to get access to the Okavango's water resources. This culminated in the forming of the Permanent Okavango River Basin Water Commission (OKACOM). The establishment of OKACOM would later facilitate inter-ministerial meetings and consultations. Since the three countries' ministers were cabinet members of their respective governments, the commissioners would report to their ministers, who would, in turn, report to the cabinet to inform the foreign ministers.

### *Orange River*

Namibia shares the Orange River with South Africa. In the 1930s, and before Namibian independence, the border was viewed as a line arising from the river's northern bank. At the time when Germany was the colonial power holding sway over Namibia, there were intentions to discuss the border with the British, but this did not happen.

Shortly before Namibia's independence, both countries' departments of water affairs suggested to establish a water committee on the Orange River. The purpose of which was to discuss matters of mutual interest and also to train the Namibians in practice and experience in dealing with a sovereign issue regarding a joint river system. A potentially explosive border issue emerged after independence. In 1970 (Turton et al. 2004), a diversion weir had been constructed upstream from Vioolsdrift to divert irrigation water to the southern bank, and a siphon was installed that would divert water across the Orange River to supply water to the farms on the northern banks in Namibia (then South West Africa). After independence, the Vioolsdrift and Noordoewer Joint Irrigation Scheme became a joint venture between Namibia and South Africa. The Namibian constitution stipulated the *thalweg* as the border, but since the colonial border is on the northern bank, South Africa could argue that the weir is entirely situated in South Africa. Heyns proposed that Namibia give South Africa a sign of how much water Namibia would like to use since, under international water law, a riparian cannot claim water it is unable to use. The estimates then, as now, show that there is enough water for both countries' needs and Namibia in the early 1980s decided that since enough water remained in the Orange, they would not agitate the issue. A dam on one of the Orange's tributaries rising in Namibia also contributed around 50 million cubic meters of water to the Orange's flow upstream from the diversion weir. A "gentleman's agreement" existed over the water allocation, and no formal agreement was at the time in existence since South Africa still acted in a mandatory capacity.

The engineers in the Namibian Department of Water Affairs decided to get the two governments to agree on the 50 million cubic meters the dam in Namibia contributed to the Orange River and, by default, the Vioolsdrift and Noordoewer scheme. This volume of water would be more than enough for future use by the irrigation farmers. The issue was, thereby, resolved, since the Helsinki Rules stipulate that a riparian cannot claim water for future use. While Namibia indicated that it would, in future, irrigate 15,000 hectares, it was only irrigating 2,000 hectares at the time of the discussions and could not claim the 50 million cubic meters that would cater for 15,000 hectares in future. During the early 1990s, Namibian and South African farmers were not cultivating water-intensive crops like dates and table grapes. This only came a decade later when the lucrative international table grape and date markets opened to Lower Orange River irrigation farmers. Currently, when lower flows occur during dry spells and drought, the farmers complain, and South Africa releases more water from dams in the upper reaches of the Orange. There is also an arrangement between the Namibian farmers and South African border officials that the farmers are allowed to gain access to the river's water, and during floods, to remove their pumping equipment from the southern bank (South African territory). This is how peace along the Orange River happens pragmatically.

### Planned Hydro-electric Dams on the Kunene River

However, even with established commissions, establishing new transboundary projects can be difficult. Regarding further developments on the Kunene River, the proposed development of the Epupa Dam was part of a study conducted during the colonial period. Immediately after Angola's independence in 1975, the new ruling party, the People's Movement for the Liberation of Angola (*MPLA*), halted being involved in the PJTC due to the outbreak of the civil war and the ensuing war with South Africa. Following Namibia's independence, Angola suggested to reinstate the existing agreements, only changing the countries' names from Portugal to Angola and South Africa to Namibia in the agreement's text. The Namibian constitution stipulated that it would adopt all agreements signed between the former colonial powers. If not, it could have created unnecessary complications for the new state's international affairs since Namibia could not govern its shared rivers in a vacuum. Sensibility was, therefore, at the order of the day.

Soon after Namibia started communicating its plans for the Epupa Dam, it realized that Angola did not have much need for the hydro-electric installation. Angola's centers for electricity demand were to the north around the capital Luanda, and it could also have plans to rehabilitate the civil war-damaged Gové hydropower plant in the Kunene's upper reaches. Angola could also build new dams upstream from Namibia, for which it would not have to ask Namibia's "permission." With Epupa, this was different since the dam wall would straddle the border between the two countries. Angola, therefore, had to give consent for its construction and fund part of the construction works and cause other complications regarding the sharing of generated electricity. For these reasons, the Angolans were not too keen on going ahead with Epupa. That is not to say the dam had been completely scrapped as a future option to alleviate Namibia's electricity shortage and dependency on South Africa, a country that is experiencing an electricity shortage itself.

The most vociferous opposition to the project came from the international environmental lobby and the OvaHimba peoples living in the area that would have been inundated by the reservoir. The environmental lobby and the OvaHimba put forth an argument that the dam cannot be built across the Epupa Falls, since the reservoir would flood grazing and the OvaHimba's burial grounds. According to Heyns, not all OvaHimba bury their dead in the area. The project would also generate much-needed job opportunities in the area, and with the dam being part of a cascade of dams on the Kunene River, it would reduce the ephemerality of the river to a more constant flow benefiting a host of purposes, such as crop cultivation along the river.

Water diplomacy does not only involve the participation of executive members of government, diplomats, and technical experts. Water diplomacy practitioners and scholars must be aware that a paradiplomatic element involving citizens and international interest groups can add to the complexity of transboundary water management. Their involvement can also increase the complexity of diplomatic efforts when negotiating infrastructure projects. Opposition from interest groups and indigenous peoples can have a significant impact on the political debate regarding proposed projects (Meissner 2005), which could have a bearing on water diplomacy efforts for joint river management. Projects may be technically sound but not politically feasible.

### On the Role of Diplomats in Transboundary Technical Commissions

While some level of formal diplomacy may be required to establish transboundary technical commissions, once established, water diplomacy should be conducted more from a technical perspective than a political or ideological approach, and the involvement of diplomats should be reduced to the minimum. They are not technical experts. Heyns remembers that when ambassadors

were invited to the various commission meetings, they would either not arrive or delay the proceedings by practicing Track 1 diplomacy, which is removed from the more technical Track 2 diplomacy that is more in line with the technical issues at hand. International affairs would get in the way of problem-solving through the practice of technocracy. Status and prestige on the part of the diplomats would often instill an air of importance that could dominate proceedings to such an extent that more attention is paid to protocol than the technical issue under consideration. Heyns also said that during the meetings, the diplomats initially show a keen interest in the meeting, but since they have limited knowledge of the subject, they're more interested in attending to their cellular phones than the proceedings, which makes it easier for the technocrats to conduct their business. The diplomats pay, in any event, more attention to the greeting part of the proceedings and often leave after protocol has been observed. Although they were not present during the technical discussions, the lines of communication are open after the meeting since the commissioner of each country still needs to report to the minister, who then, in turn, reports to the countries' respective cabinets.

### *Myopia and Militarization*

In the absence of joint projects and commissions, relatively inconsequential sections of border rivers can quickly become a myopic political and eventually military focus. For example, a 3.5 $km^2$ fluvial island in the Chobe-Linyanti River, Sedudu-Kasikili Island, became militarized when the colonial borders were formalized between Britain and Germany; the colonial powers decided that the *thalweg* in the main channel would be the border. The Chobe-Linyanti River flowing through the Caprivi region is prone to flooding when rainfall is higher than normal. During floods it creates flood plains, and it can become quite difficult to determine the basis for the *thalweg*. During floods the island forms in the flood plain as the land is surrounded by the high-water flows of the Chobe-Linyanti River. After the receding waters, the island "disappears" and becomes part of Botswana. During normal rains, the deepest point of the river is between the island and Namibia. This is common knowledge and has been the case for years. But in times when the island emerges, is the main channel to the north of the island, as Botswana claimed, or to the south of the island, as Namibia contended?

Namibia started to forcefully argue its sovereign rights to the island in the 1990s based on "the control and use of Kasikili Island by the Masubia [tribe] of Caprivi, the exercise of jurisdiction over the Island by the Namibian governing authorities, and the silence by Botswana and its predecessors persisting for almost a century with full knowledge of the facts" (cited in Majinge 2012). When the issue first surfaced, Heyns informed the permanent secretary of water affairs that Namibia would not stand much of a chance of claiming the right since the hydrology of the river system is not well understood (see Pricope 2012), but to no avail.

After Namibian independence, Botswana stationed troops and armored vehicles in the area, hoisted the Botswana flag, and erected a lookout post. This didn't sit well with Namibians, and mortars were shot from Namibia onto the area. Botswana retaliated and the Namibian army abandoned their exercise. This issue then went to the International Court of Justice (ICJ) in The Hague (Salman 2000), at a cost of N$60 million (EUR3.41 million), seemingly to safeguard its reputation for not backing off and coming across as "weak" to Namibians (Maphunye 2022).

Namibia appointed a civil engineer, Prof. Alexander from the University of Pretoria, to argue their case. His argument was that during floods, the water in the flood plain in the channel between Botswana and the formed island is deeper than the Chobe-Linyanti's *thalweg*. In other words, during floods more water flowed across the floodplain between Botswana and the island than in the



*Figure 53.1* Cape Buffalo (*Syncerus caffer caffer*) grazing on Sedudu-Kasikili Island with the Botswana flag in the background (Photo credit: H.P. Baumeler)[1]

*thalweg*. However, the criterion, according to international law, is that the deepest valley (*thalweg*) decides the boundary between two states. Because of this legal principle, Namibia's argument failed, and the ICJ ruled in favor of Botswana and held on to the island (Hangula 2010) on which cattle and game graze when flooding doesn't occur (Figure 53.1).

### *Diplomacy Is Not Always Diplomatic*

Despite its popular image, diplomacy is not always diplomatic. The following anecdote may illustrate this. When South Africa became the 11th member state of SADC in April 1994, South Africa was still the "black sheep" as far as the use of internationally shared water resources was concerned. In November 1995, the new Minister for Water Affairs in South Africa, Honorable Professor Kader Asmal, arranged a meeting in Pretoria with his colleagues, the SADC Ministers for Water. His staff requested Namibia to present a paper about transboundary water cooperation in SADC, and Heyns was appointed by the Namibian Minister for Water, Honorable Nangolo Mbumba, to do the job.

He accompanied his Minister to the meeting and presented the major transboundary projects: the Kunene hydropower scheme between Angola and Namibia; the Kariba dam, a hydropower scheme between Zambia and Zimbabwe on the Zambezi River; the Lesotho Highlands Water Project between Lesotho and South Africa, and the joint Noordoewer and Vioolsdrift Irrigation Scheme. The importance of cooperation when using shared water sources and the advantages of creating water commissions between countries sharing watercourse systems were elaborated, as well as the positive outcomes in cases where such cooperation complied with the interests of all parties involved. Heyns then "rocked the boat" by pointing out, "tongue in cheek," that Namibia, located at the bottom end of the "sewer" on the Lower Orange River, finds it very useful to have such a water commission with South Africa because Namibia can prevent South Africa from stealing its

water! Honorable Asmal immediately took exception to this statement, interrupted the speaker, got up from his chair, turned to his colleagues in the audience, and informed them that "South Africa is not stealing nobody's water!"

Heyns continued with the presentation after the provoked outburst. In the discussion following the presentation, the concept of a water sector, as proposed by Namibia, was enthusiastically supported by Prof. Asmal and the other water ministers present. Those present at the meeting subsequently agreed to accept the proposal in principle, although it was not even on the agenda of the meeting. The SADC Water Sector Coordinating Unit (SADC-WSCU) was established in 1996 to coordinate the SADC activities in the water domain. This led to the establishment of a Water Resources Technical Committee (WRTC), and later the SADC Water Division was created in the Infrastructure and Services Directorate of the SADC Secretariat as a specific regulatory body to oversee policies on water resources and sanitation infrastructure development in the SADC region and to ensure their timely implementation.

During lunchtime Heyns asked his Minister, if he was going to get fired for enraging Prof. Asmal, and the Minister replied: "No! Because I agreed with you!" Water diplomacy does not always occur in a formal environment devoid of boisterous agitation, nor is it devoid of humorous remarks in an environment seen as highly technical and dull. Sometimes it is necessary to get the point across with tongue-in-cheek comments. The South African minister gave the animated remark by Piet Heyns proper consideration, which helped to create the right amount of pressure for action. Humor can, at times, be employed to smooth over potential disagreements and create an environment where stalemate could occur to rejuvenate negotiations. A joke at the right time can transform moods, trigger positive communication, and enhance performance outcomes.

## Conclusions

Like many authors, Klimes et al. (2019) consider water diplomacy to be a dynamic process seeking peaceful and sustainable solutions. The Kasikili/Sedudu Island case points toward the opposite. Namibia resorted to the international rule of law to resolve the dispute. Water-related disputes are not, as a rule, resolved through Track 1 diplomacy. As Warner and De Man (2020) have noted, diplomacy often plays out as a mix of hard (e.g., threats of violence; obstruction) and soft (e.g., persuasion and attraction) power. We see the hard side of politics, again, in the Kasikili/Sedudu Island matter when the states communicated their sovereign intentions through militarized means. The international environmental lobby and OvaHimba took a hardline stand toward the Epupa Dam's construction. Their actions were one of the elements contributing to Namibia shelving the dam. The remainder of the cases points toward a softer approach to manage Namibia's transboundary rivers. As states pursue their interests and priorities, their communications and priorities may or may not be related to action, let alone to conflict resolution – lots of time and effort may be expended where the preferable solution is to maintain a political status quo (Vij et al. 2020). The Epupa Dam is a case in point, when Angola communicated that it is not interested in the dam and by default the sharing of its benefits. The dam is yet to be constructed. Even if it is tacitly or expressly agreed that for the moment, treading water is the best option for all (Vij et al. 2020), diplomatic actors will keep in touch.

For Heyns, one of the most important lessons when sharing rivers with other countries is to get the cooperating partners on board before you start thinking about joint schemes. In this regard, it is important to establish good relations with development support organizations like the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) and the Global Environmental Facility (GEF). These organizations can be instrumental in funding joint studies in international

river basins, while the governments can focus on more long-term priority aspects like providing water to rural areas. For the Okavango River basin study, the three riparians' economies differ, but each needed to allocate funds toward the study. The GEF funded the diagnostic assessments and the strategic action plan involving many scientists, economists, and policymakers. Where such funding also comes in handy is for administrative staff that can work on the day-to-day administrative functioning of the commission.

## Note

1 Image available from https://commons.wikimedia.org/wiki/File:Sedudu_Island_Botswana_(2).jpg

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# 54

# THE EVOLVING LANDSCAPE OF DIPLOMACY

*Paolo Lembo and Charlotta Sparre*

**Key Takeaways**

- The landscape of diplomacy has evolved dramatically with digital communications and public diplomacy, opening space for previously marginalized voices (women, youth, minorities) while blurring traditional boundaries between Track I and Track II diplomacy.
- Water diplomacy has become increasingly critical as hydrological resources face growing pressure from population growth, economic development, urbanization, pollution, and climate change, with water projected to become more politically charged than any other resource.
- Effective water diplomacy requires moral imagination, cultural understanding before technical bargaining, recognition of climate risks, viewing water as a source of cooperation rather than conflict, and clearly distinguishing diplomatic functions from technical water management roles.

## Diplomacy: Origins and Evolution

The Oxford English Dictionary defines the word "diplomacy" as "The management of international relations by negotiation; the method by which these relations are adjusted and managed by ambassadors and envoys". It is derived from the Ancient Greek word "diploma", referring to an official document or a state paper. Literally: an object folded in two.

Contrary to what is commonly perceived, the word "diplomacy" has surprisingly recent origins. In the late 18th century, the French expression "corps diplomatique" began to refer to officials involved in foreign policy. In 1796, the term "diplomacy" was officially introduced into English by the political scientist Edmund Burke.

The term "ambassador", on the other hand, has been in common use throughout recorded history, and it refers to – again according to the Oxford English Dictionary: "An official messenger sent by or to a sovereign or public body".

The practice of sending official envoys to foreign political jurisdictions to represent a sovereign political entity is very ancient. Records of treaties between Mesopotamian city-states date from 2850 BCE. Rulers in Athens, Rome, Persia, India, and China exchanged messages and gifts, negotiated treaties, and signed peace agreements. Thus, diplomats existed well before the word was invented to refer to them collectively as a class.

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The world in which diplomats work today is a heterogeneous landscape of opportunities and challenges, an international stage encompassing a virtually unlimited variety of actors, well beyond the designated institutional elites of the past. The role and functions of diplomacy today directly concern global issues such as governance, equity, water, energy, climate change, and trade agreement negotiations, among others. It is a world that is also defined by the need to recognize the overriding reality of unending intersections. The political, economic, security, cultural, scientific, humanitarian, and media spheres have merged and are now inexorably interconnected. Boundaries, once clearly marked, are now diluted. Diplomacy today must be as eclectic as the new challenges we face.

## Recent Developments

### *Digital Communications and Public Diplomacy*

In general terms, diplomacy is the art and practice of conducting negotiations traditionally held between nations but recently also between interest groups. Its principal purpose is to satisfy the needs of the entity it serves (state or organization) by advancing its interests without contrasting the needs of its counterparts, to the point of provoking the use of force. The principal function of this purpose is communication.

In an increasingly digitally connected world, governmental diplomacy found itself navigating a new communication topography. With powerful results, social media has become one of the most efficient tools of political activism, eventually reshaping the arsenals of international diplomatic discourse. A new era of public diplomacy emerged, giving space and agency to critical societal forces thus far unheard (women, youth, and marginalized minorities, among others) that established political and diplomatic elites were no longer able to ignore. Whereas traditional diplomacy was principally driven by political and economic policies, the rapid expansion of public diplomacy took international affairs center stage.

Digital media, cinema, television, radio, art, and cultural, scientific, and academic exchanges nowadays connect people to governments, but above all, citizen to citizen and people to people across borders. The new informal (but increasingly formal) public diplomacy grid has sometimes transformed people's social and development expectations into mass movements. Often taking the form of new political forces – albeit sometimes structurally unshaped – whose agency is impossible to ignore, they had to be acknowledged within the institutional contexts; in the best scenario as an unfiltered indication of popular needs and expectations, feeding the government policy-making background.

When online activism translated into on-the-ground action with momentous political effects (suffice to think about the political dynamics of the Arab world in the last decade), it outpaced the policies of traditional governmental diplomacy, which was compelled to take note and transform its modus operandi, lest it become irrelevant.

While many governments have embraced social media, either as a reform vehicle to enhance public administration efficiency or as a tool to continue to control the political narrative, the world of diplomacy, for its own intrinsically traditionalist nature, found itself struggling to reconcile the heritage of its professional traditions with an international context driven by different rules and actors.

When borderlines between Track I and Track II diplomacy gradually became blurred, the nature of foreign relations had already been transformed. It has become eventually common for foreign ministers to text counterparts via WhatsApp, X, or other platforms, moving a traditionally

closed-door conversation into open cyberspace, a shift that has fundamentally altered the diplomatic space.

Taking note of the new diplomatic habitat, journalists no longer depend on press conferences, spokespersons, and releases; they can electronically (and directly) connect with any political personality, including a foreign minister, a royal family member, or even a leader of an armed, non-state group. These new trends have revolutionized the impact and sometimes the very purpose of diplomacy, as social media amplifies the voices of citizens, activists, and groups that traditionally would have been excluded from the diplomatic conversation and often from the political sphere tout court. If successful public diplomacy begins with listening, then diplomats are nowadays obliged to turn an ear (and a tweet) to these online spaces.

### *Equity and Inclusion*

Women are assuming more relevant roles in public affairs, in the financial sector, in political life, and in government. In diplomacy though, an area traditionally male-dominated, women's role has advanced at a modest pace. In 2023 women represented only 20.5% of the top diplomatic posts worldwide (Chehab, 2023). Even if progress was made, a professional diplomatic context of equal representation is far from being attained. A new era of equal diplomatic opportunity is yet to emerge, notwithstanding the broad recognition of women's influence and weight in diplomacy and conflict resolution.

Youth have till recently played only a marginal role in diplomacy. Rarely have they been seen as a driving force behind state policies influencing international relations. And yet, the active role of young people in international and diplomatic affairs constitutes one of the most significant mutations in the world of modern diplomacy. Youth-led public diplomacy efforts are not only growing in number and power but are also becoming more effective in terms of policy impact, a reality that tangibly fulfills one of the principal goals of public diplomacy. Increasingly active worldwide, youth promote awareness of inadequate government policies, indicate more efficient mechanisms to implement existing policies, or formulate innovative policy scenarios on topics of global concern. They also engage with decision-makers in broader policy discussions, from which they have been till not long ago largely excluded. This is particularly evident in the international climate change debate, where youth-led public diplomacy has greatly oriented both domestic and intergovernmental debates leading to specific inputs, which in turn shaped major decisions at the various Conference of the Parties meetings. The "Fridays for Future" international movement on the environment is a case in point of the unexpected forces of change unleashed by youth-driven public diplomacy, powered by a savvy social media strategy.

### *The Increasing Importance of Water*

Across centuries, the fundamental elements of diplomacy have not changed much. Yet, throughout successive eras, the manners, the interests, and the contexts by which they are expressed have dramatically evolved.

All these changes also affect topics of domestic and international politics that were once of no great concern to diplomacy. Water is perhaps the most consequential among the new challenges to our security. There is no doubt that, by and large, the stability of our coexistence in an increasingly overpopulated and resource-depleted planet will depend on our ability to transform water into an active vehicle of human progress, rather than a destructive source of dispute. That is what makes the role – and the success of – water diplomacy a critical element of our common future. Or, as some would say, of our survival.

Due to demographic growth, economic development, urbanization, pollution, and climate change, hydrological resources – by their nature finite and unevenly distributed across the globe – will come under ever-greater pressure. At the same time, crude oil demand will continue to fade and so will its geopolitical impact. It is, therefore, safe to assume that water will be in the future more crucial (and politically charged) than any other resource, with demand set to rise by 20% to 30% by 2050 (UNESCO, 2019). This will in turn enhance the risk of conflict over this most essential but rapidly depleting source of life on our planet. Thus, water diplomacy is today more than ever a priority in the achievement and consolidation of peace, crucial to international security, eradicating poverty, and reducing inequalities.

## Some Advice for Water Diplomats

Robert Kagan reminds us that "in most places, the nation-state remains as strong as ever" (Kagan, 2009) and that national ambitions, passions, and competition still powerfully shape history. And yet, ultimately, we wish that the best diplomacy could serve the interests of the human community as a whole, crafting fair solutions, balanced between the interests of the sender and those of its counterparts. In doing so, diplomacy can prevent future hostile reactions from those whose legitimate needs might otherwise go unaddressed.

### *Cultivate a Moral Imagination*

The English author, diplomat, and politician Henry Wotton famously wrote in 1604: "An ambassador is an honest man, sent to lie abroad for the good of his country". In reality, anyone who has experienced years of conflict mediation or multilateral development knows too well that diplomacy driven by moral imagination is the most successful. It is sometimes the only attitude that could rescue the most exacting negotiations. Perhaps also because "immoral" diplomacy ultimately defeats its purposes. It frustrates the vital needs of future generations, making communities more vulnerable to social disruptions. Nothing is more relevant in water diplomacy than the pursuit of a global water governance system, where every individual's well-being is a function of societal human development; this is to say, the development of the larger human community, well beyond each person's circumscribed local society.

In other words, individual development cannot be pursued in an exclusionary fashion, where the gains of one group come at the expense of others. If our benefits generate stress in other communities, the moment will come when these communities' stress will become our undoing. Time and again, that has proven to have been the case in many short-lived shared water negotiation agreements.

Moral water diplomacy is not an abstract notion of philosophical nature; rather it is a strategic necessity stemming from humanity's ever-expanding interconnection, as well as the biological interdependency among water, energy, food, and the environment. Hence, water diplomacy could be defined as "moral" when it makes such interdependence conducive to the community's human development, as an essential precondition to the progress of civilization as a whole, respecting the richness of its diversity and the diversity of its needs.

Historically that happened when water diplomacy succeeded in providing a governance framework to transform chaotic and often exploitative interconnections into a functional coordination system, where every biological, social, and political element complements rather than abuses the other.

### *Seek Mutual Understanding Before Bargaining*

Water diplomacy, while often facing arduous challenges, could also provide unique opportunities for conflict management. Those who have been involved in complex water negotiations, especially concerning transboundary disputes, have often suggested that addressing such resource wrangles may also bridge gaps between adversaries through a shared focus on goals of mutual concern.

Frequently water disputes are rooted not only in interests but also in cultural contentions or misunderstandings, which need to be addressed at the outset to prepare for successful interest-based bargaining and cooperation. While cultural factors may hide behind the multi-faceted wrinkles of many water conflicts, cultural values may provide a diplomatic stage onto which to play the rules for a new, more conscious consensus. If the key component of mutual cultural understanding is emphasized due to a new awareness of its centrality, a new diplomatic space could be opened for endorsable technical solutions, sought through interest-based bargaining. Such solutions in turn may help to further foster confidence that cooperation and mutual gains may be possible, as hardened opposing positions begin to evolve and eventually soften.

To that end, more sensitive water diplomacy will underlie and seek to expose the principal cultural and human dimensions of natural resource-driven conflicts. It will gradually bring them to the surface, broadening their understanding within different societies, paving the ground for possible functional bargaining only at later stages.

### *Recognize Climate Risks*

UN-Water records that 263 transboundary lake and river basins worldwide are shared by two or more nations, covering almost half of the earth's surface (Transboundary Waters, n.d.). Climate change has increased the recurrence and the severity of extreme weather-related events such as floods, droughts, and sea level rise. Pressure on scarce water supplies continues to mount in many countries, some of which are already water-deprived. Since the beginning of the century, hundreds of incidents have occurred in water basins across the world, and though only a few of them have led to full-fledged conflicts, it is expected that climate change pressure on the planet's dwindling hydrological capital may further exacerbate existing challenges. The purpose and role of water diplomacy are, therefore, more indispensable today than ever in crafting institutional coping mechanisms to improve transboundary water governance and constructively resolve future disputes.

### *See Water as a Source of Cooperation*

Water diplomacy's role, though, goes much beyond water management requirements. It may ultimately provide policymakers a formidable vehicle to advance political negotiations on key foreign policy interests. In fact, successful diplomatic engagement over transboundary waters typically encourages progress in the resolution of wider political conflicts, ultimately fostering deeper regional integration. Transboundary waters constitute a practical entry point for diplomats aiming for higher peace dividends in contexts where parties are particularly divided. Diplomats could do much more to seize opportunities presented by water negotiations, overcome distrust, improve communication, build trust between hostile groups, and eventually approach broader-scope peace agreements.

### *Assess Interdependencies, Power Relations, and Divergent Perspectives*

Water connects landmasses more than any other natural element in the earth's ecosystem. The geopolitical impact of water and its indispensable value to sustain life on the planet compel systemic collective actions and coordinated strategies. When these actions are entangled in chaotic interconnections and power imbalances, they become political risks. If unmanaged, these political risks degenerate into domestic or (in the case of transboundary basins) international rifts.

Diplomatic coordination is made more arduous by the diverse meanings the very notion of water assumes for different people and state administrations: as a political factor, an economic factor, and a cultural factor.

Water negotiations (and not only transboundary) are intrinsically political. They are inevitably shaped by the broader political context of regions and countries sharing the same water basin and the societal structure of people living in them.

The analysis of power dynamics and imbalances among different actors or beneficiaries of any given water source is fundamental to anticipating the weight of various (and often conflicting) interests within the negotiation and its potential to ignite conflict. Political power could constitute a source of disruption when it is maneuvered by any specific interest group at the expense of the larger community. It is, however, worth stressing that political power is not only proportional to the weight governments place on it. Geography (as indicated earlier) and climate always add to or detract from the power of the parties of shared waters, making some communities more advantaged than others. Robert Kaplan argues: "[W]hile they do not determine future events, the legacies of geography, history, and culture, really do set limits on what can be accomplished in any given place" (Kaplan, 2013). And we would add, in any given shared water basin negotiation.

That explains the diverging interpretations sometimes held by upstream and downstream countries and the justification attached to the water flow diversion when viewed as critical to the community's vital needs. One of the more sensitive tasks of water diplomacy, therefore, is precisely an empirical analysis of the complete array of power imbalances (political, geographical, socioeconomic, and cultural) that could affect a fair formulation and management of shared water-resource frameworks.

## Find Your Path Forward

As the nature of water diplomacy evolves, so do transboundary water negotiation frameworks, raising new questions on the role and limits of parties to the diplomatic process. What is the new role of modern-day water diplomacy and diplomats? Has a new power interplay emerged? How to identify the hidden roots of new forms of soft pressure (or coercion) on the diplomatic stage? What are the roles of diplomats and non-diplomats in crafting framework agreements, especially in transboundary waters discussions? How to best maximize and harmonize the combined impact of the different professional profiles required to advance a negotiation?

### *Not Everything Is Diplomacy*

In recent times, the expression water diplomacy has indeed witnessed an unexpected popularity surge, much beyond traditional water professionals. Water diplomacy has become a subject of interest and works for an array of individuals, institutions, bureaucracies, academia, and multilateral and non-governmental organizations, till recently unconcerned. One of the results of this global thrust of water interest has been that every involved subject adopts – and sometimes

adapts – the notion of water diplomacy to its field and sphere: international cooperation, governance, economy, conflict resolution, and peacebuilding.

Both government officials and members of the press have kept expanding the boundaries of the meaning of water diplomacy, diluting its essence to a concept whose breadth has today become a source of confusion, rather than a contribution to rigorous water negotiations. The ensuing generalizations have blurred a common understanding of what are the original purposes of water diplomacy, and what is not and should not be.

### *Not Everyone Needs to Be a Diplomat*

A fair appreciation of the value of water and its use should begin with the distinction between the application of diplomatic instruments and the application of technical knowledge within the negotiation frame. These two dimensions refer to distinct elements that, albeit bound to be eventually integrated, require different sets of skills and methods. It is essential to recognize the distinction of functions within complementarity of purpose, as it preludes to the identification of the various professional profiles required for each task of the process, setting parameters for their terms of reference and roles. When clarity is lacking, tasks could be unfortunately attributed to those who are not best equipped to perform them. Moreover, when failures occur, the lack of clear role definitions creates additional confusion that further undermines the negotiation.

Water traverses lands across regions and countries. Water management ensures that technical management and monitoring of water resource flows are assured for the benefit of all riparian communities. The term "technical management" applies to legal as well as scientific disciplines. The expression "water management" is not to be confused with "water diplomacy", as the latter refers to the pursuit of larger goals of regional development, peace, and security. Water diplomacy is not necessarily a synonym for water cooperation, though all the above expressions pertain to the larger theme of the synergisms between water and human beings.

### *We All Have a Role in Improving Cooperation*

Cooperation agreements and mechanisms ensure that the political advantages and economic benefits of joint management minimize risks for potential disputes and also promote opportunities for joint development. It is the case of successful cooperation for the construction of a new dam infrastructure, where good cooperation could lead to the enhancement of the potential of hydropower generation for the economic benefits of a region, well beyond national boundaries. In essence, successful cooperation not only entails joint management of existing resources but also the promotion of development initiatives and socioeconomic benefits that neither party could attain alone.

Fundamentally, water diplomacy is needed when communities are unable to agree on the use of a water source (within or outside their habitat) deemed vital by each of them. Water conflicts typically refer to the challenges of water-sharing dynamics leading to adequate cooperation and peaceful cohabitation within a community or between communities. Diplomatic negotiation is key to identifying and applying the best solutions to that end – an instrument today more relevant than ever for the maintenance of peace, regional cooperation, and international security.

The key challenge before us is to appreciate the proper significance of each dimension of the water discourse, its value within the larger human development agenda, and the role each one of us has in navigating the political and natural waters of an increasingly fragile and chaotic planet.

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# EPILOGUE

## Navigating the Future of Water Diplomacy

*Shafiqul Islam, Kevin M. Smith, Martina Klimes, and Aaron Salzberg*

### No Panaceas

With the collective expertise of over 80 authors and hundreds of years of experience and wisdom embedded in this handbook, one point is clear: there is no single pathway to achieving sustainable resolutions to water problems. Water issues are inherently complex, often shaped by natural, political, cultural, and economic contexts that vary across regions, scales, and sectoral interests. While many frameworks aim to offer replicable models and generalizable solutions, water diplomacy acknowledges that such uniform approaches often fall short when faced with the dynamic, uncertain, and boundary-crossing nature of real-world water challenges.

However, the absence of generalizable solutions does not mean we are empty-handed. Certain core principles consistently emerge across contexts:

- *Science is not negotiable.* Scientific findings produced collectively using the rigor of scientific methods are fundamental to addressing the quantifiable aspects of water problems and related uncertainties. They provide the foundation for discourse and a means of strengthening relational ties.
- *A negotiated approach to problem-solving is essential.* Deliberate attention to the problem-solving processes is essential to building enduring relationships and understanding of the multiplicity of interpretations that arise in water-related conflicts and cooperation.
- *Enabling conditions guide what is possible.* In complex water challenges, outcomes rarely follow traditional cause-and-effect patterns. Rather than seeking universal drivers of success, actionable water diplomacy recognizes and focuses on enabling conditions—such as mutual dependencies, shared incentives, institutional flexibility, and contextual awareness—that allow cooperation to emerge. These conditions do not guarantee outcomes, but they create the space in which negotiated, adaptive, and inclusive solutions become feasible.
- *Adaptive learning by doing is critical.* Water systems—and the human systems they interact with—are connected and continue to evolve. Addressing such complexity requires iterative action, reflection, and adaptation, rather than rigid planning or static solutions.
- *Principled pragmatism is vital.* Addressing water challenges requires respecting core values and principles while recognizing contextual constraints. This requires a willingness to be pragmatic and compromise on entrenched policies, positions, and practices to co-create actionable, acceptable, and adaptable solutions through inclusive engagement and negotiated problem-solving.

Operationalization of these principles requires the *synthesis of scientific and social facts*:

- *Scientific facts* are grounded in empirical observations, reproducible experiments, and theoretical frameworks that strive for objectivity and replicability. They help us understand hydroeconomic systems, characterize climate variability, and assess water quality dynamics with a degree of scientific certainty.
- *Social facts*, on the other hand, are shaped by human perceptions, cultural values, power dynamics, political institutions, and international norms. They are contingent on context and subject to change as societies and geopolitics evolve across time and space.

Water diplomacy is not just about applying scientific knowledge to social and political problems—it is about creating an actionable space where scientific and social facts intersect to design, develop, and manage interventions for desirable outcomes. By embracing both, water diplomacy moves beyond the false dichotomy of "objective science" versus "subjective politics," ensuring our decisions and actions are scientifically credible, societally acceptable, ethically responsible, and politically feasible.

This handbook does not offer prescriptive solutions. Instead, it provides a flexible, responsive, and adaptive set of tools and perspectives that encourage solutions that reflect the rigor of scientific analysis within the context of social and political realities.

## Three Actionable Insights for Actionable Outcomes

### *Insight 1: Distinguishing Between Uncertainty and Ambiguity*

A key insight from this handbook is that many collective decision-making problems share two fundamental challenges: quantifiable uncertainty and ambiguity. Understanding the distinction between these concepts is critical for operationalizing water diplomacy.

- *Quantifiable Uncertainty* refers to situations where variables are stochastic. They may be well-defined but remain unpredictable. For example, while we understand hydrological cycles well enough to estimate drought probabilities, the exact timing and severity of a drought remain uncertain. Probabilistic methods, models, and risk assessment frameworks are valuable tools for quantifying and managing the uncertainty associated with these variables.
- *Ambiguity*, in contrast, arises when there is no consensus on the choice of variables, their interactions, or their importance in defining the problem. It reflects differences in values, interpretations, and priorities. Ambiguity is not about missing information but the multiplicity of possible interpretations. For example, a river may be viewed simultaneously as a sacred entity, an economic resource, and a geopolitical boundary—all legitimate yet potentially conflicting perspectives.

It may be possible to reduce uncertainty through better data. Ambiguity, however, cannot be "eliminated" with more information. Instead, it requires a deliberate dialogue process and the co-creation of shared understandings about what matters to whom. Water diplomacy embraces this reality, offering strategies to manage—not eliminate—both uncertainty and ambiguity through inclusive, adaptive decision-making processes.

### *Insight 2: Governance, Development, and Water Diplomacy*

A second insight is the wide variation in water diplomacy outcomes among countries with different levels of institutional capacity, governance structures, technological capabilities, and natural resources. These differences reflect how context, especially political priorities, governance cultures, and development pressures, shapes how water diplomacy is practiced.

In countries with relatively stable governance, robust institutions, and access to scientific and technological infrastructure, water diplomacy often focuses on long-term planning, transboundary cooperation, and environmental sustainability. Negotiations tend to be grounded in formal legal frameworks, regional agreements, and data-driven processes. Dispute-resolution mechanisms—often codified in treaties or supported by regional bodies such as the European Union—provide platforms for collaboration and enforcement.

By contrast, in fragile and conflict-affected settings, water diplomacy is frequently driven by urgent needs: access to safe drinking water, failing infrastructure, degraded ecosystems, or competing claims over scarce resources. In these contexts, governance may be fragmented or weak, and reliable data may be scarce. Negotiation processes are often informal, locally led, and shaped more by immediate survival than long-term vision. Yet these constraints often spark innovative, decentralized solutions, which are grounded in local knowledge and adaptive governance.

Across these diverse settings, the core principles of water diplomacy—deliberate, dialogue-driven problem-solving, integration of scientific and social knowledge, and principled pragmatism—remain essential. The challenge is not to find and impose uniform solutions but to design flexible strategies aligned with local capacities and constraints. Supporting knowledge exchange, building institutional legitimacy, and promoting technology transfer can help bridge the gap between regions and strengthen water diplomacy everywhere.

### *Insight 3: The Value of Contextual Intelligence*

The third actionable insight in addressing complex water challenges is that *context matters*—not as a cliché but as a strategic imperative. The interplay of natural, social, and political systems means that the same intervention can have vastly different outcomes depending on where, when, and how it is applied.

This handbook emphasizes the importance of contextual intelligence—the ability to observe, interpret, and adapt to the specific dynamics of each situation. This involves (a) recognizing power dynamics across political, economic, and security domains, cultural norms, and historical relationships that shape stakeholder interactions; (b) understanding that water governance is not just about managing resources; it's about navigating the relationships, narratives, and institutions through which decisions are made; (c) recognizing the differences between uncertainty and ambiguity; and (d) appreciating the role of emergence, where outcomes cannot always be predicted from initial conditions but arise from complex interactions among variables, processes, actors, and institutions.

## Expanding the Practice and Moving Forward

Building on these three actionable insights, one lesson this handbook reaffirms is: *water diplomacy is both problem-focused and process-oriented*. It is driven by the need to address specific challenges, but it does so by emphasizing how scientifically defensible and socially responsible decisions are made and how relationships are built, institutionalized, and sustained.

For practitioners and decision-makers, this means embracing a different rhythm of action—one that values engagement over control, iteration over finality, and alignment over dogma. It requires working with uncertainty and ambiguity rather than around it, seeking outcomes that are good enough to move forward, and always being ready to adapt as conditions change.

To practice water diplomacy is to resist the illusion of control and embrace the reality of unpredictable emergence and the necessity of collaboration. It is to acknowledge that:

- Not all facts are settled—and that's okay.
- Not all voices are equal—but they must be heard.
- Not all processes or agreements are perfect—but they can evolve.

The future of water diplomacy lies in its ability to remain flexible, inclusive, and adaptive. The challenges posed by climate change, resource scarcity, changing demographics, and shifting geopolitical landscapes will continue to evolve, but hope, innovation, and collaboration provide a path forward.

- *Innovation*: Emerging technologies—such as AI-driven water modeling, blockchain for transboundary agreements, and decentralized water treatment solutions—offer transformative possibilities. However, these innovations must be paired with institutional and diplomatic advancements to ensure accessibility, adaptability, feasibility, and, perhaps most importantly, do not wittingly or unwittingly drive social or societal change but preserve the values of water that hold deep meaning and purpose.
- *The Role of Youth*: Perhaps youth is the wrong word; age is not what matters. What matters is that the next generation of water diplomats, engineers, and policymakers approach these challenges with open minds, unconstrained by a traditional orthodoxy that may no longer be relevant to the challenges we face. Young professionals are already driving innovation in climate resilience, participatory governance, and water justice movements. Supporting their engagement and leadership will ensure a more inclusive, forward-thinking, and action-driven approach to water diplomacy.
- *Hope and Action Over Fear:* Water crises are real, but fear-based narratives often divide, overwhelm, or immobilize rather than motivate. Water diplomacy must be framed not as a response to catastrophe but as an opportunity to create shared value and build a more resilient future. Its purpose is to catalyze tangible, on-the-ground improvements, not just conversations. Despite the explosion of water-related meetings, conferences, and declarations, too many promises remain unmet. Decades ago, experts cautioned that pledges alone would not deliver meaningful change—they were right. The challenge remains: progress depends not on rhetoric but on rethinking how we govern shared water, transforming institutions, building capacity, and securing sustained investment to turn dialogue into durable action.
- *Check Your Ego at the Door:* Water diplomacy succeeds when humility outweighs ego. The best outcomes often come not from asserting control but from enabling inclusive dialogue, even when credit is invisible. Water diplomacy is not about individual legacy—it's about sustainable, shared futures. Progress in water diplomacy often happens when no one person or institution claims credit, but when diverse actors find common ground. This work is not about building a legacy—it's about building capacity for desirable outcomes.

This handbook is not a checklist for practitioners and decision-makers; it is a companion. It offers no definitive actions but provides models of how to think, how to adapt, and how to build legitimacy in contested spaces. Success in water diplomacy is not about winning the argument; it is about building relationships that allow people to live with shared decisions, even if imperfect. The future of water diplomacy will depend on strengthening both formal and informal institutions—rules, norms, and relationships—that can adapt over time and scale with changing realities.

## A Decade of Water Diplomacy

As global water stress deepens, the need for structured, sustained diplomatic approaches is more urgent than ever. Now is the time to rally around water diplomacy—not only as a response to crisis but as a foundation for cooperation. It is time to propose a "Decade of Water Diplomacy" that leverages UNESCO's commitment to open knowledge and international cooperation. A Decade of Water Diplomacy would:

- Raise *global awareness* of the critical role of water diplomacy-related tools, techniques, and processes for addressing different types of resource challenges.
- Foster *capacity-development initiatives* to equip practitioners with diplomatic and technical skills.
- Promote *data-sharing and technological innovation* to improve decision-making.
- Strengthen *institutional frameworks* that leverage water as both a catalyst for cooperation and a tool for conflict resolution.

The next ten years will be decisive. Changing climate, demographic shifts, and declining trust in institutions will test our capacity to cooperate and adapt. But they also offer a window for reimagining how we govern shared resources—through principled pragmatism, negotiated problem-solving, and relational accountability.

This handbook is not the final word on water diplomacy. It is a foundation to build upon. The ideas, tools, and cases presented here are meant to be tested, adapted, and expanded. Water diplomacy is not a destination—it is a journey of co-discovery, where learning and action go hand in hand. We hope you will remain actively engaged in continuously refining the online version of this handbook, where its evolving contents are synthesized alongside the AquaPedia Case Study Database.

Let us take that journey with purpose.

# GLOSSARY

## A Guide to Key Terms in the Handbook

*Catherine Knox and Julian Tucker*

### Key Takeaways

- Water diplomacy and related fields share a large vocabulary of terms that have nuanced meanings in some subfields, disciplines, and geographies.
- Without additional context, it can be difficult to know when a word is being used generically or with respect to one of its possibly multiple, nuanced meanings.
- Rather than proceed with a single set of definitions and try to enforce their use in this handbook, this glossary provides a reference to help readers disambiguate the use of some common vocabulary.
- In taking this approach, the handbook's text reflects the real diversity of usage in common practice as well as the real interpretational challenges that can arise because of it.

### Introduction

This glossary serves as a navigational tool for readers by clarifying key terms that they may encounter throughout the handbook or in the interdisciplinary practice of water diplomacy. These terms may carry different meanings across chapters and disciplines or be used inconsistently or with varying degrees of specificity. The handbook is strengthened by the variety of authors, backgrounds, and academic disciplines represented within, but this can make it difficult to converge on consistent definitions for key vocabulary. Likewise, as you engage in the practice of water diplomacy, you are likely to encounter a similar inconsistency in meaning and intent. This glossary is meant to help clarify common and alternative uses of key terms and to increase the accessibility of key concepts as the reader works their way through the handbook. The entries do not provide an exhaustive list of each term's use throughout the handbook but provide a representative comparison of various definitions and concepts across the chapters.

### Term List


- Adaptive Processes
- The Commons/Common-Pool Resources
- Complexity
- Conflict
- Conflict Prevention and Conflict Resolution
- Equitable and Reasonable
- Harm

- Human Right to Water
- Joint Fact-Finding
- Models
- Mutual Gains
- Necessary and Sufficient Conditions
- Principled Pragmatism
- Power Relations
- Stakeholder Engagement and Participation
- Transboundary and Boundary-Crossing Problems
- Transboundary Water Cooperation, Management, and Governance
- Uncertainty
- Value Creation
- Water Rights

## Glossary

### *Adaptive Processes*

Many authors note that designing effective mechanisms in the complex systems surrounding water diplomacy will require an "adaptive approach." This is due to the need to have flexible resolutions that can adapt to local contexts (Chapter 8), climate and environmental changes (Chapters 14, 28, and 32), changes in water supply and demand (Chapter 23), or ineffective mechanisms in existing agreements (Chapter 14).

In addition to providing a variety of reasons for why we need to adapt, the authors point out numerous elements of water diplomacy that must be adapted to these changing dynamics and their context, including: learning and values (Chapter 8); best practices, strategies, and knowledge (Chapter 33); technology like irrigation techniques (Chapter 16) and models used in negotiation processes (Chapter 21); agreements and management strategies (Chapters 22 and 42, among others); and even the tools and understanding of water diplomacy as a field (Chapters 35 and 54).

One such tool to incorporate adaptivity in water diplomacy is collaborative adaptive management, which is described in Chapter 20 on Joint Fact-Finding. In Chapter 43, Megdal explores how adaptivity is incorporated within the International Boundary and Water Commission on the Colorado River. Chapters on the Sava River, Urmia Lake, and Sukhomajri also evaluate and reference the need for adaptivity in water diplomacy (Chapters 42, 46, and 49). Chapter 36 discusses principled and pragmatic adaptation as a means of keeping actions aligned with principles when confronting water management and governance challenges.

### *The Commons/Common-Pool Resources*

"The commons," "common-pool resources," or "common resources" are terms used throughout the handbook to describe many shared water sources. In their most specific definition, explained by Larson in Chapter 23, commons are "rivalrous and non-excludable resources," meaning that access cannot be limited and multiple users are competing for the resource.

The term is frequently seen with reference to Hardin's Tragedy of the Commons, which suggests that common-pool resources are subject to overexploitation. Larson also notes how multiple studies have explored how the "tragedy" has been avoided through traditional water management approaches that do not focus on property rights but instead incorporate local institutions

and collectivism. In Chapter 26, Janssen and Balakrishna echo the same point: existing literature on collective action and the commons shows that self-governance with existing and local institutional arrangements can lead to sustainable management of the commons. Despite these findings, the authors also note that managing commons, like water, still faces many challenges, including conflicting individual versus collective goals and a lack of understanding of system dynamics. Pearl, in Chapter 47, notes that solutions to "common pool resource problems will require as much buy-in and compliance from as many people and communities as possible," indicating the need for water diplomacy.

Chapters 20 and 48 further explore challenges associated with managing the commons in cases of inland salinization and groundwater in the Great Basin, respectively, introducing a further conceptual understanding of commons literature and vocabulary for the commons as they apply to water, in addition to providing examples of commons management at a larger scale.

### *Complexity*

Frequently used across handbook chapters, "complexity" is generally used to describe interactions between systems or system elements. Often, complexity is considered to be a source of difficulty in resolving transboundary water issues. Examples of complexity include linkages between social systems, political (and geopolitical) systems, and natural systems. These linkages can span temporal, geographic, or jurisdictional scales. Less frequent but still present in the handbook is the use of "complexity" to describe technical complexities, which is used to refer to models, tools, or knowledge itself.

Numerous chapters illustrate how complexity creates challenges for water diplomacy: Petrelius describes how complexity manifests as linkages between climate and conflict in Chapter 28; Faizee describes how complexity has added additional layers of difficulty in resolving water conflict between Afghanistan and Iran in Chapter 39; and Zarghami and Salimi illustrate multiple facets of complexity in the case of Urmia Lake in Chapter 46, among others.

Some chapters offer suggestions for contributing to the resolution of transboundary water challenges, given this complexity. While these suggestions vary, there is a large agreement that to design resolutions for complex transboundary water challenges, we must understand, embrace, and design for complexity (Chapters 5, 30, 51). In Chapter 49, Choudhury and Islam expand on how to distinguish complex systems and problems from those that are simple or complicated, illustrating how complex systems require adaptive approaches or risk eventual failures. Collaborative adaptive management and its connections to joint fact-finding are also proposed to manage complex systems in Chapter 20 by Schenk et al.

### *Conflict*

The word "conflict" appears in nearly every chapter in a variety of contexts as it applies to water diplomacy. Frequently, the term is used within the context of other ideas, such as "conflict resolution," "conflict prevention," "water cooperation and conflict," "transboundary water conflict," or "conflicting values." Each use varies in its application to scale (application to international conflicts, conflicts between individual stakeholders, conflict as a general concept, theories of conflict) and the degree of conflict it describes (ranging from conflicting interests, goals, or values to non-violent conflict to violent conflicts at inter- or intra-state scales). In Chapter 6, Meijer and Kim provide a succinct summary of interlinkages between water and conflict as they frequently appear

in the book, with references to conflict at various scales and degrees. Other chapters may more narrowly define conflict as it relates to their content.

### *Conflict Prevention and Conflict Resolution*

"Conflict prevention" and "conflict resolution" are two highly linked terms that appear in numerous contexts throughout the handbook, loosely used to indicate processes to decrease risks of conflict before it emerges and then how to resolve ongoing conflicts once they have already emerged. These terms are interrelated, and many authors describe feedback between conflict prevention, conflict resolution, and water diplomacy processes. For example, in Chapter 9, Keskinen et al. consider conflict resolution and peace mediation as preventative aspects of the water diplomacy process. They also explain that water diplomacy itself can be considered a long-term is, however, worth conflict resolution and peace mediation mechanism that, when carried out effectively, can be a tool for preventing future conflicts. Chapter 53 also considers water diplomacy as a preventative tool for conflict, with conflict resolution mechanisms listed as a key approach for peace mediation and conflict prevention. Chapter 28 elaborates on how conflict resolution mechanisms interact with environmental aspects, such as water scarcity, building on the experience of the Folke Bernadotte Academy.

Chapter 13 provides more background on conflict resolution, including the identification of five key steps for engagement in conflict resolution processes, beginning with assessment and pre-negotiation through the drafting and implementation of agreements. Conflict resolution and prevention are also mentioned at different scales throughout the handbook; while Chapter 33 focuses on their application to international spheres, Chapter 30 explicitly mentions how they can be applied to both inter- and intra-state conflicts, and Chapter 46 evaluates the effectiveness of conflict resolution mechanisms within the context of a single case on Urmia Lake.

### *Equitable and Reasonable*

The term "equitable and reasonable" is used in the handbook primarily to refer to a legal principle found in Article 5 of the UN Watercourses Convention. In the context of international water diplomacy, this principle can be used to guide water allocation mechanisms, as well as to attempt to ensure adherence to baseline human rights. It also structures the process by which parties can evaluate the status of water-sharing agreements.

Although it is used in the Convention, the term "equitable and reasonable" is vaguely defined and open to interpretation, as Salamé explains at the start of Chapter 33. In Chapter 31, Campbell-Ferrari and Wilson elaborate on this ambiguity and its implications in the UN Watercourses Convention, in addition to Ziganshina's explanation of the phrase in international water law in Chapter 27. These authors note that evaluations of whether agreements are "equitable and reasonable" are decided on context and can be different on a case-to-case basis. For water negotiations to be effective, parties must come to an understanding of what is deemed "reasonable" and "equitable" in a given context. Examples of challenges surrounding the lack of a clear definition of "equitable and reasonable" and the use of the phrase can be found in Chapters 44 and 42, which detail specific cases for the Silala River and the Sava River, respectively (Spijkers, Komatina).

In addition to the legal definition, the terms "reasonable" and "equitable" are used in their generic sense throughout the handbook without explicit reference to Article 5 or other legal documents or purposes.

### *Harm*

In addition to the application of the guiding principle of "equitable and reasonable use" to transboundary water problems, the principle of "no significant harm" is mentioned repeatedly in the handbook. The authors of Chapter 27 note that the use of this principle in water agreements often indicates that the parties "endeavor within their capacity in each particular circumstance" to avoid significant harm, but that it does not imply a complete lack of damage to others in all cases. "Harm" can apply to water quality (and therefore human health) or access to sufficient water resources for drinking, agriculture, and electricity production, among other applications.

There is no single definition or metric for the term, but instead, these must be established in specific contexts by the parties to a water agreement with the help of negotiators. In Chapter 31, Campbell-Ferrari and Wilson state the need for an established, measurable standard of harm and clear standards, potentially inspired and influenced by existing examples in customary international law. The use of the principle (and negotiated definition of "harm") can be used to help begin to overcome power asymmetries but could also reinforce existing inequities if done improperly (Chapters 31 and 47).

Additional challenges to defining "harm" are determining who defines "harm" and how. While the agreement of involved parties is necessary, conflicts can arise between them, which may impede reaching a consensus (Chapter 33). In this case, negotiators or other third parties may be brought in to help establish metrics and definitions of harm according to data and an understanding of the system (Chapter 33). The challenges of defining and agreeing on what constitutes "harm" are further elaborated on by Spijkers in Chapter 44 on the Silala River. Additionally, in Chapter 38, Çallı and Maden mention Türkiye's commitment to the principle on their shared waterways.

### *Human Right to Water*

This glossary entry explores the "Human Right to Water," or "Right to Water," as opposed to the commonly used term "water right" (explored later in this glossary). While the "water right" is used to indicate a legal or institutional understanding of agreed water use or ownership, the "Human Right to Water" refers to water access as a fundamental human right recognized by international institutions. In Chapter 34, Tignino, Kebebew, and Brethaut provide an in-depth overview of the history and status of the Human Right to Water (HR2W) within the International Bill of Human Rights. The authors explain how the HR2W is emerging in transboundary contexts and how achieving the HR2W faces specific challenges in its application to transboundary cases. The authors also provide examples of how the HR2W can be incorporated in such contexts, with references to the case of the Water Charters in West Africa. Additionally, they explore challenges to operationalizing and institutionalizing the right to water, including a lack of capacity, water scarcity, and a lack of effective and targeted policies.

### *Joint Fact-Finding*

"Joint fact-finding" is described as a method to begin to create consensus and carry out effective stakeholder engagement in transboundary water systems. An important prerequisite for water management and diplomacy is an accurate assessment of the physical, ecological, and social conditions of a given water regime. Parties to water diplomacy and negotiations need to draw on accurate data to develop functional governance regimes and ensure effective water management.

To do this, interdisciplinary groups can conduct surveys in the form of "fact-finding missions," which serve to gather and evaluate information about the characteristics of a water system.

In negotiations, having a common point of departure and trust in the data underpinning decisions is extremely important. Fact-finding missions can help to provide a baseline upon which negotiations and discussions build. Several of the authors in the handbook argue that joint fact-finding missions (assessments that include evaluators from different disciplines and backgrounds and drawn from different parties to negotiations) can form a valuable part of the water diplomacy toolkit and help to foster trust in a common data set. Chapter 20, by Schenk et al., addresses joint fact-finding in detail in the case of salinization on the Occoquan River.

### *Models*

As Wheeler describes in Chapter 21, models can be sorted into three categories: scientific models, decision support systems, and stakeholder engagement tools. Each of these kinds of models fulfills a specific role when it comes to water diplomacy. The first category, scientific models, attempts to represent natural systems (although they can also incorporate other political or sociological elements in their interactions). These kinds of models are frequently mentioned in Chapter 5, the hydrology primer. The second kind of model helps practitioners to evaluate potential decisions, particularly in the face of uncertainty. Models for stakeholder engagement include concepts such as participatory or collaborative modeling (more on this in Chapters 17 and 20, among others).

As models contain uncertainty in their context, development, and outcomes (see Chapter 14), models may frequently be contested in their application. This is also due to the fact that models are "inherently imperfect and contain subjective representations, assumptions, uncertainties, and limitations" (Chapter 21). This can result in very different results from separate models of the same system. Wheeler suggests that models must be accurate, flexible, and transparent to be useful in water diplomacy negotiations.

### *Mutual Gains*

The terms "mutual benefits" and "mutual gains" are used throughout the handbook to refer to negotiation outcomes where both parties benefit (in contrast to a zero-sum approach) or to the specific Mutual Gains Approach, which is elaborated on in Chapter 22 by Lawrence Susskind. In the general context, mutual gains can occur when multiple parties work together to create value and shared payoff in a water management agreement, such as in the cases presented in the chapters on Sukhomajri (Chapter 49), the Sava River (Chapter 42), and Afghanistan and Iran (Chapter 39). These solutions are formulated during the negotiation stage and often through an interest-based bargaining approach, expanded upon in Chapter 54 by Sparre and Lembo, as this approach permits the flexibility that is often required to develop solutions that expand benefits to all parties. In Chapter 39, it is suggested that solutions rooted in mutual gains may help to overcome power asymmetries between parties working toward cooperative governance. In addition, the terms can appear in a legal context, such as in frameworks or treaties pertaining to the shared governance of rivers. For example, "mutual benefit" is a basic principle for the governance of the Sava River (Chapter 42), which is used to inform and shape policies surrounding future transboundary cooperation over the river.

Susskind (Chapter 22) elaborates on the Mutual Gains Approach (MGA), which is a method of approaching negotiations designed for cases with multiple parties, substantial uncertainty, and limited enforceability of any agreed-upon governance regimes. This approach focuses on

combining stakeholders in an informal process with formal agreement-making to eventually form governance or management structures that create value for all negotiating parties.

### *Necessary and Sufficient Conditions*

Within complex systems, the ability to predict outcomes based on known causal relationships begins to break down. The idea of "necessary and sufficient" conditions to elicit a specific response is no longer dependable; while these inputs may be required for success, their presence is not sufficient to guarantee it. Instead of the term "necessary and sufficient conditions," Islam, Choudhury, Susskind, and others suggest a reframing of "enabling conditions." Enabling conditions are more closely aligned with complexity theory, acknowledging that while there is no way to identify true necessary or sufficient conditions in complex systems, it is possible to identify more generalizable conditions that can be enablers of a phenomenon, such as successful outcomes in transboundary water management.

### *Principled Pragmatism*

"Principled pragmatism" indicates the combination of pragmatic approaches with strong principles and values. As Islam and Smith describe in their book, *Interdisciplinary Collaboration for Water Diplomacy: A Principled and Pragmatic Approach*, pragmatism without principles is often unsustainable and inequitable, while principles without pragmatism are often not implementable or actionable. The notion of principled pragmatism forms a bridge between these two concepts in an attempt to create lasting and equitable water diplomacy solutions. As Choudhury and Islam comment in Chapter 49, this kind of approach also requires adaptation not only to specific contexts and cases, but also temporally in specific cases, as the nature of the system changes due to interactions between elements of the system. Smith and Islam elaborate on this idea of principled adaptation in Chapter 36.

### *Power Relations*

Different forms of power play a vital role in water governance and diplomacy. Appreciating the relationships between individuals, institutions, and states is an important skill for water professionals to cultivate. Numerous chapters in the handbook make reference to "power relations," "power asymmetries," or, more generally, "political power." A key determinant of access to resources and information, political power plays a major role in framing negotiations, constraining or empowering actors, and contextualizing water negotiations. Some chapters make reference to the historical experience linked actors have in water diplomacy and in navigating power imbalances (e.g., Chapter 30), while others emphasize the importance of taking into account the impacts of asymmetries on the methodology of water diplomacy frameworks.

### *Stakeholder Engagement and Participation*

"Stakeholder" is used generally across the handbook to denote key actors and agents who are affected by decisions. It is hard to find a chapter that fails to reference "stakeholders," given this is a key concept within the field of water diplomacy. As Verdini notes in Chapter 8, the Water Diplomacy Framework is stakeholder-driven to successfully navigate the complexities of competing interests and identities. Many of these chapters agree and explicitly mention that

stakeholders need to be included in a meaningful way throughout the life cycle of water diplomacy projects.

A few chapters in the handbook elaborate on how to incorporate stakeholders into these projects. Chapter 9 explores participatory stakeholder processes, which use methods like knowledge mapping and social network analysis to expand understanding of terms, actors, and the diversity of views within the given context. Additionally, Chapter 21 explores how stakeholders can be included in modeling processes, Chapter 17 illustrates how stakeholder engagement contributes to knowledge transmission, and Chapter 20 explores how stakeholder engagement is linked with other processes like joint fact-finding. The selected case studies in the handbook often expand on how and to what degree stakeholders were engaged and participated in the water diplomacy process.

A few authors also explain the risk of doing insufficient stakeholder analysis; in Chapter 9, the authors note that while the approach requires stakeholder engagement, it does not directly address how to overcome power imbalances and existing inequities between stakeholders.

### *Transboundary and Boundary-Crossing Problems*

The term "transboundary" is commonly used in water diplomacy to describe water that crosses or is shared by multiple administrative units. The use of this term throughout this handbook is generally consistent with its common use to describe water that crosses or is shared by multiple administrative units. Usually, these administrative units are countries, but at smaller scales, transboundary is sometimes used to describe water shared between subnational states (e.g., Chapter 48) or municipal jurisdictions.

However, the handbook acknowledges that water crosses more than just administrative boundaries: it also crosses cultural, economic, and institutional domains, where different stakeholders hold competing values, rights, and priorities regarding water use, governance, and sustainability. It also undergoes natural and physical transformations as it moves throughout the human-influenced water cycle. Water crosses these boundaries at multiple scales, adding couplings, complexities, and unique challenges. The handbook refers to this broader category of challenges as "boundary-crossing problems." This is not an attempt to redefine "transboundary," but to preserve its common meaning, while also finding a way to discuss the challenges that arise when water crosses natural, political, and societal boundaries at multiple scales (Chapter 2).

### *Transboundary Water Cooperation, Management, and Governance*

Three closely connected terms intertwine between the chapters in the handbook: "transboundary water cooperation," "transboundary water management," and "transboundary water governance." While signifying distinct ideas, it can be difficult to tease apart the differences between each term in general and how they apply to a chapter's context. Generally, transboundary cooperation is the most loosely defined, as what can be considered cooperation may be up to interpretation in some instances. Transboundary water governance often refers to organizations, institutions, and interactions that determine stakeholder interactions, priority-setting, accountability, and the overarching normative framework in which management actions that impact shared waters occur. Transboundary water management refers more often to concrete actions and operational decisions taken within the framework established through governance, such as implementing joint infrastructure projects on shared waters. Chapter 36 provides additional details on this distinction and its implications. As Aureli and Villholth mention in Chapter 32, transboundary water governance

is also included in the UN Sustainable Development Goals and is required to be assessed and monitored. This indicates the recognized need for tracking changes in transboundary water governance metrics, however, sufficient or insufficient that assessment may be.

The authors of Chapter 9 also incorporate a distinction between "transboundary water cooperation" and "water diplomacy." They state that transboundary water cooperation "builds on the established cooperative institutions and technical knowledge and planning processes with a clear focus on water," while water diplomacy "often puts more emphasis on the political and geopolitical dimensions and related tensions on shared waters, noting the importance of conflict resolution and negotiation processes that typically engage several sectors and actors, also beyond water." They continue to explain this distinction and how both of these concepts contribute to the same aim and can also reinforce each other. Although not all authors in the handbook may agree with this distinction, this provides a useful starting place for the reader to begin to make their own distinction between these terms.

### *Uncertainty*

Numerous chapters reference the role and effect of "uncertainty" in complex systems and the need for adaptive and flexible tools to appropriately respond and manage uncertainty in the water context. Grappling with uncertainty is recognized as a challenge for water diplomats in cases presented throughout the handbook. "Uncertainty" is used frequently within the context of climate change scenarios, predictions for future water quality and quantity, and in relation to political and social systems. In Chapter 14, Gain provides an in-depth study of the nature and impact of uncertainty in water diplomacy, providing a succinct summary of uncertainty for practitioners and academics. Additionally, Gain's assessment of existing transboundary cooperation treaties reveals that uncertainty is rarely addressed sufficiently in these treaties.

Uncertainty in the handbook can also be narrowly defined to refer to quantifiable metrics, such as errors in fitted distributions in models, or in a broader application to describe our inability to predict unforeseen events or outcomes. In Chapter 8, Verdini defines uncertainty as synonymous with variability, doubt, indecision, hesitation, vagueness, ambiguity, and insecurity. Neupane (Chapter 18) also recognizes ambiguity as a form of uncertainty. Chapter 36 links ambiguity to a form of uncertainty that arises from the need for interpretation. Other authors may make different distinctions between these related terms.

### *Value Creation*

"Value creation" is a key component of the MGA to negotiation that describes the process of finding diplomatic resolutions that result in net-positive outcomes for all parties (Chapter 22). Authors recognize the need for value creation in water diplomacy processes across the handbook in order to design effective agreements (Chapters 8, 16, 25, and 48). In Chapter 16, Aviram et al. describe how creating value requires a process of identifying, distributing, and redistributing benefits of the shared water resource. Similarly, Susskind explains the need to identify where the values of each party differ to explore possible trades to create value. Value creation requires leaning on creative options driven by the goals and values of each party involved in a negotiation process. Susskind also specifies the need to provide objective standards (at least acceptable to all parties) to assess proposed resolutions in order to maintain opportunities for creative solutions.

### *Water Rights*

In the handbook, water rights refer most often to a legal arrangement in which individuals and communities are granted the use of water in some form (Chapters 16, 23, 39, 47, 48, and 49, among others). Agreements can emphasize a given activity (such as agriculture, industry, hydroelectric power generation, etc.) or volume of water (either as a fixed quantity or a percentage of flow). The concept of "water rights" is closely related to "water allocations" (although an allocation may be less or more than what may be granted according to a regime of water rights). A water right does not imply that a user will have access to the water in practice.

Water rights can be distributed through a number of mechanisms/regimes and are often an integral part of water diplomacy and water disputes. The way in which water rights are recognized and distributed can have an important effect on the viability and sustainability of transboundary water management regimes. For instance, in Chapter 48, Jarvis explains how water rights have been granted according to the doctrine of prior appropriation in the Western United States but notes that there are still discrepancies in the application of this doctrine between states. When downstream countries feel that their ability to effectively use shared water resources is impeded by upstream countries, contested water rights can contribute to interstate tensions.

The way in which water rights are structured impacts relations beyond the interaction of states. For example, Chapter 16 (Aviram et al.) argues that the way in which water rights are defined can promote inefficient use of common resources, while Chapter 23 (Larson) emphasizes that clear water rights are a prerequisite for the sustained existence of a water market.

Water rights, used in this sense, are not to be confused with the right to water as a fundamental human right, which is included as a separate glossary entry.

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*Note*: Numbers in **bold** indicate figures. (1813 lines).


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IBWC *see* International Boundary and Water Commission
ICESCR *see* International Covenant on Economic, Social and Cultural Rights
ICJ *see* International Court of Justice
ICPDR *see* International Commission for the Protection of the Danube River
ICRISAT *see* International Crops Research Institute for the Semi-Arid Tropics
ICT *see* Information and Communication Technology
IFI *see* international financial institutions
IFPRI *see* International Food Policy Research Institute
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