



Earthscan Studies in Water Resource Management

DEFINING EFFECTIVE TRANSBOUNDARY WATER COOPERATION

Melissa McCracken



“Terms as seemingly straightforward as ‘cooperation’ and ‘effective’ can actually be devilishly difficult to define, and harder to tangibly gage, especially in the world of international law and diplomacy. Melissa McCracken takes on the seemingly intractable task of operationalizing both concepts, as applied to the half the land surface of the earth that lies within river basins shared by two or more countries, and does so with aplomb. Invaluable for scholars and practitioners alike, this clear and precise volume will be helpful for anyone working in the realm of water cooperation and diplomacy, and will have useful lessons for those working in other shared resources as well.”

Aaron T. Wolf, *Professor of Geography, Oregon State University, USA*

“This book takes the next step in measuring the effectiveness of cooperation over shared water resources. By providing an approach to defining what effective cooperation actually is and to measuring where and how cooperation takes place at what level of effectiveness, it provides great guidance to both researchers and practitioners in ensuring that our shared water resources are being managed equitably and sustainably today and in an increasingly challenging future!”

Susanne Schmeier, *Associate Professor in Water Law and Diplomacy, IHE-Delft, the Netherlands*

“For those who think about and act to improve transboundary water conflicts, ‘cooperation’ is a most used and abused term. Through her scrutiny of the term, McCracken helps all of us to realise that water ‘cooperation’ between states can be as instrumental and destructive as it may be positive. Thanks to this book, we can now use the term ‘cooperation’ accurately, and perhaps move some water arrangements to be more equitable, more sustainable.”

Mark Zeitoun, *Professor of Water Security and Policy, University of East Anglia, UK*



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Defining Effective Transboundary Water Cooperation

This book establishes a framework for defining transboundary water cooperation and a methodology for evaluating its effectiveness, which will contribute to more effective and therefore successful cooperation processes.

With the increasing focus on transboundary cooperation as a part of the Sustainable Development Goal Framework, there is global recognition of transboundary water cooperation as a tool for improved governance and management of transboundary surface and groundwaters. However, there is not an agreed-upon definition of transboundary water cooperation in the literature or in practice. This book develops the Four Frames of Transboundary Water Cooperation, which is a neutral modular framework for developing context-specific explanatory definitions of transboundary water cooperation in basins and aquifers. The Four Frames of Cooperation are legal, institutional, relational, and outcome. However, we need to move beyond defining cooperation to understand better measures of the quality and effectiveness of cooperative processes. The Weighted Model of Effective Cooperation presents a first step in qualitatively evaluating the effectiveness of transboundary water cooperation. This model defines effective transboundary water cooperation and operationalizes a method to evaluate the effectiveness of cooperative processes over internationally shared waters. Effective cooperation emphasizes the relational and outcome frames of cooperation while working toward equitability and sustainability. Together, the Four Frames of Cooperation and the Weighted Model of Effective Cooperation will improve the understanding of cooperation and encourage a detailed evaluation of the quality, success, and effectiveness of cooperative processes.

This book will be of great interest to students and scholars of water resource management, water governance, and environmental politics. It will also appeal to policymakers and professionals working in the fields of water conflict, water diplomacy, and international cooperation.

Melissa McCracken is an assistant professor of International Environmental Policy at The Fletcher School at Tufts University. Her research focus is on international water policy and management, cooperation and conflict over shared surface and groundwaters, and conflict transformation surrounding environmental resources. Prior to joining The Fletcher School, Melissa was a post-doctoral scholar with the Program in Water Conflict Management and Transformation, as well as the manager of the Transboundary Freshwater Dispute Database housed at Oregon State University.

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Melissa McCracken

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When I first set out on this research project, I was never expecting to write a book. My journey to this point began during my doctoral studies at Oregon State University, where I had the opportunity to intern with the Global Water Partnership. While there, I was given the opportunity to collaborate with Professor Dan Tarlock on a new Technical Background Paper evaluating the methodology of Sustainable Development Goal Indicator 6.5.2. This exploration of the SDG Indicator and other measures of transboundary water cooperation started me down the path toward defining cooperation and effectiveness.

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1 Using a common language for transboundary waters

Every day we interact with water, whether through our day-to-day activities, like drinking tea or brushing our teeth, or through our employment, such as in industry or agriculture. For many of us, there is a high likelihood that your water was sourced from a transboundary river basin or aquifer. With 310 transboundary river basins and nearly 600 transboundary aquifers and groundwater bodies intersected by political boundaries (McCracken and Wolf 2019; IGRAC and UNESCO-IHP 2015), internationally shared waters are a vital and ubiquitous component of the world we live in. With the increasing variability and intensity from climate change, rising demand from economic development and population growth, growing threats to water quality and ecosystem health, among other challenges, cooperation over these internationally shared waters is as important as ever. However, cooperation has often been presented as an always positive process for transboundary waters, and there is a lack of agreement over the desired benefits and outcomes of a cooperative process. In short, what makes cooperation effective? By answering these questions, we can improve our understanding of transboundary water cooperation and develop more effective processes to prepare better and adapt to the challenges facing our global waters.

What you are about to read, at its most basic level, is a book about definitions of two essential words in the field of international waters – cooperation and effectiveness. This book presents a new perspective on these definitions and explores these concepts through their complexity, nuance, and context. Academic research is often focused on the generalizability and transferability of results, and to an extent, this book is no different. However, I hope you discover in reading this that definitions of transboundary water cooperation and its effectiveness are more complex and detail-rich than you might expect.

This book sets out to create a framework and a model to define and evaluate effective transboundary water cooperation and is written for students, academics, and practitioners in the field of international waters. Nevertheless, the concepts of cooperation and effectiveness can be translated to other shared natural resources and scales below the international. My aim is that, from this book, you take away a better understanding of the key terms in this field and how to define transboundary water cooperation and effectiveness. Furthermore, it

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should allow you to apply these definitions to a cooperative process and better understand the context and nuance that influences and impacts the outcomes and effectiveness of that process. I hope that academics and practitioners find these methods useful to explore and evaluate cooperative processes and that they will be able to use the methods to provide explicit guidance on what actions and policies have promoted effective cooperation over shared waters, as well as what could be done to increase the effectiveness of cooperative processes.

In addition, I have three other points that I hope you take away from this book. First is that you will recognize the importance of place, scale, and context in transboundary water cooperation and that relationships and outcomes matter when developing effective cooperation. Second is you take away that for cooperation to be effective, it must be equitable and sustainable. And third is that you recognize the tendency for cooperation to always be assumed as a positive action. While transboundary water cooperation is vital for sharing water and has the potential to reduce conflict, improve management, and increase resilience in the face of future climate change, not all cooperation is positive. Instead, transboundary water cooperation can be either constructive or destructive, as put forward by the London Water Research Group (Zeitoun et al. 2019). This book aims to shift the narrative of cooperation toward neutral rather than inherently positive. Once cooperation is defined, its effectiveness can be evaluated, and judgment can be made as to whether it is positive or negative.

A tool for navigating the book

As mentioned at the outset, the essence of this book is about definitions. Therefore, it is crucial for our discussion of transboundary water cooperation and effectiveness to have clearly defined terminology used consistently throughout the book. This chapter provides the foundational terminology upon which the exploration of the nuance and complexity of transboundary water cooperation is based, and it serves as a tool for the reader to ensure clarity in the discussion. Please refer back to this chapter as needed while reading this book and reference the definitions.

While at its core, the book is about definitions, in practicality, this book is much broader in its scope, discussion, and ultimate outcomes. As mentioned earlier, this book develops a framework for defining transboundary water cooperation in a specific place, scale, and context, and it establishes a model for evaluating the effectiveness of that cooperation. In order to achieve these goals, the book is divided into three parts, as depicted in Figure 1.1. Part I answers the question: why is a framework for defining transboundary water cooperation and a method for evaluating its effectiveness needed? Chapter 2 identifies the two main challenges regarding transboundary water cooperation. First, there is no consistent definition of transboundary water cooperation, and second, the variety of methods present for measuring cooperation are often attempting to measure its outcomes or effectiveness. However, the number of methods poses a challenge in monitoring progress and making policy recommendations as to

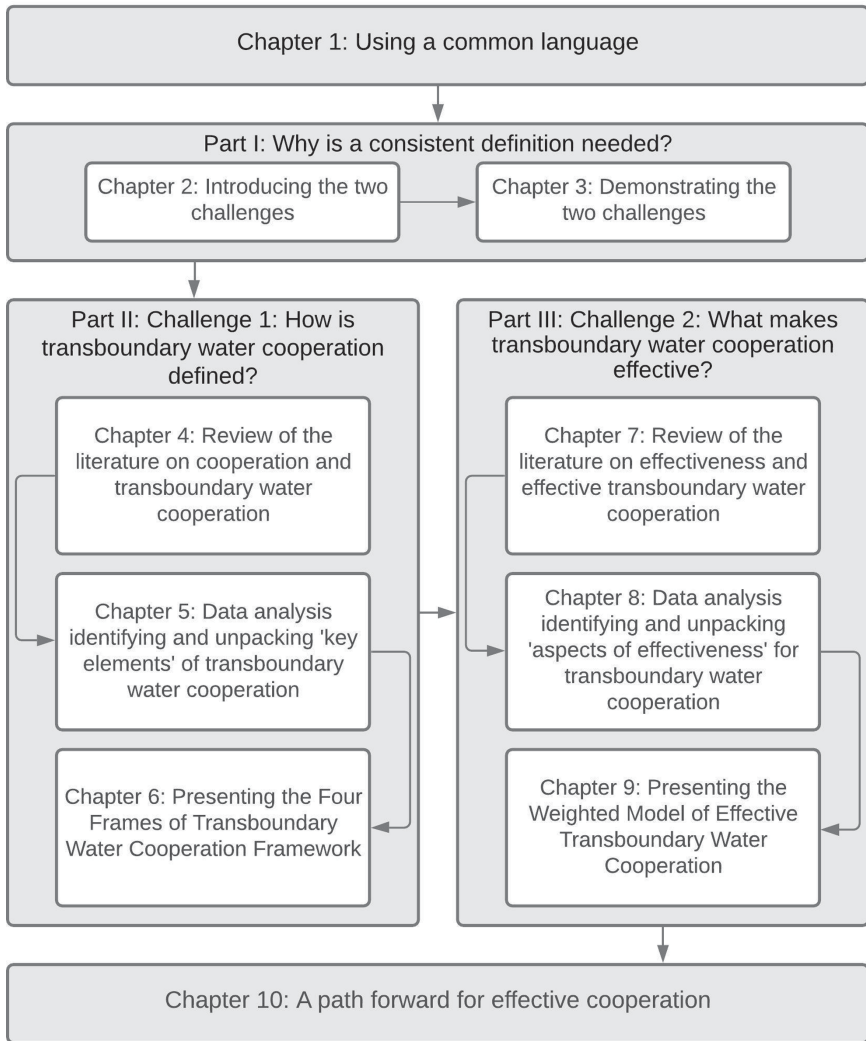


Figure 1.1 Flowchart of the organization and structure of the book.

how to improve the effectiveness of a cooperative process. Chapter 3 exemplifies these two challenges identified in Chapter 2. By comparing three methods for measuring transboundary water cooperation, Chapter 3 demonstrates the complication and confusion that can arise from the use of multiple definitions of transboundary water cooperation and the multiple frameworks for measuring and tracking progress.

Once the two main challenges have been identified and explained, Part II explores the first challenge by answering: How is transboundary water

cooperation defined? Chapter 4 begins answering this question by unpacking how cooperation, in a general sense, as well as transboundary water cooperation has been defined in the literature. It presents a review and discussion of how cooperation is used and defined in other fields and the similarities and differences with how transboundary water cooperation is defined in the international waters literature. Using data collected from a qualitative content analysis of literature and interviews with academics and practitioners, Chapter 5 delves into these perspectives on transboundary water cooperation and identifies the key elements that compose it. Using these key elements, Chapter 6 develops a concise definition of transboundary water cooperation, which is listed in the following *Common terminology* section. It then rounds out Part II by recognizing that a statement-style definition of transboundary water cooperation has limitations in that it is difficult to apply to a particular basin or aquifer to determine what is part of the transboundary water cooperation process. The chapter develops a framework for defining transboundary water cooperation by framing the key elements of cooperation into four main categories apparent within definitions of cooperation. Together these four frames represent a means to neutrally define a cooperative process taking into consideration the nuance and variance from a unique context, scale, and place.

The final part of this book, Part III, addresses the second challenge that cooperation does not always establish benefits as expected and that it can contribute to inequity and unsustainability. Therefore, a method is needed to evaluate if a transboundary water cooperative process is effective. Determining what makes transboundary water cooperation effective is the challenge approached by this part. Chapter 7 begins by reviewing the literature on general effectiveness and effective institutional regimes; it then explores how the term 'effective' has been used in the context of transboundary water cooperation in the international waters literature. Similar to Chapter 5, Chapter 8 uses the results of a qualitative content analysis of literature and interviews with academics and practitioners to identify the key aspects of effective transboundary water cooperation, as well as basins and aquifers that have effective cooperative processes and examples of those that lack effective processes. It concludes by developing a statement-style definition of effective transboundary water cooperation, which is listed in the following *Common terminology* section. Part III concludes with Chapter 9, which recognizes that a statement-style definition of effectiveness is not practical for our ultimate goal of evaluating the degree of effectiveness of a cooperative process over shared waters. Therefore, Chapter 9 presents a model and a methodology for applying the model to evaluate effective transboundary water cooperation. The Weighted Model of Effective Cooperation is based on the Four Frames of Transboundary Water Cooperation developed in Chapter 6. The final chapter of this book, Chapter 10, concludes with how the discussions in Parts II and III address the two main challenges identified in Part I. Through this summation, as well as the discussion of the challenges and limitations of the methods developed to define and evaluate effective cooperation, I hope that this

chapter – and ultimately this book – allows you to discover that transboundary water cooperation and its effectiveness are more complex and detail-rich than one might expect.

Before diving in, I want to return to the idea that this book is about definitions. International waters, like most fields of study and practice, is heavy with jargon. The language and our common understandings of the terms used imbue value and importance. Our choice of terms has the power to include or exclude and play a role in how groups sharing waters interact. Language can aid in sharing knowledge and increasing efficiency and effectiveness. Therefore, before we begin to discuss how transboundary water cooperation is defined and a model for evaluating its effectiveness, I want to identify some of the key terms used throughout this book and highlight how they are defined. The following section should be used as a reference to gain clarity in the discussion.

Common terminology

A foundational understanding of commonly used terms and concepts is needed. Without a specific and clear understanding of the key terms relevant to the discussion on transboundary water cooperation, such as transboundary basin or arrangement, there is potential for misunderstanding. The commonly used concepts and terms in the field of international waters are defined below:

Watercourse: A watercourse is “a system of surface and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus” as defined by the *Convention on the Law of Non-Navigational Uses of International Watercourses* or commonly known as the 1997 UN Watercourses Convention (United Nations 1997). This includes those groundwater bodies that are hydrologically connected and within river basin boundaries. Excluded from the 1997 UN Watercourses Convention definition are the fossil and confined groundwater bodies not hydrologically connected.

Transboundary River Basin: A river basin is the area of land that drains to a common terminus that is an ocean, sea, or terminal inland water body; it is also known as a watershed or catchment. This includes the groundwater bodies that are hydrologically connected to the surface water system. A river basin is transboundary if it contains a perennial tributary that crosses a political boundary between two or more states. (United Nations Centre for Natural Resources, Energy and Transport of the Department of Economic and Social Affairs 1978; Wolf et al. 1999; McCracken and Wolf 2019).

Basin Country Unit (BCU): The area of a transboundary river basin that is within a particular nation. Each transboundary river basin will have at least two BCUs. This area is found when the river basin boundaries are intersected with the political borders (TFDD 2021).

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Aquifer: An aquifer is a geologic formation that contains water (International Law Association 2004). More specifically, it is a “permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation” as defined by the United Nations International Law Commission’s Draft Articles on the Law of Transboundary Aquifers (United Nations 2016).

Groundwater Body: A groundwater body is defined explicitly by the European Union Water Framework Directive as a “distinct volume of groundwater within an aquifer or aquifers” (European Commission 2000). This distinction between aquifers and groundwater bodies is visible in the categorization in the *2015 Map of the Transboundary Aquifers of the World* (see Figure 2.2). However, in this book, groundwater body is used interchangeably with aquifer.

Groundwater: The water contained within a water-bearing geological formation (International Law Association 2004). In this book, groundwater will be reserved for the water contained within an aquifer. Groundwater can occur in aquifers under two general conditions: confined and unconfined.

Confined: A confined aquifer is overlain by a geologic layer with low hydraulic conductivity; this layer is also known as a confining bed, which restricts the flow of groundwater into or out of the aquifer. An aquifer is confined if water completely fills (full saturation) the pore spaces between the confining beds. It can also be referred to as an artesian aquifer (Heath et al. 2004, 6).

Unconfined: In an unconfined aquifer, water only partly fills the geologic layer. The water table is free to rise and fall, and it is actively involved in the water cycle. These are often called water-table aquifers (Heath et al. 2004, 6).

Transboundary Aquifer or Groundwater Body: A transboundary aquifer (or groundwater body) is intersected by a political boundary and is not hydrologically connected to a surface water system (UNECE 2014). However, in the Draft Articles on the Law of Transboundary Aquifers, an aquifer is transboundary when parts “are situated in different states” (United Nations 2016). Differentiating transboundary aquifers is more complex than river basins, as groundwater bodies can overlap vertically. For those that are vertically overlapping and hydrologically connected, I consider them here as one transboundary aquifer. If they are vertically overlapping and not hydrologically connected – e.g., an unconfined aquifer over a confined aquifer – the groundwater bodies will be considered separate transboundary aquifers unless they are managed conjunctively (UNECE Water Secretariat 2020).

Aquifer Country Unit (ACU): The area of a transboundary aquifer (or groundwater body) that is within a particular state. Given that aquifers have the potential to overlap vertically in the subsurface, the area referred to is the plan view

surface area of an aquifer and does not consider the aquifer thickness nor potential volume of water. If overlapping and hydrologically connected, then layers are considered as one ACU. If overlapping and not hydrologically connected, then they are separate ACUs.

Transboundary Area: The total transboundary area within a state is the sum of the surface areas of the BCUs and ACUs in that state. This sum may yield a larger value than the surface area of the country, as the BCUs and ACUs have the potential to overlap. This term is commonly used in reference to the calculation of Sustainable Development Goal Indicator 6.5.2 (see Chapter 3).

Riparian: Relating to or next to a river or stream. It also refers to the nation-states that are within an international river basin and contribute area that drains to the common terminus. For example, the Columbia River Basin is shared between Canada and United States; therefore, Canada is a riparian of the Columbia River Basin.

Hydropolitics: Hydropolitics, like transboundary water cooperation, lacks a single universal definition (Grandi 2020). However, broadly it can be understood as “a systematic study of interstate conflict and cooperation over transboundary water resources” (Elhance 1997, 218).

Institutional Capacity: Institutional capacity includes agreements, treaties, river basin organizations, institutions, and even the positive international relations between riparians (Wolf 2007). Institutional capacity is particularly important in discussions of transboundary water cooperation as it has been shown that institutional capacity can increase the hydropolitical resilience to tensions over shared water (Wolf, Yoffe, and Giordano 2003).

River Basin Organization: A River Basin Organization (RBO) is an “institutionalized form of cooperation that is based on binding international agreements covering the geographically defined area of an international river or lake basins characterized by principles, norms, rules, and governance mechanisms” (Schmeier 2013). RBOs and other institutions on shared waters are central aspects of institutional capacity.

Agreement: An agreement is a bilateral or multilateral formal legal instrument, such as a treaty, amendment, memorandum of understanding, or protocol, between riparian countries regarding transboundary waters.

Arrangement: An arrangement for water cooperation is defined as

a bilateral or multilateral treaty, convention, agreement or other arrangement, such as a memorandum of understanding, between riparian states that provides a framework for cooperation on transboundary water

management. Agreements or other kinds of formal arrangements may be interstate, intergovernmental, interministerial, interagency, or between regional authorities.

(UNECE Water Secretariat 2020, 3)

This is a broad definition, but it is centered around the existence of an agreement and is specific to the methodology to calculate the SDG Indicator 6.5.2, which is discussed in Chapter 3.

Cooperation: Cooperation has similar yet deviating definitions depending on the field from which it is derived. In the field of international relations, the most widely cited definition is “when actors adjust their behavior to the actual or anticipated preferences of others through a process of policy coordination” (Milner 1992; Lindblom 1965, 227; Keohane 1984). In the context of this book, I use a definition for general cooperation, which aids in the differentiation between cooperation in general and transboundary water cooperation: Cooperation is a joint action, which can be performed cooperatively and non-cooperatively. Cooperative joint action occurs when participants are willing to complete not only their parts but also assist in additional activities needed for the joint action. Comparatively, non-cooperative joint action is when participants complete their agreed-upon part but will not assist in any additional activities, even those required for the agreed-upon joint action (Tuomela 1993).

Transboundary Water Cooperation: Transboundary water cooperation is the interactions between actors over shared waters that result in establishing mutually beneficial outcomes through a decision-making process; this process could include formal and informal legal and institutional mechanisms depending on the scale and context. This definition is developed by this book (see Chapters 5 and 6).

Effective Transboundary Water Cooperation: Effective transboundary water cooperation achieves equitable results or outcomes through a cooperative decision-making process that has trusting relationships with stakeholder participation and communication. This process is supported by the appropriate legal and institutional arrangements, where the outcomes can be the resolution of the initial problems, reaching the goals of the parties, or complying with mutually agreed-upon principles in a legal arrangement. Effective transboundary water cooperation is equitable and sustainable. This book develops this definition (see Chapters 8 and 9).

Equitable: In the context of this book, equitable is defined in the context of the model developed for evaluating effective transboundary water cooperation – the Weighted Model of Effective Transboundary Water Cooperation. Here, equity or equitable refers to fairness or justice in the cooperative process of sharing transboundary waters. Equitability can be perceived to be achieved when there is an absence of disparities between the actors in the basin in both

outcome and process (and perhaps between sectors of use). For each unique basin or aquifer context, equity will be perceived differently. See Chapter 9 for an expanded discussion.

Sustainable: In the context of this book, sustainability is defined as one of the measures – along with equitable – for evaluating whether cooperation is effective. Sustainability is “a condition in which natural and social systems survive and thrive together infinitely (Euston and Gibson 1995)” (Svendsen 2005, 5). However, for this application, I use a definition for sustainable that is aligned with sustainable development. Sustainable and sustainable development are prevalent terms in the literature, as well as within the broader public vocabulary on environmental issues. The most common understanding is balancing trade-offs and desirable goals between the three pillars – social, economic, and environmental – to achieve sustainable development (Purvis, Mao, and Robinson 2019). It is this understanding of sustainable that is applied in this book; see Chapter 9 for an expanded discussion.

My aim in including the following final three terms differs from the previous set of definitions included in this *Common terminology* section. The goal is to provide a common understanding of the key terms used in the field of international waters and, in particular, how they are defined and used throughout this book. However, as many readers will note, the terminology is often used interchangeably or may have overlapping meanings. This is true of transboundary water cooperation – the focus of this book. There are blurred lines between transboundary water cooperation and other terms in the field, namely: water diplomacy, water governance, and water management. Like transboundary water cooperation, these terms also have multiple definitions, and my goal in providing definitions here is not to establish a judgment on what the specific definition should be. Instead, these definitions are a point of comparison, so we may better explore how transboundary water cooperation is defined and determine what it is not. A detailed comparison and discussion of these three terms and their links to transboundary water cooperation are discussed in Chapter 5.

Water Diplomacy: One definition of water diplomacy presented by the Stockholm International Water Institute is that it

Is a dynamic and evolving process and can support important efforts to achieve peaceful, inclusive and sustainable water cooperation between communities, regions, and countries. It can be tailored and responsive to the uniqueness of each process and geopolitical context.

(SIWI 2016)

In contrast, it can also be defined as

A theory and practice of implementing adaptive water management for complex water issues. The water diplomacy approach diagnoses water

problems, identifies intervention points, and proposes sustainable solutions that are sensitive to diverse viewpoints and values, ambiguity and uncertainty as well as changing and competing needs.

(“Water Diplomacy@Tufts” 2019)

From these two definitions, we can see the range in understandings of water diplomacy and the overlap with transboundary water cooperation.

Water Governance: Water governance is not inherently at the transboundary interstate scale; much of the water governance literature focuses on national governance of water at the state, regional, and local levels. One of the most widely cited definitions of water governance is by Rogers and Hall: “Water governance refers to the range of political, social, economic, and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society” (Rogers and Hall 2003, 7). However, a growing body of work is shifting to global and interstate management of water. These definitions of global water governance focusing on global norms of water management overlap with the idea of transboundary water cooperation. One definition of global water governance is “the formal and informal institutions, activities, and processes between different actors through which collective interests on water are articulated, differences are mediated, and joint actions are established” (Wiegleb and Bruns 2018).

Water Management: Like water governance, water management does not explicitly focus on internationally shared waters. Water management has evolved from technical and engineered solutions of water problems toward the “activities of analyzing and monitoring, developing and implementing measures to keep the state of water resources within desirable bounds” (Pahl-Wostl et al. 2012, 25). The recognition that many of our shared resources are transboundary has led to expanding the understandings of water management to an explicit internationally shared context. Transboundary water management has been defined as “the application of technical tools to specific water-related questions and challenges to improve water-specific outcomes in watercourses that are transboundary by nature” (Schmeier 2018). In this definition, we can see the roots of water management as a technical and engineering practice, as well as how this would overlap with and require transboundary water cooperation.

One final introductory note: the topic and focus of this book are on *transboundary water cooperation* and *effective transboundary water cooperation*. I use *cooperation* and *effective cooperation* throughout this book, without the ‘transboundary water’ modifier, to still mean *transboundary water cooperation* or *effective transboundary water cooperation*, respectively. The text explicitly notes when cooperation or effective/effectiveness is being discussed in a broad sense unlinked from transboundary water.

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