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RIVERS, ECOLOGICAL HEALTH, AND JUSTICE: INTERNATIONAL WATERCOURSES  
AND LONG-TERM LEGAL REFORM

BY

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## **Abstract**

This dissertation deals with rivers that cross national boundaries and with the international law that applies to them. It takes a critical look at that law, drawing upon normative standards that value justice among all people, without regard for where they live along rivers or for the negotiating strength of their home States, and that also value the long-term ecological health of rivers as aquatic systems. The dissertation pays particular attention to the most vulnerable States of the world on watercourse-related issues; to States that are located downstream, that have relatively weak negotiating powers in comparison with their upstream neighbors, and that face critical development needs. Bangladesh is used as the paradigm example. The dissertation draws upon current law and recent legal experiences to formulate a new vision for the international law of watercourses, a vision that, if implemented, would recognize and protect rivers as complex ecological wholes while promoting social justice among all people dependent on such rivers. In doing so, it puts forth an ambitious vision for long-term cultural as well as legal reform. The vision is offered less as a proposal for current consideration than as a way of clarifying deficiencies in current law and gaining a better sense of the overall direction in which more modest law reforms should head.

*To my family:*

*My daughter, Nironti Mahveen Hasib*

*My parents, Rehana Begum and Md. Abdul  
Majid*

*My husband, Hasib Uddin*

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## **Introduction**

In vital ways, rivers are the life blood of terrestrial landscapes, essential for the flourishing of plant and animal life and essential, too, for the people who live along or near them. Meandering rivers pay no attention to human-drawn political boundaries. As they cross jurisdiction lines, they link nations and peoples together in inescapable ways. Uses of a river by one State thus inevitably affect people in other States, as well as other life forms and ecological processes. Uses of rivers that we make today also significantly affect future generations and the options available to them.

This dissertation offers a critical look at the contemporary international law governing such watercourses, a body of law that, despite a long history, remains in its adolescence. The literature on this law is quite considerable and rapidly growing. Many commentaries on it undertake to distill and explain the customary international law of watercourses, a key step in knowing where we stand today. These writings often identify tensions in current law and isolate emerging principles, ones that are not now part of the customary law but might soon be added to it. Different international law organizations have contributed significantly to this body of writing. Other writing on watercourses law reaches beyond this work of description and prediction; it is more critical and prescriptive. This scholarly writing tends to focus on perceived inadequacies of current law and to identify next steps in the process of moving the law forward within the confines of prevailing economic and political constraints. In terms of looking ahead, this latter writing goes beyond simply predicting where the law seems to be heading. It calls affirmatively for particular legal changes, usually incremental ones and specifically designed to



make progress in customary international law (rather than, for instance, proposing entirely new conventions). Much writing in this category aims to harmonize existing components of customary law. Other law-reform proposals look to strengthen particular provisions (environmental ones, quite often) or to elevate in importance certain legal principles in comparison with other, competing principles.

This dissertation offers a different, more ambitious contribution to the literature on international watercourses. It is a contribution that goes well beyond typical commentaries even as it builds on them and is possible only because of the important efforts of other scholars.

This study steps back from current law and, in a sense, looks toward the horizon. It looks to a more distant time when the law governing watercourses has developed to the point where it successfully keeps river corridors ecologically healthy and promotes full justice among all peoples whose lives are intertwined with watercourses. It presents what might be termed a full normative assessment in that it asks and seeks to answer basic questions about the kind of law that would be needed to achieve our most lofty goals for our watercourses, goals framed in terms of ecological health, human flourishing, and social justice. It takes a long-term perspective and is not constrained, in its proposals, to measures that are feasible today in light of the potent economic and political interests that resist change. As explained below, the study pays particular attention to the most vulnerable nations of the world, those at greatest risk when watercourses are misused and those most in need of healthy rivers to promote their development goals. The dissertation uses Bangladesh as a case study of such a highly vulnerable nation, and for multiple reasons: (i) it lies downstream on nearly all of the watercourses that cross its boundaries, (ii) it faces grave ecological dangers from upstream river uses, (iii) its neighbors include powerful

nations; and (iv) its low level of economic development leaves an urgent need for sustained economic growth.

This dissertation, as will be clear, necessarily makes use of important normative standards for judging the adequacy of current law and providing the framework for a major revision of it.

These normative standards are set forth clearly with accompanying justification. Necessarily, the proposed reforms of current law build upon these normative standards, and are valid and appropriate only insofar as the normative standards are accepted. Readers who disagree with the standards will, of course, need to make appropriate modifications to the proposals put forth to accommodate their differing normative views. Even for such readers, however, the dissertation ought to have considerable value. By standing back and considering the long term vision, the inquiry is able to identify clearly on-going legal trends and to note tensions between and among them. Among the benefits of this inquiry is that it identifies significant ways in which current law might be clarified and simplified and in which issues that now seem dominant (particularly, as will be shown, the supposed conflict between equitable/reasonable use and the harm-avoidance principle) might be usefully set aside in favor of other, quite different ways of framing and phrasing the guiding legal principles and the present-day tradeoffs. Most of all, however, this study invites readers to look much further ahead and to consider long-term goals for legal change—an invitation that should be useful even for readers with different normative views.

Legal reform typically moves ahead incrementally, by small, uneven, and sometimes misdirected steps. But the practical need for incremental change does not undercut the many benefits of looking to the horizon from time to time and identifying long-term ideals and aspirations. If lawmakers could start from scratch, if they could ignore political constraints, what kind of watercourse law might they create? What goals would the ideal law seek to promote and what

major components or provisions would the law need to include to achieve these lofty goals?

More particularly, what kind of law would be needed to bring lasting justice and healthy rivers to a highly vulnerable nation such as Bangladesh? Sound answers to such questions can provide a polestar for long-term legal change. They can similarly provide tools to use to evaluate critically the law we now have.

*Ribbons of life.* Waterways are, in significant ways, living corridors that support all life even as they are also repositories for many of our wastes and provide vivid evidence of our misuses of surrounding lands. Water-flows shape the geological forms of our landscapes, transport nutrients, and provide home and sustenance for myriad life forms. For humans, rivers and their attendant life have long been useful for transportation, irrigation, silt transport, energy storage and production, and much more. They are crucial to a community's ability to meet the basic needs of its people as well as to the overall economic development of a region.

In today's world, freshwater has become an especially pressing global concern because of the increasing demand for this limited resource, with the steady rise in global population and continued economic growth.<sup>1</sup> While the size of the world's population has tripled over the last century, water consumption has increased by a factor of six; by 2030, global water requirements are expected to nearly double from those of 2005 and to exceed current accessible and reliable supply levels by 40%.<sup>2</sup> Rivers are called upon, more and more, to meet these water needs. As

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<sup>1</sup> Edith Brown Weiss, *International Law for a Water-Scarce World* (Leiden-Boston: Martinus Nijhoff Publishers, 2013) 1.

<sup>2</sup> "Charting Our Water Future," 2030 Water Resources Group, accessed January 5, 2009, <http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/charting-our-water-future>.

water consumption increases, the flows moving downstream diminish and are otherwise altered, with widespread ecological consequences.

As they provide important sources of fresh water, rivers also transport critically needed silt, which in many countries is essential to maintaining the fertility of floodplain soils. Rivers such as the Nile sustained the fertility of adjacent lands for thousands of years as overflowing waters regularly deposited nutrient-rich silt onto them. Water flows diminished by upstream withdrawals can become inadequate to carry this silt as a matter of physics and to overflow adjacent lands. Such silt deposits are particularly essential in low-lying lands that are prone to subsidence (in the United States, the Louisiana bayous offer the best illustration). Such alluvial lands can sink when cut off from their ongoing natural silt deposits—as they are when rivers are blocked by dams—leaving the sinking lands inundated or otherwise too wet for human use. Most such lands are adjacent to oceans so that the infiltrating water is salty. Invading saltwater commonly kills native vegetation, leaving lands denuded and eliminating woody vegetation that provides needed protection against hurricanes, cyclones and typhoons. Salt-water intrusion quickly contaminates freshwater, rendering it too salty for drinking or irrigation. Increased salinity due to disrupted silt flows also degrades upland aquifers.

In most of the world waterways provide vital sources of human food. Human-caused pollution can degrade supplies of fish and other aquatic life, even wiping them out. Beyond that, many aquatic species depend for their reproduction and survival on particular flow regimes. Key life cycles may depend upon seasonal flooding, particularly for species that reproduce on floodplains or for which flood conditions provide needed protection against predators. Natural flood regimes play key roles in keeping river bottoms from being silt-congested. They can be vital too in keeping salt water from moving upstream and contaminating freshwater well inland.

Reservoirs in particular can significantly alter the temperature of downstream water flows, greatly harming the life forms adapted to historic conditions.

Humans have long struggled to use rivers in ways that sustain these many life-supporting functions and traits. The challenges of doing so become greater when watercourses transect national boundaries. Today some 263 international waterways (lakes and rivers) cross international boundaries, with an uncounted number of shared aquifers.<sup>3</sup> Moreover, the basins through which these watercourses flow cover almost half of the Earth's land surface area, and all but a handful of the world's non-island States<sup>4</sup> have portions of their territories in an international basin.<sup>5</sup> International watercourses flow nearly everywhere and the issues they present are of widespread concern.

These geographic facts, combined with mounting stress on water supply and water quality almost everywhere, highlight freshwater and water flows as key areas of concern between upstream and downstream States.<sup>6</sup> Particularly when shared rivers face an overwhelming demand for water, conflicts among nations can readily occur, sometimes over a particular State's right to use and divert waters at the expense of other riparian States, sometimes over alterations of flow regimes and silt loads that cause significant downstream disruptions. Not surprisingly, various researchers have pointed to shared water resources as the single most likely route by which environmental change and ecological degradation might trigger interstate hostilities.<sup>7</sup>

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<sup>3</sup> Ken Conca, *Governing Water: Contentious Transnational Politics and Global Institution Building* (Cambridge, MA: The MIT Press, 2006), 93.

<sup>4</sup> That includes Denmark, Singapore and a few States on the Arabian Peninsula.

<sup>5</sup> Conca, *Governing Water*, 93.

<sup>6</sup> *Ibid.*

<sup>7</sup> *Ibid.*

*A highly vulnerable State.* If the international law of watercourses is to work well, promoting human flourishing and social justice while keeping waterways ecologically healthy, it needs to work for nations that are most at risk. It needs to work for nations that reside downstream on major rivers and that do not hold strong bargaining power as against upstream nations. It needs to work well for nations that are particularly dependent, not just on gaining access to a share of a river's fresh water, but on other ecological features of its rivers—the timing of its water flows, the quality of the flowing water (including silt loads), and the river's ability to keep salinity at bay.

The basic facts about Bangladesh make it a suitable nation to illustrate the plight and needs of the world's most vulnerable States. The country lies at the farthest downstream ends of almost all of the international rivers that flow through it; and except in a few ways and settings, a downstream country usually is more susceptible of harms than an upstream country. Bangladesh faces huge environmental threats from rapid urbanization, deforestation, loss of biodiversity and loss of habitats, saline water intrusion, land subsidence, coastal erosion, groundwater contamination, recurrent flooding, and increasing natural calamities including cyclones due to climate change. And with poor infrastructural development, Bangladesh harbors one of the world's largest populations,<sup>8</sup> with countless millions of its people directly relying on water sources and flows for their sustenance and livelihood. On top of that, Bangladesh has 57 common rivers shared with other countries,<sup>9</sup> including such big regional superpowers as India and China. Given the disparate power relationships and unequal economic standing among the

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<sup>8</sup> Total population estimated at 160.9 million in 2015 as shown by the World Bank data, in "Bangladesh," The World Bank, accessed March 6, 2017, <http://data.worldbank.org/country/bangladesh>.

<sup>9</sup> "The Joint River Commission Bangladesh," The Ministry of Water Resources, accessed January 10, 2014, <http://www.jrcb.gov.bd/>.

South Asian co-basin countries, a nation such as Bangladesh often fails to fairly protect its interests through bilateral or regional negotiations. Like other weak players in the world, it needs strong, morally sound international law to protect it.

*The basic legal principles and their deficiencies.* By way of setting the stage for what follows, it is useful to take a quick look at the basic principles that now guide the customary international law of watercourses and to take note of their tensions and chief inadequacies—all developed at much greater length in the following chapters.

Although international water law, in the form of bilateral pacts and understandings, dates back to the early phases of human civilization, much of its current content emerged only over the past century. Early law dealt with navigation and with the division of water flows among States. Only in recent decades has the law paid attention to waterways as more than transportation corridors and sources of water for consumptive use. Only recently, that is, has it begun even modestly to understand rivers, floodplains, and associated plant and animal life as ecologically complex wholes and to show awareness that long-term human flourishing depends upon the ecological well-being of these wholes.<sup>10</sup>

Early watercourse law, as noted, mostly had to do with navigation and toll collection along waterways. Over the centuries that law evolved to a legal stance that seems widely accepted today: a navigable waterway is open to navigation by nations that are adjacent to or crossed by the river, and not by others. Largely over the past century, the concern of international law expanded beyond navigation to include the fair sharing of the water in a river. This law borrowed heavily from the law of the United States dealing with rivers that crossed State lines.

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<sup>10</sup> Laurence Boisson De Chazournes, *Fresh water in international Law* (Oxford: Oxford University Press, 2013), 250.

The guiding, vague principle that emerged in the United States was the doctrine of equitable apportionment: water flows would be divided among States equitably, on some sort of fair-share basis, taking into account a number of relevant considerations.<sup>11</sup> Even with its vagueness, this fair-share principle sharply countered the alternative principle of territorial sovereignty, the principle under which a nation could freely use water flowing over its lands as it saw fit without concern for the interests of downstream nations. The equitable sharing idea—equitable utilization, as it is commonly termed—is now widely understood as a foundational principle of customary international law, even as a few States (China, prominently) continue to insist that territorial sovereignty applies to water flows just as it applies to natural resources that are stationary within a State’s borders. Built on the US model, equitable utilization was embraced as a principle of customary law by the ILA (International Law Association) almost five decades ago, and has gained strength ever since.

In more recent decades, lawmakers and commentators have recognized that an upstream State can harm a downstream one even when it does not divert and consume more than its share of a water flow. It can do so by contaminating a water-flow with pollution. It can do so, as some now realize, simply by altering the seasonal timing of a water-flow, by blocking movement of aquatic life, and by stripping water of components (e.g., silt) that downstream users deem valuable. This expansion of concern has been associated with a less-visible but nonetheless important recognition that downstream nations “use” water-flows simply by leaving them in place and allowing the water to sustain aquatic life and nonconsumptive human uses. The

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<sup>11</sup> *State of New Jersey v. State of New York et al. (Commonwealth of Pennsylvania, Intervener)*, 283 U.S. 336 (51 S.Ct. 478, 75 L.Ed. 1104), 1931. In this dispute, the State of New Jersey sought to enjoin the State of New York and the City of New York from diverting any waters from the Delaware River or its tributaries. The Court held that the conflict was rightly governed, not by a strict application of the common law rules of private riparian rights, but by the principle of equitable apportionment applicable between the states of the Union.



principle that has emerged in the customary law, in simple form, is a duty on States using water to act in ways that avoid material harm to other States. The do-no-harm principle is widely understood as a limit on, or in conflict with, the right of a State to utilize its equitable share of a water flow. Indeed, the tension or conflict between these two principles—equitable utilization and harm-avoidance—is often viewed as the centerpiece or foundation of the international law of watercourses with States and commentators lining up on each side, some believing that one principle should take priority, others contending that the opposing principle is more weighty.

As the harm-avoidance principle gained strength, so did largely independent concerns about water pollution and, to lesser degrees, concerns about other forms of environmental degradation. Pollution concerns showed up in various bilateral and regional watercourse agreements. They also showed up visibly in a 1992 Convention of the Economic Commission for Europe (ECE)<sup>12</sup> and in the 1997 UN Convention on the Law of the Non-navigational Uses of International Watercourses.<sup>13</sup> The environmental provisions in such conventions, however, often seemed to stand apart from the basic principles of equitable utilization and harm-avoidance, even though they were plainly related. It was, and still is, difficult to figure out how these several principles might fit together. That confusion was heightened as writers on the law of watercourses, including convention drafters, began to interject the principle of sustainable development into the law, with little comment on how it might fit together with the other principles: perhaps strengthening the environmental protections, but very possibly weakening them when needed to promote development goals.

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<sup>12</sup> The Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Helsinki, 17 March, 1992, U.N.T.S. 33207.

<sup>13</sup> Convention on the Law of the Non-Navigational Uses of International Watercourse, New York, *adopted* 21 May, 1997, U.N.T.S. 52106. [https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-12&chapter=27&clang=en](https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&clang=en).

Over this same time period, yet another principle began to enter the vocabulary used to talk about the use rights of States. This was the rising idea—often not presented expressly—that a State’s uses of water ought to be in some sense reasonable as well as equitable. The adjective was often pieced together with equitable to form what sounded like a single standard of “equitable and reasonable utilization.” But the term reasonable—also drawn mostly from U.S. law—in fact had a much different historical meaning to it. Equitable was simply a matter of fair share in the division of water flows. Reasonable was a factor that seemed to pay attention also to the efficiency of a water use, its suitability to a particular place, its consequences, and its social and economic value in comparison with competing demands for the same ways. Reasonableness seemed to—or at least could—overlap with the harm-avoidance principle, and with the environmental provisions as well. The insertion of the adjective brought far more questions and uncertainties than it did clarity—the same outcome as the addition of sustainable development.

Similar confusion seemed to attend to the pushes to add yet another component to the formula that told States how they could and could not use watercourses. This was the human-rights ideal of an individual right to clean water. In some way this factor, some said, ought to play role. But what kind of role, particularly given that concerns about access to fresh water had less to do with direct uses of watercourses than they did with issues of physical infrastructure (water purification plants, pumps, pipelines) and water pricing? When poor people had no water simply because they could not pay for it, the problem seemed to have little to do with watercourses as such.

Even as these particular components of watercourses law took shape, a related, foundational issue continued to simmer. What was the main purpose of this watercourses law? Was it chiefly to provide a framework of principles for States to use as they went about negotiating bilateral agreements with their neighbors? Was it instead or in addition meant to provide the impetus for

agreements among all States with land within a particular river basin; to stimulate whole-basin agreements? Or was it to put principles in place that limited how States could behave without regard for any bilateral or regional agreements? Was the law becoming a binding set of rules that limited uses of watercourses, directly and indirectly, as a matter of international law and apart from any express agreements? Was it becoming a tool that weak, downstream States such as Bangladesh could draw upon to challenge what stronger upstream neighbors were doing? And did it reflect a growing recognition that the environmental conditions in a waterway were perhaps of legitimate concern to people who lived far away from them, perhaps to the entire world community?

Then there is the one piece that almost no one wanted to talk about because it simply did not fit. This was the issue of dams and reservoirs, particularly on the main stem of major rivers. A reservoir that blocked a river flow inevitably brought massive ecological change to the river. A reservoir was not inherently inconsistent with the principle of equitable sharing; a State constructing a reservoir could still release to downstream States enough water to satisfy their fair shares. But a reservoir radically altered the timing of water flows along with silt loads and water temperature. It also typically blocked fish migrations and other travel patterns of aquatic life. How did such reservoirs fit together with the emerging environmental standards, with the ban on causing significant harm, and with the idea that uses of watercourses should be reasonable? No one really seemed to know. The major conventions of 1992 and 1997 largely pushed reservoirs aside. Summaries of customary international law (the 2004 Berlin Rules,<sup>14</sup> for instance) largely

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<sup>14</sup> The Berlin Rules on Water Resources, Berlin, August 21, 2004, by the International Law Association (ILA), [http://www.internationalwaterlaw.org/documents/intldocs/ILA\\_Berlin\\_Rules-2004.pdf](http://www.internationalwaterlaw.org/documents/intldocs/ILA_Berlin_Rules-2004.pdf).

treated reservoirs as a foreign topic, much as they did navigational structures and uses. The issue was simply too big to tackle and had to be left, it seemed, to local negotiations.

The final (fourth) part of this dissertation examines in full the on-going trends in the law of international watercourses, drawing upon material in earlier sections. It critiques the law using normative ideals and provides the outline for an overall reformulation of the law, a reformulation adequate to protect the legitimate interests of highly vulnerable States and their people. Without looking ahead to that full consideration, however—to that legal critique and reformulation—it is useful at this point to identify significant ways in which these just-described legal components might be improved. To highlight, at the beginning, possibilities for improvement in international law is to provide space for a more wide-ranging inquiry into present-day problems and ways of thinking critically about them.

Of primary importance, a legal regime that protects the ecological health of rivers—and thus protects the people whose lives depend on that health—needs to begin by putting in place basic environmental protections for the rivers, in terms of water quality, minimum flows, and perhaps salt-water containment. Minimum environmental stands could (and, as argued below, should) leave room for States to negotiate higher levels of protection. But minimum standards are appropriately set at the international level and made binding on States. Such standards need to operate as limits on all uses of watercourses, without regard for equitable shares and without being drawn into any overarching clash between equitable utilization and do-no-harm.

Second, a State's recognized uses of a watercourse need to include more than simply water diversions and water consumption. They need to include various instream-flow uses. They need to include the uses of river to sustain aquatic life, to combat saline intrusion, and to carry the silt

needed to maintain land levels and soil fertility cycles. Such uses of watercourses may not always be accommodated; not all uses can be. But they need to be on the table as options, as valid, recognized uses of watercourses, when water flows are allocated among competing demands.

Third, the now prominent clash between equitable utilization and harm-avoidance is best set aside as being confusing and unhelpful. As thus phrased the clash provides no real insight or guidance on how to select among competing watercourse uses. Indeed, the dichotomy seems to suggest, as many have assumed, that lawmakers ultimately must favor one side over the other. No such choice is sensible. The entire frame, as a way to highlight choices, should be cast aside. A far better approach is to put front and center the principles (i) that States should share watercourses equitably (already established for the most part) and (ii) that all uses must qualify as reasonable under multi-factor tests that take into account competing demands, economic efficiency, social importance, and other key factors. The particular uses that get priority should be those that rank the highest based on this multi-factor assessment. Reasonable use should become an ideal powerful enough to halt waste, inefficiency, low-valued water uses, avoidable ecological degradation, and similar misuses of watercourses.

Fourth, international law needs to state clearly that watercourses are indivisible common resources and must be understood and managed as such, as single entities and ecological wholes. The rules governing watercourse uses must be understood and set at that whole-basin level, leaving bilateral agreements among States merely to add implementing details.

Fifth, reservoirs and other watercourse structures simply cannot be given free passes and cannot become legitimate simply through bilateral agreement. They must be understood as uses of

watercourses (or bundles of uses) and evaluated comparatively with other competing uses. Rules governing and limiting all watercourse uses should apply to them, just as they apply to other uses.

Finally, with the above principles in place there is no need to hold on to sustainable development or any similar vague phrase having to do with environmental protection and/or tradeoffs between the environmental and economic growth. The law of international watercourses is already ahead of sustainable development law in terms of clarifying options and regulating activities (aside from the issue of dams). The imposition of prescribed environmental standards, together with a more substantial, clear ideal of reasonable use, is likely to work better to accommodate conflicting interests than the vague, much-criticized principle of sustainable development. Similarly, the language of a right to clean water is usefully pushed aside except (as will be explored) when it helps prioritize among competing water uses in assessments of their relative reasonableness.

These various points are, of course, set forth here simply in skeletal form. They will take center stage in chapters seven and eight, after detailed considerations of current law in chapters five and six. And when they return in full, they will be considered in light of normative ideals, tailored in part to the needs of Bangladesh and similar, at-risk nations. To put them forth in this Introduction, however, is to help highlight issues that will run throughout the dissertation.

- What roles should environmental concerns play when they clash with short-term development possibilities?
- How should the law decide among competing waterway uses given not just that demand will typically outstrip supply but that many competing uses are inherently in conflict?

- How should governance structures be organized—how should power be allocated—when actions in one part of a basin can so readily affect actions elsewhere?
- How much lawmaking authority should reside at the international level, not locally, when States have widely different degrees of power given their sizes, economies, and the simple realities of terrain and water-flows?

In some way, international law needs to supply answers.

As mentioned above, this dissertation looks to the horizon and sets forth a goal for long-term legal reform. Although the current law appears headed in a sound direction, it preoccupies itself with the prevailing tensions among different freestanding principles to an extent that constricts its development. Such a desultory movement is also evident from the fact that current law has largely become a repository of widely differing principles and ideals. This trend must break, and the law should move ahead with a clear vision set as a goal—a vision of ecologically healthy rivers, where all water uses would be consistent with that health and would promote justice among all the people living near them. This dissertation seeks to serve that purpose. One important contribution of this dissertation is that it would start a new legal discourse by placing these ambitious perspectives on the table and then going from there. As explained in the last chapter (chapter 8), the value of such a work is more imperative today than ever for many basin States, especially the most vulnerable.

*This dissertation.* To sum up, water is the only scarce resource for which there is no substitute. Current international law is poorly developed, despite important improvements in recent decades. At local levels, among neighboring States, cooperation over watercourses is often limited by conflicting goals and widely varied degrees of power. Put simply, the need for

significant further change is overwhelming, constant, and immediate.<sup>15</sup> Today's resource conflicts will gain in frequency and intensity as water resources become relatively more scarce and as actions by and within nations trigger even greater impacts on neighboring States.<sup>16</sup> Reform efforts to interject environmental concerns into the law have brought more confusion than clarity, particularly with the recent interjection of vague principles such as sustainable development and an individual right to clean water. Environmental standards need to gain a clear, firm place in the governing law and to expand beyond water pollution to include issues of land subsidence, siltation, water-flow regimes, and salinity intrusion. Further, the overall legal regime needs to cover reservoirs, subjecting them, like other uses of watercourses, to environmental norms and more vigorous standards of reasonable use.

Chapter 1 of this dissertation explores how rivers are used and are otherwise altered by human activities. This inquiry identifies the major types of trans-boundary effects that may follow from various water-development projects, paying particular attention to ecological and social harms. Chapter 2 introduces the fundamental environmental goals and principles set forth in some of the most important international declarations and conventions, including those that seek to integrate national development pursuits and environmental policies. With these topics covered, the dissertation turns to the case of Bangladesh, used as an example of a high-risk State. Chapters 3 and 4 survey the rivers in Bangladesh and its water relations with its neighbors. These chapters also take up the shared legal measures that the country has undertaken, along with other basin States, to forestall or ameliorate water-related problems, particularly ecological ones. The

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<sup>15</sup> Jesse H. Hamner and Aaron T. Wolf, "Patterns in International Water Resource Treaties: The Transboundary Freshwater Dispute Database," *Colorado Journal of International Environmental Law and Policy, Natural Resources Forum* Vol. 23-1 (1998): 3-33.

<sup>16</sup> *Ibid.*



following two chapters (5 and 6) detail the existing legal regime dealing with international waters. They narrate the development of international water law leading up to the 1992 ECE Convention and the 1997 UN Watercourse Convention. They also provide a critique of the latest ILA Rules of 2004 and outline some of the progressive developments in environmental protection of watercourses as evidenced in various regional and bilateral agreements entered into in the past decade and a half.

Chapter 7 builds upon these overviews of contemporary law to isolate and evaluate the chief ongoing trends in the law. It identifies the ways the many current pieces of the law fit together poorly, particularly the ways the various new environment-related elements have disrupted the once-clear principle of equitable utilization. By clarifying the weaknesses of current law, the chapter sets the stage for major reform. Chapter 8 presents and explains the major normative principles that should guide the international law of watercourses, paying special attention, as noted, to the plights of highly vulnerable States. It then uses these principles to propose a reformulated and simplified international law for watercourses, guided by an overall vision of ecologically healthy rivers and social justice for the peoples dependent on them. The proposal calls for management at the whole-basin level rather than through bi-lateral negotiations and anticipates a considerable expansion of control over watercourses at the international level and through international dispute-resolution mechanisms. The chapter's final part takes this reformulated law and considers how it would apply to the case of Bangladesh and its neighboring States. It largely addresses a single question: how well might this reformulated law resolve the acute, worsening watercourse problems in this multi-State region?

## **PART I: Rivers, Development, and Environmental Challenges**

### **Chapter 1: Rivers and Human Uses**

On a tour to Africa in 1907, Winston Churchill was carried away by the grandeur of Lake Victoria. The moment he found the world's second largest lake falling into the world's largest river, the Nile, he wondered: "so much power running to waste ... such a lever to control the natural forces of Africa ungripped, cannot but vex and stimulate the imagination. And what fun to make the immemorial Nile begin its journey by diving into a turbine." <sup>17</sup> The immense treasure and potential of this falling water never went out of Churchill's mind or the minds of other policy makers in London. Thirty eight years, in 1954, the project came into being. As Churchill served as Prime Minister of the U.K. for the second time, the Nile waters at last dove into turbines and Lake Victoria became a reservoir. This dream project provided Uganda and Western Kenya at the time with 150,000 kilowatts of electrical capacity.

The story of Lake Victoria and Churchill—and of Churchill's dream of manipulating and transforming a freshwater body to meet human needs—illustrates how policymakers have been eager to explore the latent opportunities in this finite resource. Over 45,000 times in the last century, people have made the decision to build big water projects, often using the development projects as comparatively easy vehicles to greater power, prosperity, and development. For many decades the large water-development project was seen as the most impressive symbol of the power of humankind, and particularly of the State, over water. More even than the tall

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<sup>17</sup> Eliot Elisofon, *Life*, November 20, 1950, 119.

skyscraper, the soaring dam in a wild canyon proclaimed human control over nature itself.

Today, a century after Churchill visited Africa, we share our rivers and lakes with several million dams, large and small, and with tube wells, canals, aqueducts, and pipelines, all designed to delay or divert waters from the destinations where gravity would otherwise take them.

Dams and other forms of river engineering have undoubtedly blessed the growth of civilization.

With dams and relevant technologies we have turned mad rivers into sane ones, increased irrigable lands, controlled untimely and excessive flooding, illuminated cities and towns with hydropower, and in the process, met various political purposes. Nonetheless, such projects have brought profound changes to watersheds. Nothing alters a watershed as much as a dam. At the heart of the water-project debate are issues of equity, governance, justice and power; issues that underlie the many intractable problems faced by humanity. Such debates involve concerns that reach beyond the characteristics, physical features or the operation of water projects. They deal also and more importantly with economic, social, and environmental concerns, concerns that transcend national boundary lines when a common water body is shared by two or more countries.

While the governance of international rivers is predominantly seen as the domain of sovereign, territorialized States, the problems are far more complex; they are socially trans-national even when projects seem geographically local. The world is rapidly experiencing an industrial boom, and demands for the efficient exploitation and use of global natural resources are making States increasingly interdependent. A single waterway may be subject to many incompatible claims and uses. Such pressures on water resources, and the ecological externalities of their uses, have become major sources of tension among river-basin States.

After looking briefly at water uses and water-development projects, this chapter identifies the principal environmental, social, and human impacts flowing from water-development projects, both within a nation and also across boundary lines, with particular attention to the negative externalities that are often borne by neighboring States that play no direct part in the projects. It then turns to the challenges associated with two incompatible, nonetheless essential public aims: the drive for development and the desire to maintain ecologically healthy lands and waters. As the chapter's final part notes, nations have wrestled to prioritize their competing uses of water, a collaborative task made more difficult by the lack of a well-crafted international and regional legal regime.

### The Engineering of a Finite Resource

Earth is the only water planet, with three-fourth of its surface covered by water. However, ninety-seven percent of this huge body of water is undrinkable salt water resting in the oceans. Two percent is currently locked up in ice caps and glaciers, and the remaining one percent forms freshwater. Even this one percent is not readily available as seventy-five percent of it resides at inaccessible depths in underground aquifers, thus leaving only a quarter in lakes and rivers, to be used by us. One is reminded of the famous verse by Samuel Taylor Coleridge in "the Rime of the Ancient Mariner – "water everywhere; nor any drop to drink." Further complicating matters is that this freshwater resource is unevenly distributed worldwide, thus making certain regions and people much more vulnerable. We heavily rely on this very small fraction of fresh water for our sustenance, for daily use, for irrigation, for hydropower, and for all other development activities.

At the other end of the spectrum is the demand for this limited water resource, which is inexorably increasing with the steady rise in global population. During the past three centuries, the amount of water withdrawn from freshwater resources has increased by a factor of 35, while world population has increased by a factor of 8. Extraction today is twice that of 50 years ago. With this trend in place, global water demand is expected to rise by a further 2-3 percent annually in the decades ahead.<sup>18</sup>

*Development impulses.* Dams, diversions, and irrigation canals are all ancient technologies that humans have constructed since the dawn of farming. A dam is a form of barrier that holds back water, primarily to save, manage or prevent the flow of water into specific regions. A reservoir, in contrast, is an artificial lake used for storing water and is usually created by the construction of a dam. The foothills of Zagros Mountains are thought to have harbored, eight thousand years ago, an irrigation canal used by Mesopotamian farmers.<sup>19</sup> The earliest dam remnants that have been found come from one that diverted Nile water near Memphis, in ancient Egypt, some 4,900 years ago. The Han Dynasty in China during the second century B.C. was another early cradle for earthen dams, constructed mainly for irrigation purposes.<sup>20</sup> Ever since then, civilizations have constructed such structures in different places and of different sizes and storage capacities.

With the rise of development activities and increased population, societies faced greater needs for water supply, irrigation, flood control and navigation, which necessitated (or at least led to) more water projects for meeting these needs. We have persistently undertaken manipulative river development projects in order to maximize the efficient utilization of this strained resource.

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<sup>18</sup> "Role of Dams," International commission on large Dams, accessed March 6, 2017, [http://www.icold-cigb.org/GB/Dams/Role\\_of\\_Dams.asp](http://www.icold-cigb.org/GB/Dams/Role_of_Dams.asp).

<sup>19</sup> Patrick McCully, *Silenced Rivers: The Ecology and Politics of Large Dams* (London: Zed Books Ltd, 2001), 13.

<sup>20</sup> J.R. McNeill, *Something New under the Sun: An Environmental History of the Twentieth-Century World* (New York, London: W.W. Norton & Company, 2000), 157.

As time passed, we refined our technological knowledge and started applying civil engineering, hydraulics, and fluid mechanics to these earthen forms and structures, leading in time to ever larger and stronger dams. This tendency became particularly apparent by the end of nineteenth century and into the twentieth century, when rivers were extensively developed for their greater potential for electricity generation. A major dam or series of dams became viewed as the cornerstone in the development and management of water resources in a river basin. Following that, multipurpose dams,<sup>21</sup> modeled after the Hoover dam, turned out to be a lucrative option among developing countries—for instance, China, India and Brazil—since they could receive a wide array of domestic and economic benefits from a single investment. Big multipurpose dams became particularly popular from 1930s to 1980, with some nations continuing thereafter to build on a heroic scale.<sup>22</sup>

Economic gain, a principal determinant factor for building large dams,<sup>23</sup> soon began to be complemented by other external justifications for the projects. Big and large dams were seen as potent symbols for patriotic pride, power and conquest of nature by human ingenuity. Lenin, Stalin, Franklin Roosevelt, and Deng Xiaoping all encouraged massive water projects.

Jawaharlal Nehru, the first Prime Minister of India, even regarded dams as the “temples in modern India.”<sup>24</sup> Especially during the cold war era, there was an unspoken competition among the world leaders to construct large dams. During the 1960s, more than one large dam was completed per day, on average. By the 1990s, as the construction of river-development project continued, about two-thirds of the globe’s stream flows passed over or through dams of one sort

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<sup>21</sup> Multipurpose dams are dams constructed for two or more purposes; i.e. storage, flood control, navigation, power generation, recreation, or fish and wildlife enhancement etc.

<sup>22</sup> McCully, *Silenced Rivers*, 16.

<sup>23</sup> International standards including those set by the International Commission on Large Dams define large dams as higher than 15 meters and major dams as over 150 meters in height.

<sup>24</sup> McCully, *Silenced Rivers*, 16.

or another.<sup>25</sup> In the words of environmental historian J. R. McNeill, the projects in combination amounted to a massive planetary plumbing project, intended to accommodate the needs of an evolving economy and for reasons of public health, geopolitics, and global power.<sup>26</sup>

*Benefits of water-development projects.* Water-development projects provide various economic and social benefits; including recreation, flood control, water supply, hydroelectric power, waste management, and river navigation. Most dams are built for several purposes (multipurpose dams) and produce a broad range of domestic and economic benefits. Dams and reservoirs can be effectively used to regulate river levels and flooding downstream of the dam by temporarily storing the flood volume and releasing it later. The most effective method of flood control is accomplished by a number of multipurpose dams strategically located in a river basin.<sup>27</sup> Flood-control dams impound floodwaters and then either release them under control to the river below the dam or store or divert the water for other uses. Such water projects have readily expanded and improved the irrigation zones, especially in the arid parts of the world. In addition, large urban areas depend heavily on water that is stored in reservoirs during high flows and later made available during periods of low rainfall. Finally, hydropower accounts for quite a substantial percentage of the total world electricity supply.<sup>28</sup> Hydropower is again widely viewed as renewable, predictable, and non-polluting. In fact, however, it comes with clear costs, sometimes greater overall than the costs of alternative power sources.

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<sup>25</sup> McNeill, *Something New Under the Sun*, 159.

<sup>26</sup> *Ibid.*, 150.

<sup>27</sup> "Benefits and Concerns about Dams," International Commission on Large Dams, accessed March 7, 2017, <https://www.scribd.com/document/59706704/Benefits-of-and-Concerns-About-Dams>.

<sup>28</sup> "Water," The World Bank, accessed March 7, 2017, <http://water.worldbank.org/topics/hydropower>.

*The unexpected costs.* As the construction of dams and reservoirs continued and studies of them mounted, it became increasingly clear that many of projects involved substantial and surprising costs, in addition to the known and expected costs of construction. Some of the negatives of dams stemmed from their virtues. The true and exact impacts of river engineering in many cases are hard to quantify, and are often impossible to predict with certainty. Most of the dam projects in the last century were undertaken based only on short-term studies of small watersheds in temperate climates. There was limited understanding of the functioning of large rivers in temperate regions, or of rivers of any size in the tropics.<sup>29</sup> Most of the major rivers in Europe and the U.S. were diked, straightened, dredged and dammed long before their ecology or hydrology had been seriously studied.<sup>30</sup> Further, particular designs for dams were used in different geographic locations worldwide, with little consideration of the unique features and flow patterns of the rivers being impounded. Not surprisingly, the lack of thorough study and hasty use of standard designs led over the decades to significant concerns, environmental as well as human.

### The Ecological Effects

Before going into details about the ecological effects of dams, an anecdote can help set the stage. The saga of the Aral Sea in Central Asia and its disastrous plight over the past century has become a poster case for waterway abuse. According to the then-leaders of the USSR, the nation's economic development required the harnessing of its rivers, which needed to give way to the will of the State and its planners. Stalin and his successors, in order to rapidly industrialize

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<sup>29</sup> McCully, *Silenced Rivers*, 30.

<sup>30</sup> *Ibid.*, 31.



the country, undertook mammoth and heroic dam projects and irrigation canals along the Volga, the Syr Dar'ya and the Amu Dar'ya Rivers, which supplied water to the Aral Sea. As the dams, reservoirs and diversion channels started drawing more water from the rivers for use in irrigation, the level of Aral water soon started declining.<sup>31</sup> In a zeal to achieve full independence in cotton production, policymakers sacrificed the Aral Sea, once the fourth largest freshwater body on earth.<sup>32</sup> By 1980, the Aral got only a fifth of its former water inflow; by the 1990s it received at most a tenth, and occasionally nothing at all. In 1990 it became two seas as the declining sea level exposed a land bridge in the north. Meanwhile the salinity of the water tripled between 1960 and 1993. For a watching world, the Aral Sea came to symbolize the grave and irreversible environmental consequences that could accrue from a water project.

The usual environmental impacts arising from large dams are often interconnected and overlapping because they disrupt the entire ecological chain in the water body. Typically, such environmental impacts would comprise the following concerns:<sup>33</sup>

1. Changes in downstream morphology of riverbed and banks, delta, estuary and coastline due to altered sediment load.
2. Changes in downstream water quality; effects on river temperature, nutrient load, turbidity, dissolved gases, and concentration of heavy metals and minerals.
3. Changes in the natural flow of the river or lake; changes in the seasonal timing of flows and in their natural fluctuations.

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<sup>31</sup> McNeill, *Something New Under the Sun*, 169.

<sup>32</sup> "Case Study of Transboundary Dispute Resolution: Aral Sea," Program in Water Conflict Management and Transformation, Oregon State University, accessed March 7, 2017, [http://www.transboundarywaters.orst.edu/research/case\\_studies/Aral\\_Sea\\_New.htm](http://www.transboundarywaters.orst.edu/research/case_studies/Aral_Sea_New.htm).

<sup>33</sup> McCully, *Silenced Rivers*, 30.

4. Significant reductions in biodiversity due to the blocking of the movement of organisms and because of the habitat changes due to altered flow.
5. Reductions in riverine, riparian and floodplain habitat diversity, especially because of elimination of natural flooding.
6. Increased salinity levels in the water and water bed, thereby reducing the fertility of land and suitability of the waters for irrigation.
7. Disruption of irrigation by interfering with the natural flooding and thus with the deposition of nutrient-rich sediment associated with such flooding.
8. Greenhouse gas emissions caused by the storage dams and reservoirs as they lead to the decay of plants and carbon-rich soils.
9. Coastal line erosion and submerging of deltas.
10. Increased natural calamities and increased rate of havoc as river engineering (and resulting salinity) does away with the natural buffers.<sup>34</sup>

*Trapping sediments.* One important function performed by rivers is that they carry sediments that are washed away from the soils and rocks over which they flow. Such sediments allow natural replenishment of ecosystems as they are carried by flowing water downstream and deposited along the riverbeds and river banks, where they serve as natural fertilizer. Dams and reservoirs, however, significantly obstruct that chain by trapping loads of sediments within their walls, commonly capturing and retaining up to ninety percent of all incoming sediment.<sup>35</sup>

Reduction in the sediment transport has impacts on channel, floodplain and coastal-delta morphology and brings changes to aquatic habitats for fish and other species.

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<sup>34</sup> William R. Freudenburg et al., *Catastrophe in the Making: The Engineering of Katrina and the Disasters of Tomorrow* (Washington D.C.: Island Press, 2009), 168.

<sup>35</sup> McCully, *Silenced Rivers*, 33.

The Nile Delta has historically been the most fertile zone on earth, fertility that supported the entire civilization in and around the Delta. The Delta itself was created by the deposition of this silt or sediment, which had been building up for millennia and which kept enriching and extending the landmass every year.<sup>36</sup> As a result of the High Aswan Dam on the Nile, more than 98 percent of the Nile's sediment today is deposited at the bottom of the vast Nasser Reservoir.<sup>37</sup> Thus, the massive construction project that was designed to cure flood-caused disruption and to expand irrigation had the effect of disrupting natural fertility cycles in ways that severely harmed Egyptian agriculture.

Sedimentation loss also affects long stretches of coastline near river mouths, which become more prone to erosion by coastal waves when they lose the silt deposited on them by the incoming rivers.<sup>38</sup> The sediment discharged through the Mississippi Delta, for instance, has fallen by more than half since 1953, mainly because of the huge dams built on the Missouri and Mississippi Rivers. The result of sediment deprivation, together with land subsidence due to oil and gas extraction, results in loss to subsidence of approximately 25 to 35 square miles of Louisiana's land each year.<sup>39</sup> Another example of such dam-caused coastal erosion is along the Bight of Benin, east of the mouth of the Volta River in Ghana. The dam there has virtually halted the supply of sediment, and the shoreline of neighboring Togo and Benin is now being eaten away at a rate of 10 to 15 meters per year.<sup>40</sup>

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<sup>36</sup> Deltas are formed by the accumulation of tens of thousands of years of deposits of river sediments, partly counteracted by their settling and compaction and by erosion from the sea.

<sup>37</sup> "Floodplain," accessed March 7, 2017, <http://www.scienceclarified.com/landforms/Faults-to-Mountains/Floodplain.html#b>.

<sup>38</sup> McCully, *Silenced Rivers*, 35.

<sup>39</sup> Mike Tidwell, *Bayou Farewell: The Rich Life and Tragic Death of Louisiana's Cajun Coast* (New York: Vintage Books, 2004), 334.

<sup>40</sup> "Dams and Geology," International Rivers, accessed March 7, 2017, <http://www.internationalrivers.org/dams-and-geology>.

*Alteration of flow.* Freshwater ecosystems contain a highly varied and rich biodiversity, which inevitably depends upon the “cycling of water and on functioning ecological processes and species assemblages.”<sup>41</sup> Such a fine, varied balance of life forms requires maintaining particular water-flow regimes, in terms of both quality and quantity, and the most significant environmental impacts of hydroelectric dams are, arguably, due to the alteration of the affected river’s flow. When river flows are altered, it is not merely the visible appearance of the river that is changed; rather, it is a cycle that has much deeper impacts, even beyond the river itself. Different types of dams and reservoirs result in different flow patterns, depending on the ways the structures are managed based on the functions they provide.

In the case of reservoirs built to support *power production*, the reservoir is typically managed to keep the water level high, which in turn means storing more water from the river so long as it is available. Water is allowed to flow downstream when and as the reservoir is called upon to generate power. Conversely, *flood control* as a reservoir-management goal requires that the reservoir’s level drop in advance of anticipated heavy flows (usually during the rainy season) so that the reservoir has available space to absorb the flood waters. Flood waters often carry particularly heavy sediment loads, so their capture behind flood-control reservoirs often leads to a significant loss of sediment. Minimizing the rate of sediment-capture by a reservoir on a highly seasonal river requires discharging as much sediment-filled water as possible during the flood season—a management approach inconsistent with using a reservoir for flood control or for water storage for the dry season.

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<sup>41</sup> McCully, *Silenced Rivers*, 34.

Some dams are constructed to capture seasonal flows to make them available for later diversion and consumption, often for irrigation or municipal use. These reservoirs also greatly alter seasonal flows and sediment loads. The same consequences come from dams that are intended in important part to help support navigation. They do so by retaining water flows during heavy-flow times and releasing the water as needed when navigation channels downstream need additional water to keep boats afloat. Finally, reservoirs built in important part to sustain recreation and to provide amenities for water-front residences, as well as reservoirs built as cooling ponds (for instance, for nuclear power plants), are typically managed to maintain consistent water levels year round. In regions with arid seasons, this means no releases of water downstream during parts of the year, a management approach that can leave a river stretch just below the dam entirely dry.

In varying ways and degrees, all dams and reservoir significantly disrupt the flow regime of the rivers that they disrupt, producing downstream water flows that may differ greatly in quantity, timing, sediment-loads, and temperature from natural flow regimes.

*Temperature changes.* Dams and reservoirs, as noted, significantly alter the temperature of water released downstream, particularly in the case of hydropower projects; in them, water is typically released from lower levels in the reservoir, where it is colder. Such temperature changes can disrupt the lifecycle of aquatic species by affecting their breeding, hatching and metamorphosing of larvae.<sup>42</sup> Within the reservoirs themselves, the naturally flowing water of a river is replaced by largely stagnant pools—a major ecological change beneficial to some species and harmful to many others. The surface layer of a reservoir, its water stagnant and perhaps sun-

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<sup>42</sup> Geoffrey E. Petts, *Impounded Rivers: Perspectives for Ecological Management* (New York: Wiley, 1985), 175 – 177.

baked, can become too warm for young fish of some species, even lethal for them, while the cooler water at lower levels can be fatal due to oxygen depletion. A general decline in native fish abundance in the Colorado River is attributed specifically to the cold-water releases from the middle levels of the reservoirs in the area.

*Tolls on aquatic species.* For the reasons already mentioned and several others, a wide range of water-development projects have proved to be highly detrimental to fish and other species in the water. River engineering substantially alters many of the freshwater habitats of the aquatic species and directly harms them by changing water temperature, increasing predation, and subjecting various populations to direct danger and stress. River fragmentation by dams and other water development projects have already wiped out a number of aquatic species, and have left many more endangered.

Again, the huge loss of sediments in below-dam river flows inevitably changes the biological compounds in water and takes away the necessary nutrients vital for fish populations. The sediment-free clearer water also reduces camouflage for fish, thereby making them more vulnerable to their predators. Anadromous fish<sup>43</sup> have suffered calamitous declines due to the loss of habitat behind dams. Out of the 170 fish species endemic to the heavily dammed Western United States, 105 are officially listed as threatened or endangered or are being considered for such a listing.

Essentially, a dam without sufficient fish-passage options is a sufficient barrier to wipe out anadromous fishes by preventing them from reaching their spawning grounds. The annual run of adult salmon and steelhead trout in the Columbia River Basin is estimated to have averaged

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<sup>43</sup> Anadromous fish means fish which spawn in fresh water and spend a portion of their lives in the ocean.

between 10 and 16 million fish before non-native settlers arrived in the nineteenth century. Today, after decades of decline—especially due to the 130 or so dams in the basin—only some 1.5 million salmon and steelhead enter the Columbia each year, and around three-quarters of these are hatchery reared rather than wild, river-spawned fish. The massive Grand Coulee Dam, built without any fish-passage facilities, cut off from the sea nearly two thousand kilometers of salmon spawning grounds on the upper Columbia, eliminating a once highly valued fishery.

*Ecosystem fragmentation.* In all of these ways, dams significantly impact aquatic ecosystems, altering the natural cycles of water flows, transforming the biological and physical characteristics of river channels and floodplains, and fragmenting the continuity of rivers.<sup>44</sup> Damming a river disrupts riverine habitats by isolating the upstream and downstream ecosystems and cutting off species' migratory abilities, which seriously disturbs their historical spawning habits.<sup>45</sup> Such fragmentation has already wiped out a number of aquatic species, and has left many more endangered. Swedish ecologists, Mats Dynesius and Christer Nilsson, concluded based on the estimated degrees of damage to river systems in the U.S., Canada, Europe and the former USSR that fully 77 percent of the total water discharges of the 139 largest river systems in these countries is “strongly or moderately affected by fragmentation of the river channels by dams and by water regulation resulting from reservoir operation, inter-basin diversion and irrigation.”<sup>46</sup>

*Evaporation and loss of river water.* Dams in tropical or arid regions lead to the evaporation of huge amounts of water from reservoir surfaces, evaporation that quickly lowers reservoir levels and diminishes the water-efficiency benefits of these huge monetary investments. For instance,

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<sup>44</sup> Angela T. Bednarek, “Undamming Rivers: A Review of the Ecological Impacts of Dam Removal,” *Environmental Management* 27 (2001): 803, accessed March 7, 2017, doi: 10.1007/s002670010189.

<sup>45</sup> McCully, *Silenced Rivers*, 46.

<sup>46</sup> Karlie Shea Clemons, “Hydroelectric Dams: Transboundary Environmental Effects and International Law,” *Florida State University Law Journal* 36 (2009): 494.

the annual average of 11.2 cubic kilometers of water evaporated from the Nasser Reservoir behind the Aswan Dam is around 10 percent of the water stored in the reservoir and is roughly equal to the total withdrawals of water for residential and commercial use throughout Africa.<sup>47</sup> Evaporation itself becomes a major use of water from a reservoir, a use that is fully consumptive unless the evaporated water returns as rainfall to the same river basin.

The warm and arid environment around Lake Powell behind Glenn Canyon Dam is very conducive for high rates of evaporation. Today, twenty percent of the Colorado River's annual flow is lost to evaporation and seepage from its reservoir system.<sup>48</sup> Such a huge loss of river water from the reservoir is one of the main reasons for the increased salinity in the reservoir itself and in water flowing downstream. High salt concentrations are poisonous to aquatic organisms and they corrode pipes and machineries. The increased salinity of the Colorado River costs Southern California's water users millions of dollars each year.<sup>49</sup>

*Landscape disruption.* The flooding of vast areas of landmass in the formation of reservoirs, including wetlands and tropical rainforests, is one of the main examples of landscape disruption by dams. Moreover, altered water flows and sediment capture together can bring about river-bank and coastal erosion and, in places, river-bank collapse.<sup>50</sup>

*Methane gas and carbon dioxide emissions:* Hydropower is commonly viewed by proponents and others as a clean and virtually non-polluting energy source. However, recent scientific

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<sup>47</sup> McCully, *Silenced Rivers*, 40.

<sup>48</sup> "Grand Canyon Campaign," Living Rivers: Colorado Riverkeeper, accessed March 7, 2017, <http://livingrivers.org/campaigns/grandcanyon/article3.cfm>.

<sup>49</sup> McCully, *Silenced Rivers*, 40.

<sup>50</sup> DM Rosenberg, RA Bodaly and P J Usher, "Environmental and Social Impacts of Large Scale Hydro-electric Development: Who is listening?," *Global Environmental Change* 5-2 (1995): 127, doi: 10.1016/0959-3780(95)00018-J.



studies chart the release of sometimes very substantial greenhouse gases by large-scale hydroelectric developments.<sup>51</sup> During the first years after a reservoir is filled, the decomposition of submerged vegetation and soils can lead to releases of huge amounts of methane and carbon dioxide, which before entering the atmosphere can drastically deplete the level of oxygen in the water thereby harming aquatic life. According to critics, in tropical areas of Brazil, where large dams produce more than ninety percent of electricity generation, the dams' reservoirs emit such a high amount of methane gas that the dams in combination contribute more to climate change than would an equivalent of power generation from fossil-fuel power plants.<sup>52</sup>

*Mercury contamination:* The first indication that reservoirs could exacerbate mercury contamination problems came from South Carolina in the mid-1970s. Since then, elevated mercury levels in fish have been recorded from reservoirs in a variety of locations, including Illinois.<sup>53</sup> The mercury itself largely comes from coal combustion and is carried either by air or by leakage from coal ash pits. What the reservoirs add to the mix is that the mercury is retained by the reservoirs, from there entering food webs and concentrating over time in the tissue of top predators and carrion eaters, both fish and birds. Fish mercury concentrations have increased in all reservoirs for which pre- and post-impoundment data have been collected. Mercury in fish can attain particularly high levels in large reservoirs with comparatively small water discharges. Elevated mercury levels in fish are related to the degree of flooding of terrestrial areas involved

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<sup>51</sup> Duncan Graham-Rowe, "Hydroelectric Power's Dirty Secret Revealed," *Newscientist*, Feb. 24, 2005, accessed February 8, 2014, <http://www.newscientist.com/article.ns?id=dn7046>. Also, Tim Hirsch, "Project Aims to Extract Dam Methane," *BBC News*, May 10, 2007, accessed February 8, 2014, <http://news.bbc.co.uk/1/hi/sci/tech/6638705.stm>.

<sup>52</sup> *Ibid.*

<sup>53</sup> McNeill, *Something New Under the Sun*, 131.

in reservoir creation: other factors equal, the more land flooded proportional to the volume of the reservoir, the higher the mercury levels in fish.

### The Social Consequences

The human impacts of water development projects are as dramatic as the ecological ones, for good and ill. Over the last several decades, builders of dams have evicted millions of people, almost all of them poor and politically powerless. A significant portion of those evicted come from indigenous and aboriginal population, the most marginalized section in any society. While local people are often supposed to be among the prime beneficiaries of such development projects, many projects in reality have taken a heavy toll on them.

*Displacement.* There are no exact statistics on how many people have been displaced so far due to dam construction and operation. According to an estimate of the World Commission on Dams, the number is likely between 40 to 80 million worldwide.<sup>54</sup> In the instance of the Richand project in India, many people did not even receive advanced warning and had to flee for their lives, leaving their homes and valuables, once the flood water actually rushed into their neighborhoods.<sup>55</sup>

Even when displaced peoples are relocated and provided with new lands and means for survival, many of them experience their relocations as distinctly adverse events in their lives, ones that

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<sup>54</sup> Sophie Namy, "Addressing the Social Impacts of Large Hydropower Dams," *The Journal of International Policy Solutions* 7 (Spring 2007): 12.

<sup>55</sup> Enakshi Ganguly Thukral, *Big Dams, Displaced People: Rivers of Sorrow, Rivers of Change* (New Delhi: Sage Publications, 1992), 13-14.

disrupt their settlement patterns and add costs to their economic livelihoods. The High Dam at Aswan provides a good example of how dam construction may cause significant trans-boundary displacement. The High Dam at Aswan, Egypt, resulted in the relocation of 50,000-60,000 Nubians<sup>56</sup> in the Egyptian part of the Lake Nasser Reservoir and another 53,000 Nubians in the Sudanese part. The Egyptian Nubians were moved to new villages 20 kilometers north of Aswan, where serious problems developed with land allocation, soil quality, irrigation facilities, distances between allocated land and home villages, the government's requirement that the settlers raise unfamiliar crops such as sugar cane, and the inappropriate, non-traditional housing provided.<sup>57</sup>

The Sudanese Nubians were resettled in the Kashm el-Girba region to the southeast. The social structure of many of the old villages was severely disrupted because they were split up upon resettlement. Social tensions were exacerbated by settling three different ethnic groups together: the farmers flooded out by the Aswan development and two groups of local nomadic pastoralists being "sedentarized" by the government. Aside from cultural differences, the grazing practices of the pastoralists were incompatible with the cultivation practiced by the farmers.<sup>58</sup>

*Violence.* Displacement alone is not the end of the story. Often, protesting people are put to torturous treatment by the builders. In 1982, more than 3,500 impoverished Mayan Indians were illegally and forcibly evicted from their villages along the Chixoy River, Guatemala, to make way for a hydro-electric dam, a project, financed by the World Bank and the Inter-American Development Bank. Around 400 villagers from Rio Negro had been tortured, kidnapped and

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<sup>56</sup> An ethnic group originally from northern Sudan, and Southern Egypt.

<sup>57</sup> Rosenberg, Bodaly and Usher, "Environmental and social impacts," 127.

<sup>58</sup> Ibid.

killed by the time the dam wall was complete for opposing their relocation and seeking better compensation.<sup>59</sup>

*Livelihood and harvest disruption.* Where the resource base for a certain community is largely aquatic, and local residents need constant and unobstructed access to the lakes and rivers, dams and reservoirs carry a heavy price for them, both economically and socially. The biological changes in the water accompanied by the flow and temperature fluctuations take a toll on the fish population and their spawning activities, which can serve as a prominent source of livelihood for indigenous people. Harvest disruption also occurs because access to hunting, fishing and trapping areas are rendered more difficult, or even impossible, by debris, increased discharge, or by a reservoir itself. A commercial fishery around the Aral Sea that formerly supported 60,000 workers came to a halt once the gigantic freshwater lake diminished drastically in size and became more saline than the seas.<sup>60</sup> Such subsistence-based economies are sensitive to industrial development because changes in the resource use and harvesting patterns directly affect the established systems of land tenure and resource management and the organization of production and distribution.

*Health concerns.* Evidence from all different dam projects suggests that some populations become highly susceptible of getting sick after their resettlement to a new place. This can be well explained by the rates of malnutrition, poor health, and sanitation at resettlement sites. In an unknown environment, resettled groups can confront different types of diseases without their immune systems having sufficiently developed to fight them.<sup>61</sup> Often the most serious health risk

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<sup>59</sup> George Ledec and Juan David Quintero, "Good Dams and Bad Dams: Environmental Criteria for Site Selection of Hydroelectric Projects," (Latin America and Caribbean Region Sustainable Development Working Paper 16, the World Bank, Latin America and Caribbean Region (LCSES), November, 2003).

<sup>60</sup> McNeill, *Something New under the Sun*, 44.

<sup>61</sup> *Ibid.*, 80.

attributed to a reservoir is that it harbors vectors like mosquitos and snails, which thrive in irrigation canals and along the edges of reservoirs.

Another health risk with river development projects is associated with the influx of workers in the construction area and also from the mingling of diverse groups of people upon resettlement. Particularly in tropical developing countries, such reshuffling carries the risk of increases in a wide variety of diseases, such as tuberculosis, syphilis, AIDS, and measles.

*Dam collapses.* There are plentiful examples of dam failures due to poor and imperfect engineering. If a dam collapses—perhaps the worst of all outcomes—the reservoir water typically sweeps away the entire area. In 1975, a series of dam bursts in Henan province of China left perhaps 230,000 dead.<sup>62</sup>

### Effects Carried Forward: Trans-boundary Harm

Water knows no boundaries. Water flows not only ignore political boundaries, but also evade institutional classification and elude legal generalizations. Thus, a river carries the impacts and consequences springing from a development project from the actor country to the downstream country. A recent survey of international river basins revealed three striking facts about the extensive internationalization of the world's waters.<sup>63</sup>

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<sup>62</sup> “Corruption and the Environment: A Project for Transparency International,” Environmental Science and Policy Workshop Columbia University, School of International and Public Affairs, April, 2006, accessed February 11, 2014, <http://mpaenvironment.ei.columbia.edu/files/2014/06/Transparency-International-final-report.pdf>.

<sup>63</sup> The original survey put the figure at 261; a 2002 update adjusted it to 263. See Transboundary Freshwater Dispute Database (n.d. b), table 4 (International River Basin Register).

1. The number of international waterways (lakes and rivers) is larger than previously thought: 263, compared with a 1978 UN estimate of 214.<sup>64</sup>
2. The basins through which these watercourses flow cover almost half of the Earth's land surface area.
3. Among the world's non-island States, all but a handful (including Denmark, Singapore and a few States on the Arabian Peninsula) have some portion of their territory in an international basin. Among States occupying international basins, almost two thirds (ninety two) have at least half of their territory in an international basin; for more than one third (fifty), the figure is 80 percent or more of national territory.<sup>65</sup>

Along with these 263 common rivers, there are again untold numbers of shared aquifers. Water has been a cause of political tensions between Indians and Bangladeshis, Arabs and Israelis, Americans and Mexicans, and all ten riparian States of the Nile River. Water, as noted, is a scarce resource and has no substitutes, and strong law is needed to govern its use given the often weak motivations that exist among countries to cooperate fairly and to keep watercourses ecologically healthy.<sup>66</sup>

*Addressing the challenges.* Water-development projects have indeed helped promote economic development in many States. However, it is equally undeniable that they have exacerbated environmental and social problems. Many scholars have claimed that the benefits emerging

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<sup>64</sup> The increase in international waterways as compared with the 1978 estimate is due partly to improved remote sensing techniques (identifying new border crossing waterways) and partly to changing political boundaries with the breakup of several states in the post-cold war era (turning previously domestic waterways into border-crossing ones).

<sup>65</sup> Conca, *Governing Water*, 92.

<sup>66</sup> Jesse H. Hamner and Aaron T. Wolf, "Patterns in International Water Resource Treaties: The Transboundary Freshwater Dispute Database," *Colorado Journal of International Environmental Law and Policy* 1997 Yearbook, 1998.

from a dam are often exaggerated, with economic gains overstated and resulting costs understated. As for hydropower dams, there is an important difference between a hydropower plant's capacity and its actual electricity generation, a distinction that is often overlooked or hidden. Even many major dams are not created solely for hydropower and cannot be operated simply to generate it; operations must balance competing goals when, as usual, the goals call for different water-management methods.<sup>67</sup> It is, therefore, crucial to estimate and weigh the perceived costs with the promised benefits, typically a challenging task given the unquantifiable nature of environmental goods and ecosystem services and the difficulties of putting money values on human suffering. However, even if we take into account numeric values of lost fisheries, livelihood and even restoration efforts, we get startling numbers. The Bureau of Reclamation assumes that economic damages due to Colorado River salinity are approximately \$750 million per year in the U.S., even without including the economic damages to the farmers in Mexico.<sup>68</sup>

Further, many potential dam sites are far from the cities and industries, and the resulting ill effects often do not reach the people who literally consume the benefits. This logically leads to unfairness concerns as the adverse effects have to be borne by the local and indigenous people, thereby making them much more vulnerable; for local people, the costs can greatly exceed the benefits that they enjoy. An estimated ten percent of humanity has already been directly harmed by dams, whereas the resulting benefits have gone disproportionately to economic and political elites and other interested groups. As a World Bank internal review states: "Dam and reservoir

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<sup>67</sup> In particular, sharp conflicts exist when reservoirs are called on to produce hydropower while also storing water for use, controlling flooding, and perhaps even sustaining recreation. In hot dry times hydropower generation can require constant releases of water through turbines while the goals of water storage and recreation would call for zero discharges. Similarly, flood control can call for discharges at a time when hydropower is not particularly needed.

<sup>68</sup> McNeill, *Something New under the Sun*, 216.

operation is not dictated by optimization rules, but by the struggles of interest groups.”<sup>69</sup> A fair approach would ensure an equitable distribution of the benefits and resources among all the stakeholders, net of the costs that they bear and with special sensitivity to respecting the traditional livelihoods and cultural integrity of local people.

Along with nationwide environmental and social impacts, dams and other river development projects have trans-national consequences as well. Rivers and watersheds seldom adhere to national boundaries. Even when the debate about a proposed project arises as a geographically “domestic” controversy, the resulting costs and social conflicts can easily be extensively and increasingly transnational. Over the past few decades, large dams and water infrastructure projects have become a globally linked arena of contentious politics among nations. This may be the reason why Aaron T. Wolf, an environmental policy expert, chose to term water management as “conflict management.”<sup>70</sup> Researchers looking at the prospects for “environmentally induced” violent conflict have pointed towards shared water resources as the single most likely route by which environmental change might trigger interstate hostilities.<sup>71</sup> Such possible conflict of uses over a scarce resource is nothing new, and it has existed since humans began exploiting rivers in earnest. A historic understanding of trans-boundary adverse impact can be found in an inscription dated 1369 on the Anantharaja Dam in South India. Listing the conditions for good dam construction, it specified that a dam should not be placed on a site at the boundary of two kingdoms.<sup>72</sup>

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<sup>69</sup> William I. Jones, *The World Bank and Irrigation* (Washington, D.C.: The World Bank, 1995), 94.

<sup>70</sup> Aaron T. Wolf, “Healing the Enlightenment Rift: Rationality, Spirituality and Shared Waters,” *Journal of International Affairs* (2008): 51, [http://www.transboundarywaters.orst.edu/publications/abst\\_docs/Wolf-Healing%20the%20Enlightenment%20Rift%2008%20FINAL.pdf](http://www.transboundarywaters.orst.edu/publications/abst_docs/Wolf-Healing%20the%20Enlightenment%20Rift%2008%20FINAL.pdf).

<sup>71</sup> Thomas Homer-Dixon, “Environmental Scarcities and Violent Conflict: Evidence from Cases,” *International Security* 19, no. 1 (1994): 5-40, Project MUSE, [muse.jhu.edu/article/447316](http://muse.jhu.edu/article/447316).

<sup>72</sup> Nicholas J. Schnitter, *A History of Dams: The Useful Pyramids* (Rotterdam, Netherlands: A.A.



As with territory, so with authority. An upstream nation, while considering dam construction, can easily ignore the ecological effects that might take place in downstream countries. Also, the latter group may remain ignorant of such a project or of its any potential negative outcomes. Even when aware of the facts of downstream harm, the acting State may disagree sharply with the interpretation of the facts taken by its affected counterpart. States that are mutually aware of the likely consequences of a dam project might disagree significantly on how best to use river water and river corridors generally and even on what the river actually entails and means. Robert Goodland, an ecologist with the World Bank and a frequent intermediary between the Bank and its critics, has identified no less than seventeen separate points of knowledge-based dispute between feuding States, including the nature and distribution of costs and benefits, the feasibility and desirability of alternatives, the capacity of governments to regulate effectively, and the essence of “development.” Such ramifications vividly illuminate the gaps in the national and international governance systems and the politicization now occurring at different levels.

That said, the challenge of resisting a proposed dam within the politics of a State might well be easier than contesting it from the position of a downstream neighboring State. In the wake of serious protests from local people, a democratic form of government may think twice about proceeding with a project for fear of losing political power in the next election. That fear is less strong in a country without a democratic form of government and hardly present at all in a dispute among two or more nations that share the river being dammed. The concerns of a downstream State might easily be ignored in the internal decision-making processes of the acting State unless there are internal political forces that step forward to raise their concerns. Even then, the question arises: Can a government be held accountable for such a unilateral action

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Balkema, 1994).

when international law has long shown such respect for the concept of State sovereignty over territories and natural resources?

Often, a downstream government may seem to be “okay” with a certain dam project for the sake of good neighborly relations, for lack of negotiation skill, or in exchange for particular benefits such as a share in electricity. Such a scenario leaves the affected population of the downstream States in a much more precarious situation, entirely losing the support of political leaders in their home State who ought to be representing their interests internationally. What options would affected citizens of a downstream State have in such a case? Recent decades have seen the emergence of what might be termed the trans-nationalization of opposition, through growing links among organizations of local affected people and a global advocacy network linking environmentalists, human rights activists, and indigenous peoples’ groups. A notable example may be the Tipaimukh dam controversy, where the people in Bangladesh themselves, while working independently alongside their government, have also approached different international advocacy groups and media for assistance, seeking to apply pressure against their own government and that of India (site of the proposed dam) and to present a petition against the dam to the United Nations.

As this and many similar cases illustrate, dam-related controversies that were once largely internal matters within a State and among its people have become regional, or even sometimes international, disputes involving multiple stakeholders; i.e. the acting State, its affected people, downstream States, their affected people, international bodies, construction corporations, financiers, civil society groups and more. This multi-stakeholder model makes the scenario even more complicated and can create particular difficulties attempting to align the concerns, stances, and goals of the various interests. Logically, international funding sources and multinational

corporations should pay close attention to such conflicts and be attentive to resulting harms. The World Bank, however, while funding many dam projects around the world, mostly seems to get involved only in situations involving corruption while paying little attention to other ill-effects. For instance, the \$1.8 billion Merowe Dam in Northern Sudan was funded by China Export Import Bank and Arab financiers, and built by Chinese, German and French companies. As the project moved forward, several people were killed and many more were brutally oppressed and injured in crack-downs by the security forces.<sup>73</sup> Should not these institutions and bodies have a parallel role in monitoring whether their projects stimulate violations of human rights and whether the projects comply with required standards?

#### Dams and the Need for International Law

At present, some 140 bilateral and regional agreements regulate water flows and water allocation in international watercourses. Few of them, however, seriously address environmental concerns; while others, by failing to do so avoid engaging many of the human social costs. As will be considered later in chapters 5 and 6, the United Nations Watercourse Convention of 1997 includes provisions aimed at environmental protection but fails to integrate them well into the other guiding principles and largely exempts dam projects entirely from their provisions. In general, existing international legal instruments fall far short of addressing the full range of real-world problems caused by major river structures; they are more attentive, often solely attentive,

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<sup>73</sup> “Merowe Dam, Sudan,” International Rivers, accessed March 7, 2017, <http://www.internationalrivers.org/campaigns/merowe-dam-sudan-0>.

to issues of water allocation and too often include conflicting provisions dealing with the responsibilities and liabilities of the State parties. Establishment of few global institutional arrangements such as Global Water Partnership (GWP), International Council on Local Environmental Initiatives (ICLEI), and the Trans-boundary River Basin Initiative (TRIB) have been promising, though the effectiveness of these bodies have been much hindered by the limited scope of their decisional authority, their narrower geographic scope and finally, by the frequent lack of co-operation among the stakeholders.

New dam projects are not likely to end given their apparent capacity to help address the basic needs of an ever-increasing population. Without question, however, more care and attention should be accorded to their full consequences and policymakers should proceed in a much more reasoned way. Despite technological advances in predicting the environmental effects of hydroelectric developments, a great deal of uncertainty still exists. Surprisingly, new kinds of major impacts resulting from hydroelectric development are still being identified. Mercury concentration and greenhouse gas emissions in new reservoirs are two such recent discoveries, refuting the sanguine view that hydropower is immensely clean.

When harms are anticipated, steps need to be taken to alleviate them with new technologies developed to do so. Some success has already been achieved in reducing harms to fish population by installing sufficient passage options, i.e. fish screens<sup>74</sup> and fish ladders,<sup>75</sup> and transporting fish on barges. However, these passage options, it should be clear, do not fully eliminate fish mortality; indeed, while reducing some dangers they expose the fish to new

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<sup>74</sup> Fish screen is designed to prevent fish from swimming or being drawn into an aqueduct, cooling water, dam or other diversion on a river, lake or waterway where water is taken for human use.

<sup>75</sup> Fish ladder is a structure on or around artificial barriers (such as dams and locks) to facilitate fishes' natural migration.

threats, injury and stress. As for the many other ecological and human concerns, most are not easily amenable to technological refinement; they can only be addressed through more drastic options, such as dam removal. That idea was once unthinkable—dams once constructed were meant to stay forever. But deadly experiences like the Aral Sea and the Nile River basin have given rise to a wide scale anti-dam movement throughout the world. Dam opponents have urged State actors on many occasions to remove dams and affiliated structures from the rivers and to endeavor to restore the lost ecosystems. Though hydropower development or other forms of river-development projects have slowed since 1980s, they have never stopped. New construction continues apart in various major river basins in the world, especially in developing regions. New construction aside, the world will long deal with the dangers of previously built giant structures. They are still with us. With the passage of time and age they become more fragile and prone to failure and unanticipated effects if not taken care of or maintained in timely ways.

Less than twenty percent of the world's estimated feasible hydropower potential has been developed so far. The potential for harnessing this potential is particularly extensive in Asia, South America and Africa. For new projects to promote human flourishing over the long term, States need to take a more holistic view of water-resource management and to proceed in a spirit of cooperation when altering international watercourses. A high priority should be given to the preparation and implementation of integrated management plans, endorsed by all affected governments and backed by international agreements. Sound integrated water resources management would recognize the full range of social, economic and ecological uses of water, cross-sectoral water management, and water management at multiple scale and levels. There

will also be a need to coordinate local, regional, national, and transnational practices and institutions.<sup>76</sup>

The drive to manipulate rivers has always had a strong transnational dimension, given the ecological effects for downstream nations including the often heavy toll on freshwater biodiversity, impacts on floodplain ecosystems, dam induced seismicity and calamities and more recently discovered greenhouse gas emissions from dam reservoirs. Jawaharlal Nehru, who once celebrated the big dams as the temples of modern India, came to term the too-frequent disastrous effects of them as the “disease of gigantism.” It is likely that an outright ban on new dams is neither desirable nor justifiable, given the special needs of the developing nations. But somewhere and somehow the balance of competing interests needs to be recalibrated. We should embark on new river-engineering projects only after much thought and well-considered evaluation and with full impact-assessment reports in hand. Where rivers cross boundaries, all affected States should be involved in the decision-making processes. But consultation alone is far from enough, even when undertaken in good faith. Much more is needed if rivers are to regain and retain ecological health and if the legitimate interests of all States—regardless of negotiation power—are to receive due weight. International governance is needed, not just to provide the framework for inter-State negotiations but to put in place essential, basic protections for rivers as vital corridors supporting all life. Law is needed also to ensure that entire basins are understood, as they should be, as single entities, properly managed only at the whole-basin scale. As chapters that follow explain, international law today falls far short of these lofty goals; it falls far short of providing adequate long-term environmental protection and of promoting full social

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<sup>76</sup> Peter Dauvergne, ed., *Handbook of Global Environmental Politics* (Cheltenham: Edward Elgar Pub., 2012), 435.

justice among all peoples. Legal reform is much needed, and it needs to be guided by and aimed at lofty normative visions. For that to happen, the visions themselves need to be talked about and to gain clarity and, in time, widespread international support.

## Chapter 2: Principles of International Environmental Law

Contemporary disputes about the management of international watercourses take place in the context of a larger discussion of how people inhabit the planet. Particularly over the past century, the international community has paid increasing attention to uses and alterations of nature that, upon study and reflection, seem misguided, ecologically unsound, or socially unjust; to alterations, that is, that pose serious environmental and social problems. Out of these various concerns have come major statements of international environmental policy. These statements are an important part of the watercourse story, both because they color the ways people think about waterways and because they supply useful vocabulary for evaluating competing watercourse uses. For reasons considered in later chapters, the law of international watercourses ought to contain its own, detailed norms designed to protect waterways and their ecological health; it should not rely on, or incorporate by reference, the vague environmental standards intended to guide human uses of nature generally. To get to that conclusion, however, requires an assessment of these general statements of international environmental policy and of the politics the lie behind and around them.

### The Two Central Declarations

International environmental law has come to depend chiefly on statements made in two significant international declarations: the 1972 Stockholm Declaration<sup>77</sup> and the 1992 Rio

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<sup>77</sup> “Declaration of the United Nations Conference on the Human Environment” *adopted* at the United Nations Conference on the Human Environment in Stockholm on 16 June 1972, <http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97&articleid=1503>.



Declaration.<sup>78</sup> These Declarations, made twenty years apart, marked important developments and represented major milestones in the evolution of international environmental law. Though non-binding in nature, they embrace and express some of the leading environmental principles and fundamental norms to guide States in their national policies and international activities. Taken together, these two documents demonstrate, for the first time at the international level, the importance of protecting the natural environment and for integrating environmental concerns into States' developmental and other pursuits.

The Stockholm Declaration was the result of the first wave of formulation of environmental principles, and was again the first of its kind to set norms governing human interactions with nature. It underscored the common duty of people to safeguard the natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, for the benefit of present and future generations through careful planning and management. Two decades later, the Rio Declaration reaffirmed many of the Stockholm principles. As it did so it brought forward a few other key concepts in the realm of international environmental law.

Although both are non-binding declarations, their repeated use and references made to those in other regional and international instruments have established these two as important documents in the field of international environmental law. Both declarations include provisions that, at the time of their adoption, were either understood to already reflect customary international law or expected to shape future normative understandings. This is more so for the Rio Declaration which, by expressly reaffirming and building upon the Stockholm Declaration, reinforced the

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<sup>78</sup> "Rio Declaration on Environment and Development" *adopted* at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit in Rio de Janeiro on 14 June 1992, <http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163>.

normative significance of those concepts common to both instruments.<sup>79</sup> Today, many principles in these two Declarations have entered into the mainstream of international legal discourse and have taken the forms of customary international law.<sup>80</sup>

The United Nations Conference on Environment and Development (UNCED)—the same conference that produced the Rio Declaration—adopted yet another important document following the Rio Declaration, known as the Agenda 21.<sup>81</sup> The Agenda 21 was formulated as an action plan, representing consensus reached by around 178 States for securing a global partnership aiming at a quality environment and healthy economy. It presented a set of integrated strategies and programs to halt and reverse the effects of environmental degradation and to promote environmentally sound and sustainable development in all countries. This was also another non-binding instrument, and it addressed a broad range of issues; e.g. continuing damage to ecosystems, the worsening of poverty, hunger and ill health, increasing world population and literacy etc. Comprising forty chapters, the Agenda 21 looks at social and economic dimensions, the conservation and management of resources for development, strengthening the role of major groups, and the means of policy implementation.

All these documents set forth overarching goals to be achieved, prescribe some general directions towards using our environment, and apply to different aspects of environmental issues including different types of natural resources. Beyond these non-binding and broader policy-oriented documents is the body of international environmental law in the forms of United Nations conventions, multilateral and bilateral treaties, and scholarly works of different

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<sup>79</sup> Günther Handl, “Introductory Note on Declaration of the United Nations Conference on the Human Environment, Stockholm, 16 June 1972, and Rio Declaration on Environment and Development, Rio de Janeiro, 14 June 1992,” Audiovisual Library of International Law, accessed February 12, 2014, <http://legal.un.org/avl/ha/dunche/dunche.html>.

<sup>80</sup> Ibid.

<sup>81</sup> The United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, held in Rio de Janeiro, from 3 - 14 June, 1992.

international organizations designed to address a particular natural resource or specific type of environmental problem.<sup>82</sup> Also, there are the decisions of the International Court of Justice, arbitral awards, and decisions of some national courts to the extent they have informed international environmental legal discourse.

### Eight Guiding Principles

Careful evaluation of the various legal sources just mentioned reveal the prevalence of a few normative principles, many of which either found expressions in explicit language for the first time in the above mentioned declarations, or were later complemented and referred to in many other categorically addressed treaties. Among them are the no harm principle, the principle of sustainable development, the precautionary principle, the principle of common but differentiated responsibility, the polluter pays principle, the principle of environmental protection, the principle of co-operation, and the principle of participation.

*Principle of no harm.* One of the long-established principles in international environmental law is the responsibility of States not to cause significant harm to others. The notion discounts, to a great extent, the concept of absolute territorial sovereignty in the way it requires States to ensure that their activities within their jurisdictional limits avoid causing harm to areas beyond those limits. The concept first surfaced in the *Island of Palmas Case*<sup>83</sup> between the Netherlands and the USA as early as in 1928, where the Permanent Court of Arbitration explained the concept of territorial sovereignty by qualifying it with a corresponding duty. The court went on to say that

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<sup>82</sup> For example, the Biodiversity Convention, 1992 is aimed at protecting biodiversity, while the Montreal Protocol, 1987 was targeted at combating the risk of ozone depletion.

<sup>83</sup> *Island of Palmas case* (Netherlands, USA), Perm. Ct. of Arbitration, 2 U.N. Rep. Int'l Arb. Awards 829 (1928), accessed February 15, 2014, [http://legal.un.org/riaa/cases/vol\\_II/829-871.pdf](http://legal.un.org/riaa/cases/vol_II/829-871.pdf).

“territorial sovereignty involves the exclusive right to display the activities of a State”; but this right comes with a corollary duty—the obligation to protect within the territory the rights of other States, in particular their rights to integrity and inviolability in peace and in war, together with the rights that States may claim for their nationals residing in foreign territory.<sup>84</sup> Similar reasoning was endorsed later in the famous *Trail Smelter case* between the USA and Canada in 1941,<sup>85</sup> where the court concluded that “under the principles of international law, as well as of the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.”<sup>86</sup> Although this was a case involving air pollution, the ruling holds much importance as applied to other shared resources as well. A slightly refined version of the principle later appeared in some of the international environmental agreements, including the Stockholm Declaration of 1972 and the Rio Declaration of 1992. In identical language, Stockholm Principle 21 and the Rio Principle 2 establish a State’s responsibility to ensure that activities within its activity or control do not cause damage to the environment of other States or to areas beyond national jurisdiction or control. This obligation is balanced by the declarations’ recognition, in the first part of the respective principles, of a State’s sovereign right to “exploit” its natural resources according to its “environmental” (Stockholm) and “environmental and developmental” policies (Rio).

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<sup>84</sup> *Island of Palmas case* (Netherlands, USA), Perm. Ct. of Arbitration, 2 U.N. Rep. Int’l Arb. Awards 829 (1928), 839.

<sup>85</sup> *Trail smelter Arbitration* (United States, Canada), Arbitral Trib., 3 U.N. Rep. Int’l Arb. Awards 1905 (1941), accessed February 15, 2014, [http://legal.un.org/riaa/cases/vol\\_III/1905-1982.pdf](http://legal.un.org/riaa/cases/vol_III/1905-1982.pdf).

<sup>86</sup> *Ibid.*

While at Stockholm some States still questioned the customary legal nature of the obligation concerned, the clear restatement of this principle in the Rio Declaration invigorated its importance, and today there is hardly any doubt that this obligation forms part of general international law. Thus in its Advisory Opinion on the *Legality of the Threat or Use of Nuclear Weapons*<sup>87</sup> first, and again more recently in the *Case concerning Pulp Mills on the River Uruguay*,<sup>88</sup> the International Court of Justice expressly endorsed the obligation as a rule of customary international law.

*Principle of sustainable development:* The concept of sustainable development runs like an unbroken thread through the Rio Declaration. And although the Stockholm Declaration did not yet use the term sustainable development, the concept similarly ran as a strong undercurrent throughout its text as well. However, both at Stockholm and at Rio, characterization of the relationship between environmental protection and economic development was one of the most sensitive challenges facing the respective conference.

The concept itself was born from a conflict between developed States promoting environmental protection and developing States demanding opportunity for economic growth. This conflict took center stage at the 1972 Stockholm Conference, where the two chief concerns took prominence. One concern was that strict environmental regulation would deny developing nations their right to economic betterment. The competing concern was that unrestrained development would lead to environmental devastation and impinge upon others' rights to a healthy environment. As these concerns collided, it became clear that a balance was needed between environmental considerations and development. Although the concept was in the air at

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<sup>87</sup> *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, I.C.J. Reports 1996, 226, International Court of Justice (ICJ), 8 July 1996, accessed March 7, 2017, <http://www.icj-cij.org/docket/files/95/7495.pdf>.

<sup>88</sup> *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, International Court of Justice, and judgment delivered on April 20, 2010, accessed March 7, 2017, <http://www.icj-cij.org/docket/files/135/15895.pdf>.

the time of the Stockholm Declaration, the term sustainable development, expressing the need for compromise between environment and development, was first applied in 1980 by the International Union for the Conservation of Nature and Natural Resources (IUCN). The term has since been incorporated in different multilateral treaties, international declarations, foundation and planning documents of international and regional organizations, and other sources. While the term has become representative of the concept, a singular and consistent definition for sustainable development does not exist. The most widely recognized and oft-quoted definition comes from the 1987 Brundtland Report, which explains it as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”<sup>89</sup>

Although the Rio Declaration presented sustainable development as an overall beacon it did not define the term with particular clarity. Principle 3 of the Declaration might be taken as its most clear definition. It explains that the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations. Further, in order to achieve sustainable development, environmental protection must constitute an integral part of the development process and cannot be considered in isolation from it.<sup>90</sup> At its best, this principle reflects a more action-oriented approach to protecting environment while undertaking development activities. Nevertheless, to this day the actual operationalization of the concept has remained a challenge due to its vagueness overall (what is being sustained?) and lack of clarity in the traits that define or illustrate sustainable development. The two-part term aptly captures the

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<sup>89</sup> World Commission on Environment and Development, *Our Common Future* (Oxford, New York: Oxford University Press, 1987), accessed March 7, 2017, <http://www.un-documents.net/our-common-future.pdf>.

<sup>90</sup> The Rio Declaration on Environment and Development, 1992, Principle 4.

tension in future development but leaves to a later day the work of translating that tension into on-the-ground projects and activities.

*Precautionary principle:* The precautionary principle or the precautionary approach in the international environmental law means that, when confronting threats of serious or irreversible damage, a lack of full scientific certainty about them shall not be used as a reason for postponing preventive or remedial measures. One of the clearest examples of this principle in operation comes from the measures taken under the Montreal Protocol on Substances that Deplete the Ozone Layer.<sup>91</sup> The protocol called for the phase out of CFCs due to their apparent effects on the stratospheric ozone layer. The protocol was adopted and implemented even though the scientific predictions and calculations that underlay it were far from scientifically conclusive. Later, the Rio Declaration reiterated that, in order to protect the environment, the precautionary approach should be widely applied by States according to their capabilities.<sup>92</sup> Today, the concept is widely reflected in international practice, although there exists no single authoritative definition of either its contents or scope.

*Principle of common but differentiated responsibility.* In view of the differing contributions by States to global environmental degradation, Principle 7 of the Rio Declaration introduced the principle of common but differentiated responsibilities. The principle reflects the fact that States contribute in different ways and by different degrees to various aspects of global degradation. Given these differences, States ought to have both shared and individual responsibilities as part of their common task to address that degradation. Since its appearance in the Rio Declaration, the principle has become more commonly accepted as a cornerstone of the sustainable

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<sup>91</sup> The Montreal Protocol on Substances that Deplete the Ozone Layer, *agreed* on September 16, 1987, *entered into force* on January 1, 1989, U.N.T.C. 26369, [https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-2-a&chapter=27&clang=en](https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-2-a&chapter=27&clang=en).

<sup>92</sup> The Rio Declaration on Environment and Development, 1992, Principle 15.

development paradigm. It has gained strength, even though it suffers from the same challenges and the normative deficiencies as the idea of sustainable development itself.<sup>93</sup> The uncertainty arises in part because the principle is linked both to the idea of differentiated responsibility due to different contributions to existing problems and to the reality that States differ widely in their capabilities to take action due to differences in their development status. The linkage of these two realities was made clear in the United Nations Framework Convention on Climate Change.<sup>94</sup> That Convention not only accepts that developing countries need to comply with less strict standards than the developed countries (reflecting their lower contributions to the problem), but also accepts that they are entitled to technological and financial assistance in order to help them meet their obligations under the treaty (reflecting their much different development levels).

*Polluter pays principle:* The Polluter pays principle recalls the well-established legal precedents that hold the polluter who creates an environmental harm liable to pay compensation and costs to remedy that harm. In the context of growing concern about the international economic implications of environmental control measures, the Council of the OECD (Organization for Economic Co-Operation and Development) formally propounded the polluter-pays principle in 1972.<sup>95</sup> Although first formalized internationally by the OECD, the principle has a long root. The concept was applied in the famous *Trail Smelter* arbitral award, which compelled Canada to pay compensation for damages in the United States caused by a Canadian source of air pollution. The award also required Canada to take steps to abate the pollution to avoid further damage.

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<sup>93</sup> Handl, *Introductory Note*.

<sup>94</sup> United Nations Framework Convention on Climate Change, Rio de Janeiro, *adopted* on 3 - 14 June 1992, *entered into force* on 21 March 1994, 1771 UNTS 107; S. Treaty Doc No. 102-38; U.N. Doc. A/AC.237/18 (Part II)/Add.1; 31 ILM 849 (1992), accessed March 7, 2017, <http://unfccc.int/resource/docs/convkp/conveng.pdf>.

<sup>95</sup> OECD (Organization for Economic Co-Operation and Development) Recommendation of the Council on Guiding Principles concerning International Economic Aspects of Environmental Policies, 26 May 1972, accessed March 7, 2017, <http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=4&InstrumentPID=255&Lang=en&Book=False>.



Principle 16 of the Rio Declaration reaffirms the polluter pays principle by saying that national authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, implementing the foundational idea that polluter should, in principle, bear the cost of pollution. The principle has been widely accepted in the developed world and it has been included in many conventions and treaties, including the 1992 ECE Convention, the 1992 Treaty of Maastricht, and the 1992 Paris Convention.

*Principle of minimization of environmental harm.* This is the expression of a newer principle as it appears in the International Law Association (ILA)'s 2004 work on the Berlin Rules on Water Resources. Article 8 of the Rules framed this requirement as one of the general principles guiding State action. The commentary accompanying it articulated the principle as a current or emerging rule of customary international law.<sup>96</sup> Although the Berlin Rules are limited in application to international watercourses, the commentary makes clear that the obligation to minimize environmental harm does not depend upon the harm arising in a transboundary setting only; it is a broader obligation derived from general international environmental law.<sup>97</sup> Neither the Stockholm nor the Rio Declaration established environmental protection (that is, minimizing environmental harm) as an independent principle or State obligation. Instead, they integrated this concern into the paradigm of sustainable development. Other, more specific documents, however, have taken stances similar to that of the Berlin Rules. Neither the Biodiversity Convention nor the Ramsar Convention on Wetlands, for example, limits the scope of States' obligations by balancing them against development goals. Instead they present environmental, biodiversity or wetlands protection as independent and focal objectives. On international waters,

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<sup>96</sup> The Berlin Rules on Water Resources, International Law Association, Berlin, 2004, accessed March 7, 2017, [http://internationalwaterlaw.org/documents/intldocs/ILA\\_Berlin\\_Rules-2004.pdf](http://internationalwaterlaw.org/documents/intldocs/ILA_Berlin_Rules-2004.pdf).

<sup>97</sup> ILC Commentary to Article 8 of the Berlin Rules on Water Resources, 2004.

the United Nations Convention imposes a general obligation upon States to protect the environment of international watercourses, an obligation recognized by the International Court of Justice in the *Gabcíkovo-Nagymoros* Case shortly afterwards. Similarly, the 1992 ECE Convention and a good number of recent regional treaties have endorsed this requirement of minimization of environmental harm, enough of them so that it is now likely to stand today as a fairly established principle of international environmental law.

*Principle of cooperation:* Both the Stockholm and the Rio Declarations envisioned high levels of international cooperation on international matters concerning the protection and ecological enhancement of the natural environment. The Stockholm Declaration recognized the fact that the world faced, in effect, a growing class of environmental problems—not just individual, localized issues. The emergence of these problems in the regional or global context called for extensive cooperation among nations and concerted action by international organizations. The declaration provided expressly that environmental protection was to be handled in a cooperative spirit by all countries, big and small, on an equal footing. It called for this cooperation to occur through multilateral or bilateral arrangements and other appropriate means.

Later, the Rio Declaration strengthened the concept of cooperation, urging the development of a global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystems.<sup>98</sup> Building on earlier statements, this document envisioned a “new level of cooperation” among the full range of stakeholders involved; i.e. among States, key sectors of societies, and people themselves. It particularly called for new international environmental agreements and other steps to protect the functional integrity of the global environment and the greening of development systems. In contrast to the Stockholm Declaration, which overlooked

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<sup>98</sup> The Rio Declaration on Environment and Development, Principle 7.

transboundary concerns, the Rio Declaration unequivocally and in mandatory language called upon States to assess likely environmental consequences, and to inform and consult with potentially affected other States, whenever their proposed actions involved a risk of significantly harmful transboundary ecological effects.<sup>99</sup> Today, the principle of cooperation appears firmly established on the international scene, and has been functioning as a cardinal theme in many international, regional and bilateral agreements.

*Principle of participation.* One important aspect of the Rio Declaration is its strong emphasis on the roles of and participation by indigenous peoples and by women and the youth in the conservation, management, and development of the environment. The Declaration proclaims that “environmental issues are best handled with the participation of all concerned citizens at the relevant level.”<sup>100</sup> It calls upon States to ensure that each individual has access to appropriate information, has opportunities to participate in decision-making, and, overall, receives justice in environmental matters.

Although this principle of participation has antecedents, the Rio Declaration broke new ground by giving it such an expansive role. The Declaration presented it, for the first time at a global level, as a concept critical both to effective environmental management and democratic governance. This principle found even a stronger expression in the Agenda 21, which recognized and required distinct decision-making roles for all major groups; i.e. women, indigenous people and their communities, youth and children, non-governmental organizations, workers-farmers, business and industry, and the technological community.

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<sup>99</sup> The Rio Declaration on Environment and Development, principle 19.

<sup>100</sup> Ibid., principle 10.

Since the 1992 Rio Declaration and Agenda 21, this principle has sunk firm roots in international community expectations, as reflected notably in the Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Aarhus Convention), the 2010 UNEP Guidelines for the Development of National Legislation on Access to Information, Public Participation and Access to Justice in Environmental Matters and various resolutions of international organizations and conferences. These expressions are adequately numerous and widely enough supported so that the normative provisions of Principle 10 of Agenda 21 could today be deemed imperative.<sup>101</sup>

Besides these foregoing principles, the Rio Declaration added further objectives and goals into the mix; i.e. eradicating poverty as an indispensable requirement for sustainable development;<sup>102</sup> giving special priority to the needs of developing and the least developed countries;<sup>103</sup> reducing and eliminating unsustainable patterns of production and consumption;<sup>104</sup> promoting a supportive and open international economic system leading to economic growth and sustainable development in all countries while better addressing the problems of environmental degradation.

### Environmental Law and Watercourses

Both the Stockholm and the Rio Declarations have been widely acclaimed given their roles in influencing and reshaping environmental concerns on a global scale. They brought forward key concepts and sought to recognize the interplay between humans and nature. On the downside, the Declarations evince a strongly human-centric approach by implying that States should be

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<sup>101</sup> Handl, *Introductory Note*.

<sup>102</sup> The Rio Declaration on Environment and Development, principle 5.

<sup>103</sup> *Ibid.*, principle 6.

<sup>104</sup> *Ibid.*, principle 8.

advancing environmental objectives so as to enhance human benefits, rather than stressing nature's integrity itself or the moral status of other life forms and biotic communities. Rio Principle 1 unabashedly positioned "human beings ... at the center of concerns for sustainable development," much as the Stockholm Declaration, in Principles 1, 2, 5 and several prefatory paragraphs, postulated a distinctly instrumentalist approach to environmental protection: such protection was a means to the desired end of human flourishing. Overall, the two Declarations consider the protection and improvement of the human environment as a major issue given the connections to the well-being of people and economic development throughout the world. Such an anthropocentric formulation contrasts with the focus of some other contemporary legal documents, e.g., the World Charter for Nature of 1982,<sup>105</sup> and the Convention on Biological Diversity,<sup>106</sup> whose principles of conservation are informed by the "intrinsic value" of every form of life regardless of its worth to human beings.<sup>107</sup> Yet, even as they retained humans as normatively unique, pushing aside arguments about the intrinsic value of nature, there is no denying that the Stockholm and the Rio formulations have had strong impacts on international political-legal discourse and processes of decision-making. Their various provisions and principles have significantly shifted the legal landscape.

It is important to realize that the development of international environmental law has taken place alongside that of international water law. Indeed, much international water law can be thought of as a sub-set of international environmental law. While dealing with all types of natural resources, the Agenda 21 includes a specific chapter dedicated to freshwater resource management and

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<sup>105</sup> The General Assembly resolution 37/7, accessed March 7, 2017, <http://www.un.org/documents/ga/res/37/a37r007.htm>.

<sup>106</sup> The Convention on Biological Diversity, or the Biodiversity Convention, *adopted* at the United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, 5 June 1992, and *entered into force*, 29 December 1993.

<sup>107</sup> Handl, *Introductory Note*.

protection. The chapter provides for objectives, courses of action to follow, and means of implementation to protect the quality and supply of freshwater resources. It also calls for the application of integrated approaches to the development, management and use of water resources.<sup>108</sup> About transboundary water resources, the chapter reaffirms their importance to all riparian States, and then calls for promoting co-operation among the concerned States in conformity with existing agreements and other relevant arrangements, taking into account the interests of all riparian States concerned. Finally, the chapter outlines the types of programs, orientations, and decision-making processes needed to address freshwater resources: integrated water resources development and management; water resources assessment; the protection of water resources; water quality and aquatic ecosystems; particular measures to protect drinking water supply and sanitation; steps to integrate water management and sustainable urban development; the protection of water for sustainable food production and rural development; and, in some manner, programs and actions to address the impacts of climate change on water resources.

As noted already and discussed more fully later, the law on trans-boundary water issues includes the United Nations Convention on the Non-navigational Uses of International Watercourses, adopted in 1997. This convention addresses environmental concerns but reaches well beyond them to standardize interstate water allocations and all other non-navigational uses of watercourses. The relevant environmental law affecting watercourses also includes the Convention on Biological Diversity and the Ramsar Convention. The Convention on Biological Diversity was developed and adopted at the United Nations Conference on Environment and

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<sup>108</sup> Agenda 21, Chapter 18: Protection Of The Quality And Supply Of Freshwater Resources: Application Of Integrated Approaches To The Development, Management And Use Of Water Resources.

Development in June 1992 with a three-fold objective—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. The convention defines biological diversity as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and among ecosystems.<sup>109</sup> Therefore, the Convention contributes to the international water law to the extent it relates itself to the conservation of aquatic biodiversity and aquatic ecosystems. Similarly relevant is the Ramsar Convention, or the Convention on Wetlands of International Importance, Especially as Waterfowl Habitat, which provides a framework for wetland conservation.<sup>110</sup> The convention encourages nations to identify and designate wetlands of international importance—rivers, marshes, coral reefs and similar areas—and establishes criteria for evaluation based on the ecosystem services that the wetlands provide.

*Criticism and the path ahead for watercourses law.* The Stockholm and Rio Declarations continue today to provide influential guidance on environmental protection and how best to reconcile it with needs for economic development. Their chief underlying principle of sustainable development, however, has been subject to strong, persistent criticism ever since it was introduced, and literature outside the law continues to articulate more particularized goals for environmental protection. Looking ahead, it is clear that sustainable development as articulated in these declarations is not adequately clear or strong enough, either to protect the environment adequately or to resolve disputes between environmental protection and

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<sup>109</sup> The Convention on Biological Diversity, 1992, article 2.

<sup>110</sup> The Convention on Wetlands of International Importance Especially as Waterfowl Habitat, 2 February, 1971, done in Ramsar, Iran.

development. A more clear body of law is needed, one tailored to the particular contexts in which such clashes arise. International watercourses provide one such context, and, as discussed below, watercourses law has moved beyond sustainable development to embrace more particular environmental standards. For reasons considered in later chapters that trajectory needs to continue; new, better law is needed to add further specificity to environmental protections and to clarify the limits on development activities.

Perhaps the most commonly expressed complaint against sustainable development—and sustainability as a freestanding goal—is that it is too vague. According to critics the idea fails to make clear exactly what is being sustained and by whom. A related complaint is that sustainable development brings together two ideas that are inherently in conflict without providing anything like the guidance needed to reconcile their differences. Much development is environmentally degrading, and many forms of environmental protection can either put vital parts of nature off limits, thus restricting economic options, or add further costs to development projects so that they become unprofitable or uncompetitive. An early, penetrating expression of this criticism was presented by environmental historian Donald Worster in an essay, “The Shaky Ground of Sustainable Development.”<sup>111</sup> Worster illustrated the vagueness critique by cataloguing some of the many variant definitions of sustainability. Many advocates of the term, he explained, linked it to the science of ecology, but ecology alone, Worster noted, was not sufficiently robust to give guidance without being supplemented by normative standards drawn from outside science. As for sustainable development, it seems based on the questionable assumption that we can easily determine the carrying capacity of local and regional ecosystems. It carried forward the old idea that nature was best understood as pools of natural resources. Most of all, it envisioned that

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<sup>111</sup> Donald Worster, “The Shaky Ground of Sustainable Development,” in *The Wealth of Nature: Environmental History and the Ecological Imagination*, Worster (New York: Oxford U.P. 1993).



environmental protection could and would be traded off against development goals without any deviation from the overall standard.

The complaints of Worster and others were widely embraced, particularly by conservation voices working within or greatly influenced by the ecological sciences. They were prone to formulate environmental standards that drew more on science but expressly went beyond science to incorporate key normative values. A still-useful survey of normative concepts and goals in the conservation literature was issued in 1999 by three American scholars from different fields—a philosopher and two biological scientists.<sup>112</sup> As they surveyed the literature, they divided the many normative alternatives into two main groups. One group of proposals sought mostly to sustain the ecological functioning of natural systems, paying particular attention to soil retention, fertility cycles, and hydrologic systems. In contrast with these functionalist normative visions were those in the second category, which focused instead on the biological composition of particular landscapes—often, although not always, seeking to protect or restore the full range of plant and animal species that inhabited a landscape before the advent of significant human change.

The United Nations itself, after putting such emphasis on sustainable development, took a rather different approach in 2000 and following years when it undertook an international study of the status of the planet and human effects on it. The resulting multi-volume report, titled the Millennium Ecosystem and issued between 2003 and 2005, assessed the planet by considering it as the source of various ecological services or ecosystem services, which the report identified and categorized. By doing so, the report authors employed a normative standard that fit easily within what the American scholars had termed the functionalist normative approach, an approach

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<sup>112</sup> J. Baird Callicott, Larry B. Crowder and Karen Mumford, “Current Normative Concepts in Conservation,” *Conservation Biology* 13:1 (Feb. 1999): 22-39.

that assessed the condition of ecosystems, and thus set normative standards by which to judge human activities, based on the ecological functioning of such ecosystems.<sup>113</sup> What was new in the “ecosystem services” approach was mostly the vocabulary; nature’s ecological processes were viewed in distinctly instrumental terms, based on their contributions to human flourishing. They were not, as they were for many conservation scholars, viewed as intrinsically valuable or valuable because of their roles in sustaining all life, not just humans.

Looking back, it seems reasonably clear that the goal of sustainable development is best understood as a foundational point of beginning for thinking about humans and nature and charting the path ahead, a path that, as the principle makes clear, needs to include both environmental protection and continued development that allows the world’s most disadvantaged to get ahead. Sustainable development, that is, provides a starting point or framework, which would give way over time as its elements were made clearer by the continued evolution of international law. In time, sustainable development would be put behind, replaced by fuller and clearer principles of international law and the specific terms of particular conventions.

As considered below, the international law of watercourses has in fact moved beyond sustainable development. Current law remains unclear and its key elements fit together poorly. But the law has progressed considerably, chiefly in the 1997 United Nations Convention considered above and in the more pollution-focused 1992 Convention on the Protection and Use of Transboundary Watercourse and International Lakes, put forth by the United Nations Economic Commission for Europe but recently opened for signing by all nations. Further progress is needed; and current

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<sup>113</sup> An early volume issued by the study team, *Ecosystems and Human Well-Being: A Framework for Assessment* (Washington DC: Island Press, 2003), set forth the methodology used to assess natural conditions and the extent to which humans were overtaxing the planet. Later volumes gave the results of the planetary study using this assessment methodology, including the summary volumes *Ecosystem Services and Human Well-Being: Synthesis* (Washington DC: Island Press, 2005) and *Ecosystems and Human Well-Being: Our Human Planet, Summary for Decision Makers* (Washington DC: Island Press, 2005).

law is nowhere near adequate to provide the clear guidance. But it has progressed far enough to date to eliminate any need to hold on to sustainable development, or sustainability in general, as an overall organizing principle.

The main criticism of sustainable development continues to follow the lines of argument of Donald Worster: the ideal links environmental protection with development without making much effort to reconcile the conflict between them except by way of vague, lofty expressions. The conflict remains within the single principle rather than between independent normative goals. A full, durable reconciliation of this conflict is not likely to come about, soon or perhaps ever. But substantial progress can be made toward reconciliation, and international watercourse law needs to incorporate some form of reconciliation, tailored to the realities of watercourses and the many ways people depend on them.

Reconciliation in the watercourses context is likely to begin by setting minimum standards for the ecological condition and functioning of major watercourses, standards that would be respected if at all possible by all human uses and development projects. Only after satisfaction of these environmental standards would the tradeoff begin between further protection and intensive watercourse uses. Even in that context, however, it is essential to recognize that ecologically healthy rivers support key uses that cannot be supported or undertaken when rivers are not healthy. Thus, there is no uniform inverse relationship between environmental protection and human uses. Many human uses require environmental protection. The tradeoffs, then, are often between human uses that are possible only when rivers are healthy and human uses that are, instead, less ecologically sensitive; human uses are on both sides.

With these environmental law principles covered, and criticisms of them identified, this study turns to the special case of Bangladesh as an illustration of a highly vulnerable nation dependent

for its long-term flourishing on a sound international law of watercourses. How does this State use its many international watercourses, and in what ways might the actions of other States interfere with these uses? Given these uses of watercourses and given the possible interferences with them, what types of environmental or other protections might Bangladesh and similar nations need if the nation is to flourish over time at levels similar to the flourishing that characterizes other, less vulnerable nations? And what record of success and failure does the State have as it has reached out to neighboring States and sought to negotiate watercourse conventions that adequately protect its needs?

## PART II: Bangladesh, Its Rivers, and Its Neighbors

### Chapter 3: Waters, Uses, and Conflicts

Bangladesh, situated in the Ganges-Brahmaputra-Meghna basin (GBM basin), is endowed with extensive water resources. Its surface-water system consists of about seven hundred big and small river networks crisscrossing the country along with hundreds of *beels* and *haors*<sup>114</sup> – saucer-like depressed basins of a marshy character.<sup>115</sup> In addition to these water bodies, the villages of Bangladesh are littered with numerous ponds of varying sizes, which serve as important sources of domestic water supply.<sup>116</sup> These common, widespread water bodies have intimately linked the economy and social life of the country to water.

Despite this overall abundance, seasonal changes every year play a vital role in varying water flows in Bangladesh, especially surface water flows, causing wide fluctuations in the amounts of available water. During the monsoon (June – October), the country receives abundant rainfall, ranging from about 3200 mm in the northeast to about 1600 mm in the southwest region, followed by severe scarcities of water during the dry season (January – May). Reflecting this seasonal discrepancy, surface-water inflows to the country vary from a maximum of about

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<sup>114</sup> *Haors* and *beels* are local terms for natural depressions on a floodplain. There is no clear-cut distinction between *haors* and *beels*; larger ones are called *haors* and smaller ones *beels*. *Haors* are normally connected into a neighboring river system but do not represent dead rivers. *Beels* are defined as any definable water body or old riverbeds except oxbow lakes. In A Atiq Rahman, Saleemul Huq, Gordon R Conway, eds., “Environmental Aspects of Surface Water Systems of Bangladesh: An Introduction,” in *Environmental Aspects of Surface Water Systems of Bangladesh* (Dhaka: University Press Limited, 1990), 2.

<sup>115</sup> Ibid.

<sup>116</sup> Ibid.

140,000 m<sup>3</sup>/s in August to a minimum of about 7,000 m<sup>3</sup>/s in February.<sup>117</sup> This surface-water variation directly affects groundwater-recharge rates, thereby causing seasonal variations also in the availability of groundwater. Thus, whereas Bangladesh enjoys an abundance of water, the uneven distribution of water in terms of place and timing puts the country and its people at the mercy of nature. On one hand, the overabundance of water during the monsoon causes egregious flooding in Bangladesh, while on the other, scarcity in the dry season causes severe drought conditions leading to losses of crops and livestock, public health problems, and environmental degradation.

Bangladesh lies across the delta of three major rivers, the Ganges-Padma, the Brahmaputra-Jamuna, and the Meghna. Together with their tributaries and distributaries these rivers discharge about 5 million cubic feet per second of water into the Bay of Bengal at peak periods, and carry and deposit an annual sediment load estimated at between 1.5 and 2.4 billion tons.<sup>118</sup>

### The Major River Systems in Bangladesh

In combination the rivers in Bangladesh form one of the largest river networks in the world with a total length of about 24,140 kilometers (about 15,000 miles) and with exposed water covering about 7 percent of the country's surface.<sup>119</sup> The network consists of major rivers and their

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<sup>117</sup> *Banglapedia: National Encyclopedia of Bangladesh*, s.v. "Water Resources," accessed March 7, 2017, [http://en.banglapedia.org/index.php?title=Water\\_Resources](http://en.banglapedia.org/index.php?title=Water_Resources).

<sup>118</sup> A Atiq Rahman, Saleemul Huq, Gordon R Conway, eds., "Environmental Aspects of Surface Water Systems of Bangladesh: An Introduction," in *Environmental Aspects of Surface Water Systems of Bangladesh* (Dhaka: University Press Limited, 1990), 4.

<sup>119</sup> Rahman, Huq and Conway, "Environmental Aspects," 4.

tributaries and distributaries, including tiny hill-country streams and seasonal creeks and canals that wind throughout the country and serve as the life blood of communities. Dominated by its three major rivers—the Ganges/Padma, the Brahmaputra/Jamuna, and the Meghna Rivers—the network is among the largest on earth in terms of catchment's size, river length and volume of discharge. The combined discharge passing through this overall system into the Bay of Bengal reaches up to 1,174 billion cubic meters annually. The rivers are characterized by fine sandy bottoms, flat slopes, substantial meandering and channel shifting, and eroding banks.<sup>120</sup> The rivers flow generally southward and serve directly and indirectly as the main source of water for irrigation and as the principal arteries of commercial transportation.

*The Ganges-Padma River System.* The Ganges (named the Padma in Bangladesh) is one of the major trans-boundary rivers in South Asia. To date, it has also been the most contested river between Bangladesh and India. The traditional source of the river is the Bhagirathi, a mountain stream that originates at about 23,000 feet in the Gongotri glacier on the southern slope of the Himalayan range.<sup>121</sup> In total the Ganges has five headwater streams, the Bhagirathi, Alokanda, Mandakini, Dauli Ganga and Pinder. As it flows downstream it is joined by a number of tributaries originating in other parts of the Himalayas within the boundaries of China, Nepal, and India.<sup>122</sup> Crossing the high lands of the Himalayas, the river falls from 10,300 feet to about 1,000 feet and then descends to 400 feet at Allahabad, India. From there, it flows in a southerly and south-easterly direction. The Ganges was probably the first river to break through the Indian

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<sup>120</sup> *Banglapedia: National Encyclopedia of Bangladesh*, s.v. "River and Drainage System," accessed March 7, 2017, [http://en.banglapedia.org/index.php?title=River\\_and\\_Drainage\\_System](http://en.banglapedia.org/index.php?title=River_and_Drainage_System).

<sup>121</sup> Ziaur Rahman, A. S. M. Oliullah, Rezwana Nur, *Water Sharing Discord between Bangladesh and India: People in the Crossfire* (Dhaka: News Network, 2004), 24.

<sup>122</sup> *Ibid.*

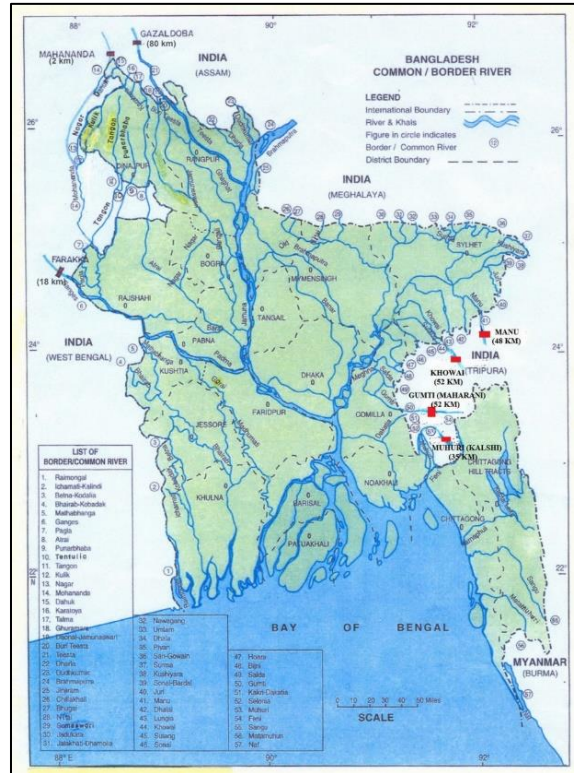


Figure 1: Rivers in Bangladesh (including border rivers). Source: The Joint River Commission, Bangladesh

shield-barrier during the Pleistocene upheaval. Since then, the river has transported enormous quantities of sediment that, over time, has built up the largest part of the Bengal delta.<sup>123</sup>

The total length of the Ganges from the slopes of the Himalayas to its mouth at the Bay of Bengal is about 2600 kilometers (1600 miles); and its total drainage area is 1,117,000 square kilometers, of which 861,390 square kilometers lie in India, 67,390 square kilometers in Bangladesh, and 188,220 square kilometers in Nepal and China.<sup>124</sup>

<sup>123</sup> Nazmul Alam, M. Abul Kashem Mozumder, *Tipaimukh and Beyond* (Dhaka: A H Development Publishing House, 2009), 19.

<sup>124</sup> Salman M. A. Salman and Kishor Uprety, *Conflict and Cooperation on South Asia's International Rivers: A Legal Perspective* (Washington, D.C.: World Bank Publications, 2003), 130.



The delta of the Ganges River starts at Farakka in West Bengal. Downstream the river splits into two channels—the Padma and the Bhagirathi. The Padma flows in a southeasterly direction, forming the boundary between Bangladesh and India for about 80 miles before entering Bangladesh, while the Bhagirathi flows southward in India into the state of West Bengal.<sup>125</sup> Within Bangladesh the Padma soon joins with the Jamuna River, near Rajbari, Goalondo. The combined flow of the two rivers constitutes the lower segment of the Padma, which continues to flow southeastward through central Bangladesh until it joins the massive Meghna river near Chandpur. There the Padma ends as an independent river under its own name. The combined flow, using the Meghna name, moves southward to empty into the Bay of Bengal.

The Ganges/Padma serves as the source from which about one third of the people draw their sustenance. The river's floodplain is described as active, moribund, and meandering; its chief physical trait is its continued towhead (sandbar) formation.<sup>126</sup> The river's sediment load is so substantial that it becomes, near Goalondo, Rajbari, the nation's most significant land-building river.

*The Brahmaputra-Jamuna River System.* The Brahmaputra is also one of the world's great rivers, ranking fifth in terms of total discharge and eleventh in drainage area.<sup>127</sup> The Brahmaputra River rises in the northern and eastern slopes of the Himalayas (in the great glacier of Kailash range) at about 5,150 meters in the Tibet region. Known in Tibet as the Yarlung Tsangpo River, it flows

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<sup>125</sup> Salman M.A. Salman and Kishor Uprety, "Hydro-politics in South Asia: A Comparative Analysis of the Mahakali and the Ganges Treaties," *Natural Resources Journal* 39 (1999): 295, accessed March 7, 2017, <http://heinonline.org/HOL/LandingPage?handle=hein.journals/narj39&div=32&id=&page=>

<sup>126</sup> Khan and Rashid: 1985, in *Impact of River Bank Erosion and Flood in Bangladesh: an Introduction in Riverbank Erosion, Flood and Population Displacement in Bangladesh*, K. Moudud Elahi, Riverbank Erosion Impact Study, Jahangirnagar University (1991).

<sup>127</sup> Colin R. Thorne, Andrew P.G. Russell and Muhammad K. Alam, "Planform Pattern and Channel Evolution of the Brahmaputra River," *Geological Society London, Special Publications* 75 (1993): 257-276, doi:10.1144/GSL.SP.1993.075.01.16.

across southern Tibet to break through the Himalayas in great gorges, where it is joined by many tributaries as it journeys throughout both China and India. A major tributary is the Manas, which originates in China and flows across Bhutan, thus adding Bhutan as a riparian of the Brahmaputra.<sup>128</sup> The combined river then enters India through Arunachal Pradesh, where the river is known as the Dihang or Siang. Upon entering Assam it finally becomes known as the Brahmaputra. There its waters divide in the flatlands to form a braided pattern, at places 16 kilometers of width.<sup>129</sup> The river proceeds straight southward to enter Bangladesh near the Kurigram district. In the vast delta of Bangladesh, it merges first with the Ganges/Padma (as described above) and then with the Meghna, after which the mingled waters empty into the Bay of Bengal.

The Brahmaputra River flows some 2,900 kilometers (1,800 miles) from its source in the Himalayas to its confluence with the Ganges/Padma River. The total drainage area of the river is 480,000 square kilometers, of which 293,000 square kilometers lie in Tibet, 195,000 square kilometers in India, and 45,000 square kilometers in Bangladesh.<sup>130</sup> Like the Padma, this river carries a high sediment discharge, ranking third in the world. In its lower course the river is said to be both a creator and a destroyer—depositing huge quantities of fertile alluvial soil but also causing disastrous and frequent floods.

The Brahmaputra is an exceptionally dynamic river, changing its course and intensity over time as it journeys from the Himalayas to its confluence with the Padma River. Within Bangladesh the river followed a different route in recent past. Due to heavy flooding the river shifted some 60 miles westward and merged its flow with that of the Jamuna River. Overall the Brahmaputra is

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<sup>128</sup> Rahman, Oliullah and Nur, *Water Sharing Discord*, 26.

<sup>129</sup> Alam and Mozumder, *Tipaimukh*, 19.

<sup>130</sup> Rahman, Oliullah and Nur, *Water Sharing Discord*, 26.

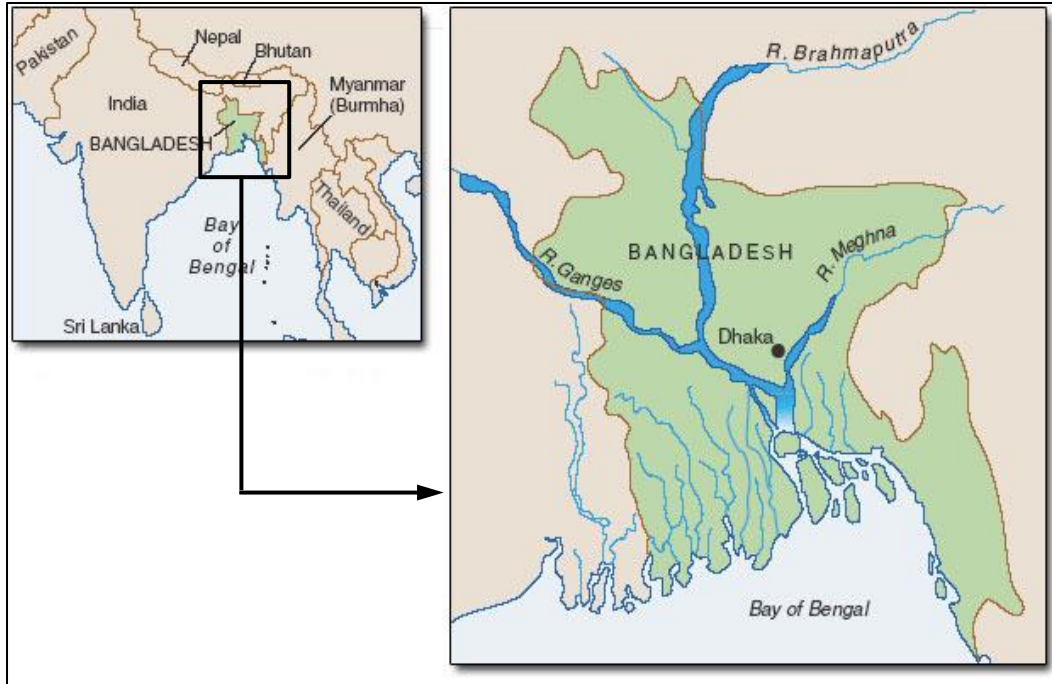


Figure 2: The three major river systems in Bangladesh

characterized by pronounced seasonal rises and falls in the river flow, by fluctuations in the number and position of major channels active during floods, by the formation and movement of large bed forms, and by widespread bank slumping.<sup>131</sup>

*The Meghna River System.* The third major river forming the overall Bangladeshi river network is the Meghna. This river is comparatively smaller in length than the other two rivers; it runs for some 930 kilometers (578 miles) through India and Bangladesh. The total drainage area of the Meghna is about 85,000 square kilometers, of which 49,000 square kilometers lie in India and 36,000 square kilometers in Bangladesh.<sup>132</sup> The headstream of the Meghna originates in the Indian state of Mizoram, where it is termed the Barak.<sup>133</sup> It later bifurcates into the Surma and

<sup>131</sup> James M. Coleman, "Brahmaputra River: Channel Processes and Sedimentation," *Sedimentary Geology* 3 (1969): 129-239, accessed March 7, 2017. DOI: 10.1016/0037-0738(69)90010-4.

<sup>132</sup> Rahman, Oliullah and Nur, *Water Sharing Discord*, 27 (2004).

<sup>133</sup> *Ibid.*, 26.

the Kushiara within the Indian state of Assam just before entering Bangladesh. After making their ways into Bangladesh, both rivers are fed by tributaries such as the Singla, the Langai, the Manu, and the Khowai.

After travelling well into Bangladesh, the Surma and the Kushiara reunite in the Kishoreganj district above Bhairab Bazar, where the river finally takes the name Meghna. From there, the Meghna flows southwest and joins the Padma (the combined flow of the Ganges-Padma and Brahmaputra) near the Chandpur district. The Meghna at that point becomes mightier in the sense that the massive combined river uses its name. By water volume the lower Meghna River starting from this point is one of the largest rivers in the world, including as it does the flows of the three great rivers: Ganges/Padma, Brahmaputra, and Meghna. Near Bhola, just before flowing into the Bay of Bengal, the river divides again into two main streams in the Ganges delta, creating and flowing around a major island. The western stream of the Meghna is called Ilsha; the eastern one is called Bamni.<sup>134</sup>

The Meghna River is predominantly a meandering channel, while in several reaches, especially where small tributaries contribute further sediment, braiding is evident with sand islands dividing the river into two or more channels.<sup>135</sup> It is commonly called the mighty Meghna for being around 12 kilometer wide at times near its estuary and for carrying about four times the run off of the Mississippi River.<sup>136</sup>

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<sup>134</sup> Sheikh Fazle Elahi, *Antorjatic Nodi Ain o Bangladesh-Bharat Panibirodh - International Law of Rivers and Bangladesh-India Conflict* (Dhaka, 2010), 18.

<sup>135</sup> "Ganges-Brahmaputra-Meghna River basin, Water Report 37 (2011)," Food and Agriculture Organization of the United Nations, accessed March 7, 2017, <http://www.fao.org/nr/water/aquastat/basins/gbm/index.stm>.

<sup>136</sup> Alam and Mozumder, *Tipaimukh*, 18.

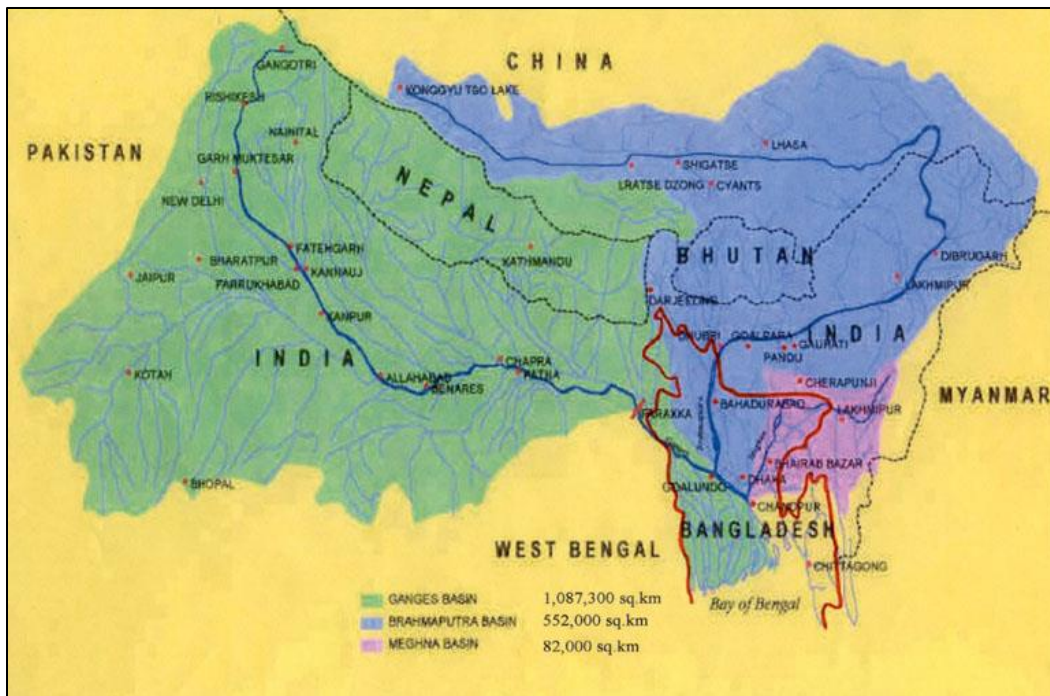


Figure 3: The Ganges-Brahmaputra-Meghna (GBM) Basin. Source: The Joint River Commission, Bangladesh

The Ganges-Brahmaputra-Meghna (GBM) basin as a whole. As explained, the Ganges-Brahmaputra-Meghna (GBM) river basin is one of the largest in the world with a total area of just over 1.7 million square kilometers.<sup>137</sup> The rivers are said to form a single basin system both for historical reasons and because of the ways their flows ultimately intertwine a few hundred kilometers upstream of the mouth of the Bay of Bengal. Still, each is quite sizeable and independently important and each displays unique physical attributes. Further each of the three has tributaries that are important by themselves, in social, economic, and political terms, as well as for water availability.<sup>138</sup>

<sup>137</sup> The total catchment area is distributed between India (64 percent), China (18 percent), Nepal (9 percent), Bangladesh (7 percent) and Bhutan (3 percent). In Eklavya Prasad Nandan Mukherjee, "Situation Analysis on Floods and Flood Management," *Ecosystems for Life: A Bangladesh-India Initiative*, IUCN, International Union for Conservation of Nature (2014): 124.

<sup>138</sup> Asit K. Biswas, "Management of Ganges-Brahmaputra-Meghna System: Way Forward," in *Management of Transboundary Rivers and Lakes*, eds. Olli Varis, Cecilia Tortajada and Asit K. Biswas (Berlin: Springer, 2008), 143-164, accessed March 7, 2017, <http://www.thirdworldcentre.org/wp-content/uploads/2015/04/gbmspringer.pdf>.

The GBM river system functions as the third largest freshwater outlet to the world's oceans; only the Amazon and the Congo have larger annual flows.<sup>139</sup> (The Brahmaputra alone provides 50% of the flow, twice the contribution of the Ganges/Padma.<sup>140</sup> ) Overall, the rivers during flood season carry nearly 6 million cubic feet per second (cusecs)<sup>141</sup> of water to the Bay of Bengal, in the process transporting approximately 13 million tons of suspended sediment per day. As noted, this sediment-laden water flow causes the rivers to be extremely unstable with channels that regularly migrate laterally. Within recent times the rivers have occupied and abandoned numerous river courses. The long-term patterns have been for the Ganges/Padma to migrate eastward and the Brahmaputra to shift westward, largely due to major faults or fractures in the earth's crust and plate tectonics.<sup>142</sup>

Viewed as a whole the GBM basin is one of the world's most dynamic and diversified in terms of climate, population, and cultural factors. For water managers the basin is particularly challenging given its wide variations in water flows, temporally and spatially. During the intense monsoon, excess water causes extensive flooding that disrupts normal life and economic activities, while the scarcity of water in the dry season restricts productivity and growth.<sup>143</sup> Climatic conditions range from cold and snowy in Bhutan to meso-thermal, micro-thermal, and tundra and taiga conditions in Nepal, to the humid and tropical monsoon-influenced climate of Bangladesh.<sup>144</sup> Again, the basin is characterized by low precipitation in the northwest of its upper region and high precipitation in the areas along the coast. High precipitation zones and dry

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<sup>139</sup> Salman and Uprety, *Hydro-politics in South Asia*. .

<sup>140</sup> *Max Planck Encyclopedia of International Law*, s.v. "Brahmaputra," Max Planck Institute for Comparative Public Law and International Law, accessed March 8, 2017, <http://opil.ouplaw.com/home/EPIL>.

<sup>141</sup> Cubic feet per second = 0.0283 cubic meters per second.

<sup>142</sup> Alam and Mozumder, *Tipaimukh*, 19.

<sup>143</sup> Rahman, Oliullah and Nur, *Water Sharing Discord*, 28.

<sup>144</sup> "Ganges-Brahmaputra-Meghna River Basin, Water Report 37 (2011)," Food and Agriculture Organization of the United Nations, accessed March 8, 2017, <http://www.fao.org/nr/water/aquastat/basins/gbm/index.stm>.

rain shadow areas are located in the Brahmaputra River basin, whereas the world's highest precipitation area is situated in the Meghna river basin.<sup>145</sup>

The basin harbors a total of 630 million people,<sup>146</sup> almost one tenth of the world population, with the majority living in rural areas and the major chunk of the population poor.<sup>147</sup> The population continues to increase steadily, and population density is very high in a large part of the basin.<sup>148</sup>

### Groundwater in Bangladesh

Along with utilizing surface fresh-water systems, Bangladesh also makes extensive use of its groundwater sources. River-borne sediment deposits have created fluvial-deltaic sediment layers throughout Bangladesh, many dating from the Pleistocene and Holocene ages.<sup>149</sup> They are laden

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<sup>145</sup> M.Q. Mirza et al., "Trends and persistence in precipitation in the Ganges, Brahmaputra and Meghna river basins," *Hydrological Sciences Journal* 43, Issue 6 (1998), accessed March 8, 2017, doi: 10.1080/02626669809492182.

<sup>146</sup> "Ganges-Brahmaputra-Meghna River Basin, Water Report 37 (2011)."

<sup>147</sup> In 2008, the total population in Bhutan, which is entirely located in the Brahmaputra river basin, was estimated at 687,000 inhabitants, of which 66 percent is rural. About 95 percent of the population lives in the southern subtropical zone or in the central mid-mountainous zone of Bhutan, mainly in the relatively gentle sloping areas of the river valleys. In Nepal, located entirely in the Ganges river basin, the total population was 28.8 million, of which almost 83 percent rural. The total population of Bangladesh is 160 million (73 percent rural) of which 122 million inhabitants live inside the GBM river basin. The total territory of India has a population estimated at 1 181 million inhabitants (71 percent live in rural areas), of which 476 million inhabitants live inside the GBM river basin (World Bank, 2010). In the total territory of China, the population is about 1 345 million, of which 57 percent are living in rural areas. However, only 1.7 million inhabitants are estimated to be living in the GBM river basin (World Bank, 2010), in "Ganges-Brahmaputra-Meghna River Basin, Water Report 37 (2011)."

<sup>148</sup> Population density in the basin area ranges from 6 and 18 inhabitants/km<sup>2</sup> in China and Bhutan respectively, to 195, 432 and 1013 inhabitants/km<sup>2</sup> in Nepal, India and Bangladesh respectively, in "Ganges-Brahmaputra-Meghna River Basin, Water Report 37 (2011)," 3.

<sup>149</sup> M. Shamsudduha and A. Uddin, "Quaternary Shoreline Shifting and Hydrogeologic Influence on the Distribution of Groundwater Arsenic in Aquifers of the Bengal Basin," *Journal of Asian Earth Sciences* 31, Issue 2 (2007):177–194, accessed March 8, 2017, <http://dx.doi.org/10.1016/j.jseae.2007.07.001>.

with water and operate as productive fresh water aquifers.<sup>150</sup> These aquifers occur both at relatively shallow depths beneath the broad alluvial floodplain, alluvial fan and deltaic deposits (5–20 meters below ground level (mbgl)), and also at comparatively deeper depths (15–45 mbgl) underlying the Madhupur clay and Barind clay deposits in Bangladesh<sup>151</sup>

These underground aquifers resemble the just-described surface-river systems in terms of their acute seasonality, particularly the shallow aquifers beneath the Ganges/Padma and Brahmaputra floodplains. These heavily used aquifers are recharged annually by river flows in this region. The extreme variation in these seasonal rivers flows—with 80% of the annual discharge occurring during the four-months of monsoon—translates into a similar seasonal variation in aquifer recharge rates.<sup>152</sup> This variation in recharges is heightened further because the surface-water shortage during the dry winter leads to increased water withdrawals for crop production. Higher surface-water uses reduce aquifer recharges, while the dry-season groundwater withdrawals directly lower groundwater levels. Thus, groundwater availability displays many of the same seasonal traits as surface water availability. As noted below, the low aquifer levels, particularly late in the dry season, cause further problems due to salinity intrusions and land subsidence.

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<sup>150</sup> Edward McBean, Andrew deJong, and Bahram Gharabaghi, “Groundwater in Bangladesh: Implications in a Climate-Changing World,” *Water Research and Management* 1, No. 3 (2011): 3-8, accessed March 8, 2017, [http://www.wrmjournal.com/index.php?option=com\\_content&view=article&id=98&Itemid=101](http://www.wrmjournal.com/index.php?option=com_content&view=article&id=98&Itemid=101).

<sup>151</sup> P. Ravenscroft et al., “Arsenic in Groundwater of the Bengal Basin, Bangladesh: Distribution, Field Relations, and Hydrogeological Setting,” *Hydrogeology Journal* 13 (2005): 727–751, doi: 10.1007/s10040-003-0314-0.

<sup>152</sup> McBean, deJong, and Gharabaghi, “Groundwater in Bangladesh,” 3-8.



## Water Use in Bangladesh

Water and life in Bangladesh are inextricably connected. Water and river corridors sustain the people in many ways. The rivers and other surface water bodies (haors, beels, lakes and ponds) all make major contributions to the agriculture and general economy of the country by providing navigation routes and sustaining fisheries and irrigation. Underground water sources, on their side, have been particularly pivotal in meeting drinking-water needs countrywide in addition to supporting irrigation. Groundwater use in particular has undergone dramatic expansion over the past four decades, mostly attributable to increased dry-season agricultural irrigation.<sup>153</sup>

The following are some of the principal ways that water and water resources have been extensively used in the country, along with some of the non-consumptive, in-stream flow services that the rivers provide.

*Irrigation.* Irrigation is the primary water use, accounting for most of the surface and underground water withdrawals in Bangladesh. In 2008, the total water withdrawal was an estimated 35.87 km<sup>3</sup>, of which 31.50 km<sup>3</sup> (88 percent) was for agriculture, 3.60 km<sup>3</sup> (10 percent) for municipalities, and 0.77 km<sup>3</sup> (2 percent) for industries.<sup>154</sup> Approximately 79 percent of the total water withdrawal comes from groundwater and 21 percent comes directly from surface-water sources.<sup>155</sup> In Bangladesh, about 94% of all irrigated land is under small-scale and

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<sup>153</sup> T. Shah et al., “Groundwater: A Global Assessment of Scale and Significance,” in *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*, ed. D. Molden (London, UK: Routledge, 2007), 395-419.

<sup>154</sup> “Irrigation in Southern and Eastern Asia in figures: AQUASTAT Survey – 2011,” Food and Agriculture Organization of the United Nations, accessed March 8, 2017, <http://www.fao.org/docrep/016/i2809e/i2809e.pdf>.

<sup>155</sup> Ibid.

traditional irrigation.<sup>156</sup> These extensive irrigation uses sustain an agriculture sector that contributes about 19.29% of the country's Gross Domestic Product (GDP) and employs 63% percent of the total manpower, directly and indirectly.<sup>157</sup>

Irrigation other than overflow irrigation—that is, other than irrigation that occurs when floodwaters overrun farm fields—began in earnest in Bangladesh between 1960 and 1970 with the construction of large-scale multipurpose irrigation, flood-control, and drainage projects. However, these relatively costly projects supplied water to only about 7 percent of the total irrigable area.<sup>158</sup> Though the country has abundant surface-water resources, particularly in the monsoon season, its flat deltaic topography and the instability of major rivers make large reservoirs, and thus gravity-based irrigation systems, technically difficult and costly. Without such surface-water storage facilities, irrigators can only use surface water by means of overflow irrigation or direct withdrawals of river water, both of which are, as explained, difficult or

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<sup>156</sup> This includes irrigation by age-old traditional water lifting pumps, as well as pumps operated by electric motors or engines. Bangladesh uses extensive uses of shallow tubewells, deep tubewells (for underground water sources), motorized pumps, low-lift pumps for the purpose of irrigation. The country also uses manual pumps including *Doan*, swing basket, BRRi diaphragm pump, rower pump, treadle pump, hand tubewell, and hand sprinkler. *Doan* is a manually operated boat-shaped wooden trough, closed at one end and open at the other. The closed end is tied with a rope to a long wooden pole which is pivoted as a lever on a post. A weight, a large piece of stone, or a ball of dried mud, is fixed to the shorter end of the lever. The open end is hinged to the discharge point. The trough is dipped into the water by applying the body weight and the force of the operator. Water is lifted by the counter weight on the beam and is emptied Irrigation by swing basket. Swing basket consists of a basket or shovel-like scoop to which four ropes are attached. Two persons stand facing each other and swing the basket to fill in water. BRRi diaphragm pump consists of two metal boxes sealed with some rubber sheet and made air tight, which creates a vacuum and lifts water. Rower pump consists of metal pipe with a piston inside. The mechanism is similar to the hand tubewell. It is fixed on the soil surface in inclined position. The operator uses his hands to lift water. It can be used to lift both surface and subsurface water if the water level does not exceed the suction limit. Banglapedia notes that water is being lifted in Bangladesh through 26,704 deep tubewells, 4,69,226 shallow tubewells, 56,829 low lift pumps, 1,42,132 manual pumps, and more than 5,65,000 indigenous water lifting devices, in *Banglapedia: National Encyclopedia of Bangladesh*, "Irrigation," accessed March 8, 2017, <http://en.banglapedia.org/index.php?title=Irrigation>.

<sup>157</sup> Source: DAE/AIS 2013, BBS 2006 & 2012. In T. F. Khan, M. W. Ullah and S. M. Imamul Huq, "Assessment of Vulnerability in Agricultural Sector in Disaster Prone Areas in Bangladesh," *Bangladesh J. Sci. Res.* 28, 2 (2015): 91-101.

<sup>158</sup> "FAO's Information System on Water and Agriculture: Bangladesh," Food and Agriculture Organization of the United Nations, accessed March 8, 2017, <http://www.fao.org/nr/water/espim/country/bangladesh/index.stm>.

practically impossible during the dry season owing to the limited availability of surface water. In combination these facts have led to massive increases in groundwater withdrawals.

Through the 1950s Bangladeshi farmers chiefly supplemented overflow irrigation only with traditional means using human and animal traction; i.e. the swing basket<sup>159</sup> and “doan.”<sup>160</sup>

Groundwater withdrawals for dry-season irrigation began during the 1960s to 1970s. Initial groundwater withdrawals for irrigation relied on deep (depth >80 mbgl) tube wells (DTW) installed by the Bangladesh Water Development Board (BWDB).<sup>161</sup> The country soon shifted instead to shallow tube wells (STW), following the identification by hydro-geologists of large quantities of groundwater at relatively shallow depths. Thousands of STWs were installed during the eighties. With a growing population and rising food needs, groundwater irrigation by these deep and shallow tube wells has expanded rapidly since then. As a result, the area irrigated by groundwater in Bangladesh has grown from 4% to 70% between 1972 and 1999.<sup>162</sup> Today, during the peak of the dry season from March to April, 63 percent of the country’s irrigation

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<sup>159</sup> Swing basket consists of a basket or shovel-like scoop to which four ropes are attached. Two persons stand facing each other and swing the basket to fill in water.

<sup>160</sup> “Doan” is a manually operated boat-shaped wooden trough, closed at one end and open at the other. The closed end is tied with a rope to a long wooden pole which is pivoted as a lever on a post. A weight, a large piece of stone, or a ball of dried mud, is fixed to the shorter end of the lever. The open end is hinged to the discharge point. The trough is dipped into the water by applying the body weight and the force of the operator. Water is lifted by the counter weight on the beam and is emptied Irrigation by swing basket.

<sup>161</sup> BADC Survey report on irrigation equipment and irrigated area in Boro 2003 season, Survey and monitoring project for development of minor irrigation, Bangladesh Agricultural Development Corporation, Sech Bhaban, Dhaka, 2003. In M. Shamsudduha et al., “Recent Trends in Groundwater Levels in a Highly Seasonal Hydrological System: the Ganges-Brahmaputra-Meghna Delta,” *Hydrology and Earth System Sciences* 13 (2009): 2373-2385, doi:10.5194/hess-13-2373-2009.

<sup>162</sup> M. Mainuddin, “Groundwater Irrigation in Bangladesh: 'Tool for Poverty Alleviation' or 'Cause of Mass Poisoning'?” (Proceedings of the Symposium on Intensive Use of Groundwater: Challenges and Opportunities, Valencia, Spain, 10-14 December, 2002).

comes from groundwater extraction by shallow tube wells.<sup>163</sup> Winter cultivation of the high-yielding Boro rice uses more irrigation water than any other agriculture practice or crop.<sup>164</sup>

*Navigation.* With some 700 rivers and tributaries crisscrossing the country, Bangladesh has one of the largest inland waterway networks in the world. The total length of its waterway is about 13,000 kilometers, of which 8,433 kilometers are navigable in the rainy season while about 4,800 kilometers are navigable in the dry season.<sup>165</sup> Inland water transport has always been an easier, more accessible and relatively cheaper means of transport in Bangladesh. Moreover, during widespread catastrophic events, such as the floods or cyclones that ravage Bangladesh quite frequently, water transportation often remains the only mode of communication throughout the affected zones.<sup>166</sup>

This river network of Bangladesh plays a vital role in national life as the most important transportation artery supporting the country's economy. The inland ports and landing *ghats* serve as feeder ports to the two seaports of Bangladesh. In addition to the cargo that moves from one inland port to another, inland ports handle about 40 percent of the country's total foreign trade.<sup>167</sup> Boats made in the country are the most widely used carriers on the rivers and waterways of Bangladesh. They transport passengers and merchandise on a large scale. Mechanized water transport is mainly operated by the Bangladesh Inland Water Transport Corporation (BIWTC),

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<sup>163</sup> "Bangladesh: "Invisible hazard" of groundwater depletion," IRIN Humanitarian News and Analysis, accessed March 8, 2017, <http://www.irinnews.org/feature/2011/12/13/%E2%80%9Cinvisible-hazard%E2%80%9D-groundwater-depletion>.

<sup>164</sup> Dry season irrigation provided by groundwater is used for 80 percent of Boro rice cultivation - also known as winter rice. In BADC Survey report on irrigation equipment, 2003. Also in "Invisible hazard," IRIN Humanitarian News and Analysis.

<sup>165</sup> *Banglapedia: National Encyclopedia of Bangladesh*, s.v. "Water Transport," accessed March 8, 2017, [http://en.banglapedia.org/index.php?title=Water\\_Transport](http://en.banglapedia.org/index.php?title=Water_Transport).

<sup>166</sup> *Ibid.*

<sup>167</sup> "Bangladesh Transport Sector," the World Bank, accessed March 8, 2017, <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/EXTSARREGTOPTRANSPOR T/0..contentMDK:20674801~menuPK:868784~pagePK:34004173~piPK:34003707~theSitePK:579598,00.html>.

which runs ferry and launch services along the main routes. Besides, there are also water transportation services run by private companies.<sup>168</sup>

Although waterways have faded in relative significance in recent years with the rapid infrastructural development of roads and highways, they remain vital transportation corridors, year-round in the case of traffic to and from the coastal districts and throughout the entire country during the monsoon season. The network connects almost all major cities, towns, and commercial centers and is expected to retain its significant role in national life and in the economy for the foreseeable future. Thus, keeping the rivers and waterways in navigable state has always been an important national goal.

*Fisheries.* The inland-water fisheries of Bangladesh are among the most productive in the world. Given its warm climate and vast surface water sources (including ponds dug specifically for fish cultivation), fishing is an integral part of the nation's economy and food culture. Bangladesh's total fish production totaled about 3 million metric tons (mt) in 2010 – 11, and average annual growth rate of fish production in the last three years is 6.11%.<sup>169</sup> Fish and fishery products are the country's third largest export commodity, contributing about 4.43% to national GDP and 2.73% to foreign exchange earnings in 2010 – 2011.<sup>170</sup>

Fisheries also play a major role in employment and as a source of nutrition. The fisheries sector employs an estimated 1.4 million commercial fishers.<sup>171</sup> Yet another 11 million people indirectly earn their livelihood by fishing or in fisheries-related employment. Most of these (an estimated

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<sup>168</sup> "Transportation," *Bangla2000*, accessed March 8, <http://www.bangla2000.com/Bangladesh/transportation.shtm>.

<sup>169</sup> "Department of Fisheries, Government of the People's Republic of Bangladesh," <http://www.fisheries.gov.bd/>.

<sup>170</sup> *Ibid.*

<sup>171</sup> M.S. Shah, "Human resource development activities in fisheries sector," in *Fish Fortnight Compendium 2003*, Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh. (Dhaka, Bangladesh, 2003), 57–59.

9.5 million people (73 percent)) are involved in subsistence fishing on the country's flood plains,<sup>172</sup> a number that increases to 11 million between June and October each year. There are 3.08 million fish farmers, 1.28 million inland fishermen, and 0.45 million collectors of fry (fish and shrimp). It is estimated that fisheries and related activities overall support more than 7 percent of the country's population.<sup>173</sup> In terms of nutrition, the sector provides almost 63 percent of the national animal protein consumption.<sup>174</sup>

*Drinking water.* Much of the nation's surface water is too polluted to drink without expensive and unavailable water treatment. This pollution has stimulated measures to provide the population with alternative drinking water sources that are safer and more accessible. That effort in recent decades has chiefly involved replacing surface water supplies with groundwater, and millions of shallow, hand-operated tube wells have been installed throughout the country to help achieve the goal. Today, underground sources currently meet most of the drinking water supplies in Bangladesh. In Dhaka city alone, for example, 97% of all water demands are met by underground water.<sup>175</sup> This reliance on groundwater has improved drinking-water quality, but it exacerbates groundwater withdrawals and thus the various environmental problems and vulnerabilities linked to such withdrawals.

These, then, are the principal ways that Bangladesh uses its freshwater resources to sustain its large population. Like other relatively flat parts of the globe, Bangladesh has not really been able

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<sup>172</sup> M.E. Azim, M.A. Wahab, and M.C.J. Verdegem, "Status of aquaculture and fisheries in Bangladesh," *World Aquaculture* (2002): 37–40, 67.

<sup>173</sup> "National Aquaculture Sector Overview: Bangladesh," Food and Agricultural Organization of the United Nations, accessed March 8, 2017, [http://www.fao.org/fishery/countrysector/naso\\_bangladesh/en](http://www.fao.org/fishery/countrysector/naso_bangladesh/en).

<sup>174</sup> Ibid.

<sup>175</sup> "Invisible hazard." *IRIN Humanitarian News and Analysis*.

to use its water resources for hydropower generation, despite its massive water flows. The country has so far constructed only one such hydropower project<sup>176</sup> and the potential for more is modest because of the overall flat terrain and the high population density. Population density is particularly restrictive given that reservoirs in flat regions necessarily take up much larger spaces and displace more people.

### Ecological Roles of Water Flows

In addition to meeting these direct human water needs, these freshwater bodies and underground water sources in Bangladesh also bestow extraordinary in-stream flow services and perform the crucial job of supporting the surrounding ecosystems on which the huge population depends.

*Sediment load, delta formation and preventing coastal erosion.* As we have seen, the GBM river system transports enormous amounts of sediment every year in a process that has been replenishing and extending the Bengal Delta for ages and continues today. This is what formed the Bengal Delta on which most of modern-day Bangladesh lies. It is also what nourished the soil's fertility and made it ideal for agriculture. Further, the deposition of sediments carried by these river systems helps extend the coastlines, thereby reducing coastal erosion and land-sinking that would otherwise take place.

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<sup>176</sup> Karnafuli Hydropower Station constructed in 1962 as part of the Karnafuli Multipurpose Project - on Karnafuli River, Bangladesh. In *Banglapedia: National Encyclopedia of Bangladesh*, "Karnafuli Hydropower Station," accessed March 8, 2017, [http://en.banglapedia.org/index.php?title=Karnafuli\\_Hydropower\\_Station](http://en.banglapedia.org/index.php?title=Karnafuli_Hydropower_Station).

*Pushing back salinity from freshwater.* An especially important function performed by the river flows in Bangladesh is their role in pushing back salinity from the Bay of Bengal. The combined flow of the major rivers, especially during the rainy season, keeps saltwater from moving inland, contaminating the waters for human use and harming aquatic animals and plants. This salinity-protection function is essential for multiple reasons and it explains, more than any other reason, why the river systems need to maintain minimum flows. Sufficient surface-water flows, as they recharge underground aquifers, also protect the coastal aquifers from saline water seepage below ground, a danger that, if realized on any significant scale, would be catastrophic. In the case of aquifers the saline-contamination danger is quite real: dry-season withdrawals already sometimes drop water tables below sea level, triggering widespread saltwater intrusion, the downward leakage of arsenic concentrations, and the general degradation of water resources.<sup>177</sup>

*Protecting aquatic diversity and surrounding ecosystems.* The freshwater systems in Bangladesh are crucial for maintaining ecological balance and for providing habitat for aquatic species. The country possesses a rich array of aquatic species and resources with ecosystems that are very diverse biologically. Ecological health, like direct human water uses, is threatened by saline water intrusion. The danger is most grave to the ecosystems and the biodiversity of the southern coastal regions of Bangladesh but could reach further much further inland if river flows are further diminished or if groundwater levels drop.<sup>178</sup> Bangladesh harbors the Sundarbans, the largest mangrove forest in the world and a UNESCO heritage site. A fine balance of fresh and salt water is required for the Sundarbans to remain healthy (in much the same way that a distinct

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<sup>177</sup> Anwar Zahid and Syed Reaz Uddin Ahmed, "Groundwater Resources Development in Bangladesh: Contribution to Irrigation for Food Security and Constraints to Sustainability," *IWMI Books, Reports, International Water Management Institute* (2006): 43, accessed March 8, 2017, <http://publications.iwmi.org/pdf/H039306.pdf>

<sup>178</sup> "Invisible hazard," *IRIN Humanitarian News and Analysis*.



balance is needed to maintain the crab fisheries in Chesapeake Bay). A minimum surface water flow is therefore essential to enable the surrounding environment to perform its own natural functions of preserving aquatic diversity. For many aquatic species, it is important also that this flow contain something close to historic sediment levels and stay within historic temperature ranges. Thus, historic natural flows with unaltered conditions as to sediments and temperature have helped the rivers in Bangladesh sustain their aquatic biodiversity and, in the process, their surrounding ecosystems.

*Flooding as a mixed phenomenon.* Bangladesh is well known for its ravaging annual floods that cause enormous loss of life and damage to crops and property. Flooding has always come as a mixed blessing for Bangladeshis. Flooding destroys crops and homesteads and brings vast economic losses, particularly when flood waters stay longer than usual. At the same time, this recurrent flooding created the entire Bengal delta with its rich alluvial deposits and incredible natural fertility. Embankments and levees are sometimes used to control flooding in specific places. Flood-control reservoirs, common elsewhere in the world, have not been feasible for the same reasons that frustrate hydropower generation: the flat terrain and the high population per unit of land area. Further, the major portions of the river basins—including the places where flood-control reservoirs might be constructed—are in upstream neighboring countries.<sup>179</sup>

Like all other water-development efforts, flood control and drainage (FCD) improvement projects severely disturb existing hydrological cycles, and changes in the flood regime would bring about adverse consequences, some predictable, others unexpected. Flood-protection embankments prevent the overbank spill of flood waters at high river stage, thereby reducing

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<sup>179</sup> M.H. Siddiqui, "Flood Control and Drainage Development: Physical Environmental Issues," in *Environmental Aspects of Surface Water Systems of Bangladesh*, eds. A Atiq Rahman, Saleemul Huq, and Gordon R Conway, (Dhaka: University Press Limited, 1990), 105.

overland flooding and floodplain sediment deposit.<sup>180</sup> Complete flood control thus would deprive the basin's soils of vital nutrients and would also affect the flora and fauna of floodplains.<sup>181</sup> Similar costs arise when flood protection takes the form of reservoirs that, in operation, trap the sediment carried by floodwaters, sediment needed not just for soil fertility but to avert land subsidence. Water-retention projects, like the flow reductions caused by upstream withdrawals, would also cause low flows at the river mouths thereby aggravating salt-water intrusion.

To sum up, Bangladesh makes extensive uses of both its surface and ground water sources for agricultural irrigation and for drinking water supply. The rivers and other surface freshwater bodies support fishing industries that provide the major source of protein to the people. Also, inland waters have always been used for navigation within the country. Beyond these vital functions, freshwater resources have long provided instream-flow and ecological services, including sedimentation transport and discharge, salinity control, and the protection of aquatic ecosystems. Unlike its other upstream basin counterparts, Bangladesh could never utilize its massive water flows for hydropower due to its geographic location and land terrain.

As seen above, water scarcity during the dry season has become an ever-increasing concern. Much of the concern relates to direct withdrawals within Bangladesh itself, from its rivers and aquifers. But the scarcity problem is importantly caused also by actions occurring in other States upstream. Upstream water diversions, particularly in the Bihar and West Bengal provinces in India and also Nepal, have had substantial effects. Moreover, the construction of the Farakka barrage (a diversion project) just above the Indian-Bangladeshi border has considerably

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<sup>180</sup> Siddiqui, "Flood Control and Drainage Development," 105.

<sup>181</sup> Rahman, Huq and Conway, "Environmental Aspects," Chapter 2, 14.

decreased the dry-season flow of the Ganges into Bangladesh, causing or exacerbating major environmental problems within the country.<sup>182</sup>

Irrigation, as noted, causes problems when water tables fall too low, thereby concentrating pollutants (in the case of surface waters) and reducing natural protections against salt-water intrusion. Beyond that, irrigation uses of water add further contaminants to the water and thus cause problems when irrigation water not used by the plants or lost to evaporation returns to the rivers. Irrigation return-flows are often more saline and contain agricultural contaminants such as fertilizers and pesticides. The same general pollution problem can arise in connection with industrial uses of water: discharges from industrial plants typically contain industrial effluent, often laced with heavy metals and organic pollutants. Where water is used as a coolant, the returned water may be of a much higher temperature than the stream itself.<sup>183</sup> In a word, even water uses that return water to a river, thereby sustaining the flow, often degrade rivers with contaminants.

### Managing Waters in the GBM Basin: Nature of the Conflicts

The water-related problems in the GBM basin resemble other typical discords between upstream and downstream riparian users. While South Asia has been endowed with abundant freshwater water resources, a lack of coordinated planning along with newly added political boundaries has compounded the region's water problems, problems that, as explained, are aggravated by wide

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<sup>182</sup> Rahman, Huq and Conway, "Environmental Aspects," Chapter 1, 10.

<sup>183</sup> *Ibid.*, Chapter 2, 12.

seasonal variations in rainfall. On individual water issues, the populous countries such as India, Bangladesh, and Nepal have often been unable to agree on their respective strategies and management plans.

In South Asia, arrangements in the form of regional agreements were initiated by the British when it exercised control over greater India. The British Government entered into agreements with various then-existing Indian states covering the construction and regulation of irrigation canals.<sup>184</sup> Since then, a number of bilateral agreements, treaties, or memoranda of understanding have been signed among the riparian countries. Those instruments include the 1920 Agreement between Nepal and India (then within the British empire) for constructing the Sarada Barrage on the Mahakali River; the 1954 Agreement between Nepal and India on the Kosi Project; the 1959 Agreement between Nepal and India on the Gandak Irrigation and Power Project; the 1977 Agreement between Bangladesh and India on sharing of the Ganges waters at Farakka and on augmenting its flows; the two Memoranda of Understanding in 1982 and 1985; the 1996 Treaty between Nepal and India concerning the integrated development of the Mahakali River; and the 1996 Treaty between Bangladesh and India on sharing of the Ganges waters at Farakka.<sup>185</sup>

This dissertation primarily concentrates on the case of Bangladesh; that is, on how Bangladesh, as the most downstream nation in the basin, has engaged with other riparian States regarding water issues. It does so by considering three instances of ongoing and looming conflicts over border-crossing watercourses. The three conflicts are: the dispute over the Farakka barrage

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<sup>184</sup> In 1875, an agreement between the British Government and the State of Jind was signed to regulate the supply of water for irrigation from the Western Jumna Canal. In 1893, the British Government and the Patiala State signed an agreement regarding the Sirsa branch of the Western Jumna Canal. In 1908, Great Britain and the Panna State signed an agreement respecting the Ken Canal (World Bank, 2010). In “Ganges-Brahmaputra-Meghna River Basin, Water Report 37 (2011) 12.

<sup>185</sup> Salman and Uprety, *Hydro-politics in South Asia*, 650.

(diversion dam) on the Ganges River between Bangladesh and India; India's proposed river interlinking project; and the emerging Yarlung Tsangpo River project, still in an early stage. In combination, the three projects cover the two largest rivers in the GBM basin (the Ganges and Brahmaputra (or the Yarlung Tsangpo River as it is called in China)); they illustrate the nature and type of water disputes and use-conflicts in the region; and they underscore the long-term need for basin-wide management.

*Dispute over the Ganges/Padma: the Farakka Barrage.* This longstanding dispute between Bangladesh and India concerns the construction and operation of a barrage across the Ganges River in Farakka, just 17 kilometers (11 miles) upstream of the border with Bangladesh. The purpose of the Farakka barrage was to divert water from the main stem of the Ganges into the south-flowing Bhagirathi-Hoogli River in order to maintain the flow of the Hoogli River, keeping the river navigable and the port at Kolkata accessible. Incidental purposes for the barrage were to combat salinity intrusion and to supply drinking water to Kolkata.<sup>186</sup> The barrage was to have a length of 7363 feet, and was designed to divert 40,000 cusecs of water from the Ganges to the Hooghly River.<sup>187</sup>

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<sup>186</sup> Rahman, Oliullah and Nur, *Water Sharing Discord*, 32.

<sup>187</sup> Deepa Karthykeyan, "Conflict and Co-operation on Trans-boundary Waters in South Asia," (Draft paper for presentation at Pondicherry University, p.12, Also in "The Ministry of Water Resources, River Development & Ganga Rejuvenation," Government of India, accessed March 8, 2017, <http://wrmin.nic.in/forms/list.aspx?lid=252>.

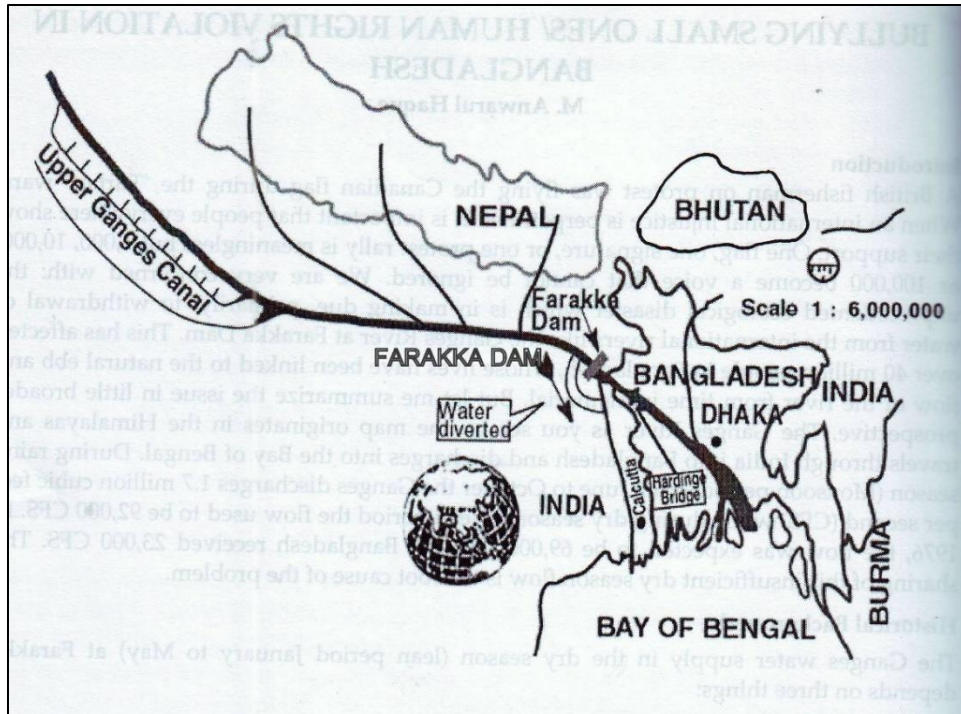


Figure 4: Farakka Project. Source: International Farakka Committee

As may well be perceived, such a diversion would materially diminish the flow of water entering Bangladesh, a prospect that quickly caused tension between the countries. India's intent to construct Farakka barrage first became evident in 1951 via newspaper reports. The reports prompted then-Pakistan (before the independence of Bangladesh in 1971) to object officially to the Indian plan as early as October 29, 1951. India replied that the project was still in conceptual framing and that Pakistan's concerns were "hypothetical."<sup>188</sup> Over the next decade, Pakistan (on behalf of present Bangladesh) made clear that the proposed barrage would significantly reduce its incoming water flows, seriously reducing water tables, curtailing irrigation options, and worsening salinity intrusions. As a conciliatory step, Pakistan proposed various co-operative measures governing the river systems to the east. It recommended that the two States together seek advisory and technical assistance from a UN body and that the project be examined jointly

<sup>188</sup> Aaron T. Wolf, Joshua T. Newton, "Case Study of Transboundary Dispute Resolution: the Ganges River controversy," 2007, accessed March 9, 2017, [http://www.transboundarywaters.orst.edu/research/case\\_studies/Documents/ganges.pdf](http://www.transboundarywaters.orst.edu/research/case_studies/Documents/ganges.pdf).

by experts of both countries. India responded unfavorably to these offers, with the exception of agreeing to “exchange data on projects of mutual interests.”<sup>189</sup> Expert-level meetings between the two countries eventually commenced on June 28, 1960. However, these meetings accomplished little success and construction of the barrage began in 1961. Pakistan then attempted several times to arrange a minister-level meeting, an offer repeatedly rebuffed by the Indian counterpart on the ground that such meetings should await the compilation of full data on the project.<sup>190</sup> Instead, India agreed to secretary-level meetings.<sup>191</sup> Throughout these meetings, Pakistan sought an agreement requiring the equitable sharing of the Ganges waters; it did not seek to halt the project entirely. On its side, India continued to insist that a comprehensive agreement was not possible until the data at hand were complete and accurate.<sup>192</sup> Construction of the Farakka barrage concluded in 1971 and testing began.

As Bangladesh gained independence from Pakistan, a change occurred in what Bangladesh interpreted as the indifference of India towards concerns about Farakka. The first evidence of change came in 1972 when the governments of newly independent Bangladesh and of India signed the Statute of the Indo-Bangladesh Joint Rivers Commission,<sup>193</sup> creating a body to oversee common river issues. Along with maintaining a liaison, the Commission was to work to harness the rivers common to both countries for their mutual benefit. Although the statute made no reference to the Farakka barrage or to other Ganges issues, it represented a move toward co-

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<sup>189</sup> Wolf and Newton, “The Ganges River controversy,” 3.

<sup>190</sup> Ibid.

<sup>191</sup> These meetings, at the level of secretary, commenced on December 9, 1968 and a total of five were held in alternating capitals through July 1970.

<sup>192</sup> Wolf and Newton, “The Ganges River controversy,” 4.

<sup>193</sup> *Banglapedia: National Encyclopedia of Bangladesh*, s.v. “Farakka Barrage,” accessed March 9, 2017, [http://en.banglapedia.org/index.php?title=Farakka\\_Barrage](http://en.banglapedia.org/index.php?title=Farakka_Barrage).

operation and showed an apparent openness to the joint management of rivers that the countries shared.

The Ganges/Padma typically fails during the dry season to supply sufficient water to meet basic needs. The governments of both countries endorsed this fact in a joint declaration on May 16, 1974, observing further that, during periods of minimum flow, augmentation of the river flow was needed to meet the basic requirements of the two countries. They agreed to assign the task of determining the optimum method of augmentation to the Joint Rivers Commission. They also resolved that an agreement between them was needed on how best to divide the river flow during the low-flow season before the Farakka project should begin full operation.<sup>194</sup> Five Commission meetings and one minister-level meeting were held between June 1974 and April 1975, at which the two sides put forth widely differing proposals for augmenting the Ganges flow. Bangladesh proposed the construction of storage facilities along the headwaters of the Ganges tributaries in Nepal, thereby drawing Nepal into the planning. India opted instead for diverting Brahmaputra water to the Ganges at Farakka by a link canal, a proposal involving a more radical reengineering of the basin system.<sup>195</sup> The two augmentation strategies faced challenges from their adversaries and no consensus emerged.

In the meantime, at a minister-level meeting in Dhaka between April 16 to 18 in 1975, India asked that, as an interim measure while discussions continued, a feeder canal at Farakka be run during the current period of low flow to learn more about the barrage's effects. The two sides agreed to a limited trial operation of the barrage, with discharges varying between 11,000 and 16,000 cusecs in ten-day periods from April 21 to May 31, 1975, with the remainder of the flow

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<sup>194</sup> Ibid.

<sup>195</sup> Wolf and Newton, "The Ganges River controversy."



guaranteed to reach Bangladesh. Once the trial period ended India continued to divert Ganges waters at Farakka throughout the 1975-76 dry season, at the full capacity of the diversion (40,000 cusecs out of a dry season average flow of 50,000 cusecs) without negotiating a new agreement with Bangladesh. With India thus unilaterally controlling the river flow the barrage and its operating methods became a significant source of conflict. Bangladesh charged that India diverted too much water during the dry season and released too much water during monsoon rains. For Bangladesh the consequences of the project were acute in terms of desiccation of tributaries, salinization along the coast, and setbacks to agriculture, fisheries, navigation, and industry.<sup>196</sup> Four more meetings between June 1975 and June 1976 yielded no results.

In January 1976, Bangladesh presented its concerns to the United Nations (UN). It sponsored a resolution calling on India to share more water and to consider the interests of Bangladesh when operating the Farakka barrage. The resolution failed to pass, but the UN General Assembly in a Statement of Consensus called on the parties to resolve the issue amicably. This ultimately led on November 5, 1977, to the Ganges Waters Agreement. The agreement included a formula to share the Ganges waters at Farakka, to govern for five years and thereafter based on mutual agreement. The Joint Rivers Commission was again charged to develop a long-term solution for augmenting the dry-season flows of the Ganges. Nevertheless, by the end of the five-year life of the agreement, no solution had been worked out.<sup>197</sup>

Upon the expiration of the agreement in 1982, Bangladesh and India failed to frame any workable agreement except for a Memorandum of Understanding, again on an interim basis. This Memorandum authorized temporary allocations of water for the 1983–1984 dry seasons.

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<sup>196</sup> Wolf and Newton, "The Ganges River controversy," 4.

<sup>197</sup> Ibid.

When this Memorandum also expired in 1984, India nonetheless continued operating the Farakka barrage. Another similar compromise was reached in 1985 with the signing of the Indo-Bangladesh Memorandum of Understanding, which addressed dam operations between 1986 and 1988 and established a Joint Committee of Experts to help resolve development issues.<sup>198</sup> Between 1988, when the last agreement lapsed, and 1996, no agreement was in place between India and Bangladesh. India granted Bangladesh only a portion of the flow of the Ganges, with no minimum flow guaranteed and no special provisions for drought years. Each side kept roughly to its positions as stated above, with little room for compromise. Finally in 1996, a new treaty was signed between the two riparians, based generally on the 1985 accord. It delineated a flow regime under varying conditions and had a term of 30 years.<sup>199</sup>

This Treaty between the Government of the People's Republic of Bangladesh and the Government of the Republic of India on Sharing of the Ganges Waters at Farakka, signed on 12 December, 1996, is basically a water-sharing treaty between the two countries. As the hefty name suggests, it formulates a recipe for allocating Ganges water during the lean season.<sup>200</sup> It did not include a plan for augmentation of the river flow, an issue on which the States remained far apart. The most notable change in the 1996 treaty from the 1977 agreement was its introduction of a new formula for the distribution of Ganges waters from January 1st to May 31st, the

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<sup>198</sup> Salman and Uprety, "Hydro-politics in South Asia, 295.

<sup>199</sup> Wolf and Newton, "The Ganges River controversy," 4.

<sup>200</sup> The lean season allocation scheme between the two countries looks like this: First of all, it guarantees Bangladesh a minimum of 35,000 cusecs in lean season. If the Ganga has more than 75,000 cusecs of water, India could divert 40,000 cusec into the Hoogly and allow the rest to flow to Bangladesh. And if the Ganga flow is between 75,000 and 70,000, Bangladesh could withdraw 35,000 cusecs and the rest could be withdrawn by India. If there is 70,000 cusec and less, then the water would be shared equally by the two sides. However, the supply regulation has to ensure that each side gets alternatively 35,000 cusec for 10 days at a stretch from March 1 to May 10, the driest period. In case of emergency situation, such as the flow at Farakka falling below 50,000 cusec, both sides are required to hold "immediate consultation. In the Treaty between the Government of the People's Republic of Bangladesh and the Government of the Republic of India on Sharing of the Ganga / Ganges Waters at Farakka, Bangladesh – India, 12 December, 1996.

region's dry season. If the treaty expires as scheduled on 2026 without a further understanding, the States could again enter a post-treaty period marked with uncertainty and insecurity.

It must be remembered that the Ganges treaty is all about water allocation and sharing during dry seasons. It addresses, that is, Bangladesh's immediate needs for dry season water and India's stated needs for water to sustain its port and irrigation. The treaty does not address directly the many ecological concerns caused or exacerbated by the barrage's significant alteration in the natural river flow. Further, the treaty does not deal with extreme events and how they are best accommodated, nor does it cover upstream activities in other States. Notably, Nepal, China, and Bhutan, not parties to the treaty, have their own development plans that could impact the agreement. Finally, the treaty does not contain an arbitration clause to ensure that the parties uphold its provisions<sup>201</sup> and otherwise lacks any enforcement mechanism except through diplomatic undertakings.

*India's River Interlinking Project.* Another major concern for Bangladesh in its water dealings with India has been India's envisioned river interlinking project, a massive project—the biggest conceived by India to date—that would connect 37 rivers in India through some 30 links and 36 dams<sup>202</sup> and feature massive diversions of water from the Ganges/Padma and the Brahmaputra.<sup>203</sup> Aside from its ambitious scope, the project is also noteworthy because it was,

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<sup>201</sup> Wolf and Newton, "The Ganges River controversy, 4.

<sup>202</sup> Rohan D'Souza, "Supply-Side Hydrology in India: The Last Gasp," *Economic and Political Weekly* 38,36 (2003): 3785, 3786, doi: 10.2307/4413994. Also Abhimanyu George Jain and Armin Rosencranz, "The Indian Supreme Court Promotes Interlinking of India's Rivers: Judicial Overreach?," *Environmental Law Reporter* 44, No. 5 (2014), accessed March 9, 2017, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2431762](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2431762).

<sup>203</sup> All interlinking schemes are aimed at transferring of water from one river system to another or by lifting across natural basins. The project will build 30 links and some 3000 storages to connect 37 Himalayan and Peninsular rivers to form a gigantic South Asian water grid. The canals, planned to be 50 to 100 meters wide and more than 6 meters deep, would facilitate navigation. The estimates of key project variables - still in the nature of back-of-the-envelope calculations - suggest it will cost around US \$123 billion (or Indian Rs 560,000 crores, at 2002 prices), handle 178 km of inter-basin water transfer/per year, build 12,500 km of canals, create 35 giga watt of hydropower capacity, add 35 million hectares to India's irrigated areas, and create an unknown volume of navigation and fishery

in effect, commanded by the Supreme Court of India in 2002 in response to a writ petition challenging the paradox of water abundance in certain parts of India and drought conditions in other parts.<sup>204</sup> India initially proposed to interlink the Ganges and the Cauvery in 1972 and to that end created the National Water Development Authority.<sup>205</sup> When implementation of this work mired for a number of reasons, the Supreme Court directed the government to move ahead and complete the project by 2016. It instructed the government to nationalize all rivers in the country, to take appropriate steps to interlink the rivers, and to formulate a scheme whereby water from the west flowing rivers could be channelized and equitably distributed.<sup>206</sup>

The idea of interlinking India's rivers was motivated by concerns about the disparate regional distribution of water and the juxtaposition of frequent floods in some places and droughts in others. The project would maximize the utilizable amount of water in water-rich regions without letting the water be "wasted." The entire river linking project primarily comprises two components, the Himalayan Component and the Peninsular Component. The Northern Himalayan Component would link fourteen Himalayan rivers in Northern India, including the Ganges and the Brahmaputra, by means of a series of storage dams in India, Nepal and Bhutan. The Brahmaputra and its tributaries would be linked with the Ganges, and new canals would transfer surplus water from the eastern tributaries of the Ganges to the west.

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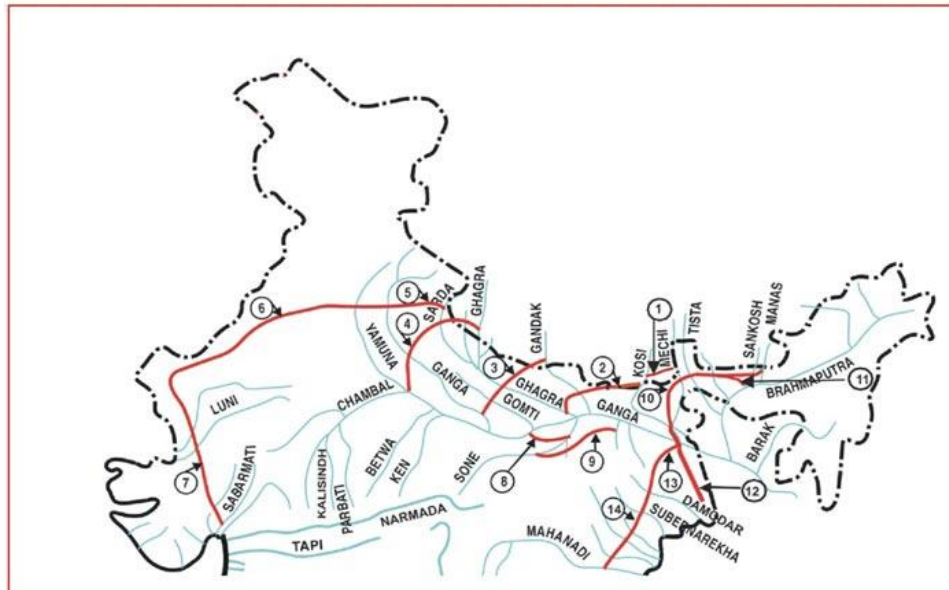
benefits. See, Dharmendra Mehta and Naveen K. Mehta, "Interlinking of Rivers in India: Issues & Challenges," *Geo-Eco-Marina* 19 (2013), doi: 10.5281/zenodo.56851.

<sup>204</sup> Writ petition of 512/ 2002, Supreme Court of India.

<sup>205</sup> Shobha Warner, "Persons Behind The Project: NRIs Keen on River Linking Project," Sustainable Development Networking Programme Bangladesh, Quoted in Shawkat Alam, "An Examination of the International Environmental Law Governing the Proposed Indian River-Linking Project and an Appraisal of Its Ecological and Socio-Economic Implications for Lower Riparian Countries," *Georgetown International Environmental Law Review* 19 (2007): 211.

<sup>206</sup> Re: Networking Of Rivers vs Unknown on 27 February, 2012, Supreme Court of India, Writ Petition (Civil) No. 512 of 2002; <http://indiankanoon.org/doc/41857247/>.

## PROPOSED INTER BASIN WATER TRANSFER LINKS HIMALAYAN COMPONENT



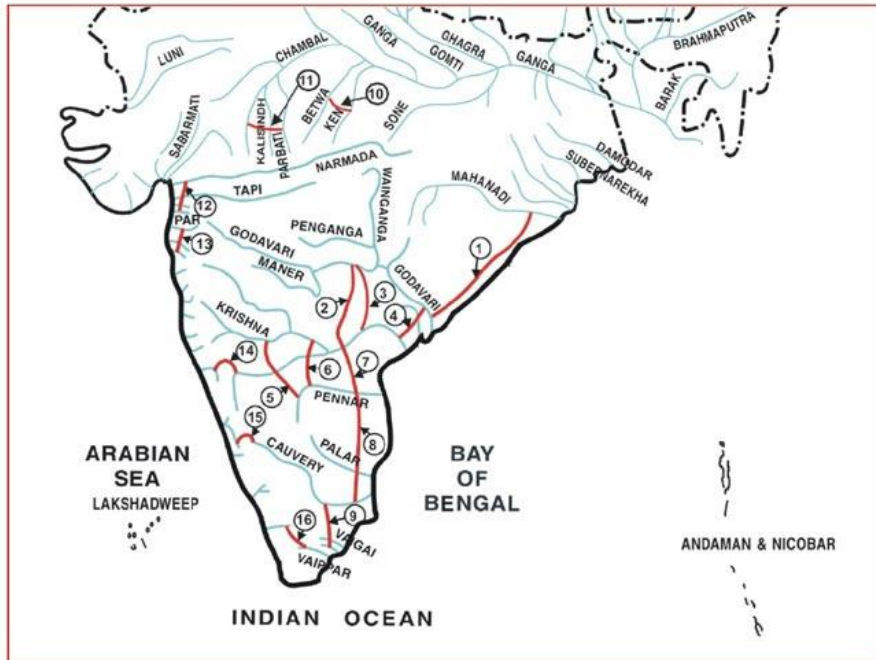
- |                          |  |
|--------------------------|--|
| 1. Kosi – Mechi          | 8. Chunar- Sone Barrage                      |
| 2. Kosi – Ghagra         | 9. Sone Dam – Southern Tributaries of Ganga  |
| 3. Gandak – Ganga        | 10. Manas –Sankosh - Tista - Ganga           |
| 4. Ghagra – Yamuna *     | 11. Jogighopa – Tista – Farakka (Alternate)  |
| 5. Sarda – Yamuna *      | 12. Farakka – Sunderbans                     |
| 6. Yamuna – Rajasthan    | 13. Ganga (Farakka) – Damodar – Subernarekha |
| 7. Rajasthan – Sabarmati | 14. Subernarekha – Mahanadi                  |
|                          | * FR Completed                               |

Figure 5: The Himalayan Component of the River Interlinking Project. Source: National Perspective Plan (NPP), National Water Development Agency, India

The Southern Peninsular Component features four major parts: the interlinking of Mahanadi-Godavari-Krishna-Cauvery Rivers and construction of storage basins at potential sites in these basins; the interlinking of west-flowing rivers, north of Bombay and south of Tapi; the interlinking of Ken-Chambal; and finally the diversion of other west-flowing rivers.<sup>207</sup>

<sup>207</sup> “National Water Development Agency, India, National Perspective Plan (NPP),” accessed March 9, 2017, <http://nwda.gov.in/searchdetail.asp?lid=108&skey=interlinking&langid=1>.

## PROPOSED INTER BASIN WATER TRANSFER LINKS PENINSULAR COMPONENT



- |  |   |
|--|---|
| 1. Mahanadi (Manibhadra) – Godavari (Dowlaiswaram) *   | 9. Cauvery (Kattalai) – Vaigai – Gundar * |
| 2. Godavari (Inchampalli) – Krishna (Nagarjunasagar) * | 10. Ken – Betwa *                         |
| 3. Godavari (Inchampalli) – Krishna (Pulichintala) *   | 11. Parbati – Kalisindh – Chambal *       |
| 4. Godavari (Polavaram) – Krishna (Vijayawada) *       | 12. Par – Tapi – Narmada *                |
| 5. Krishna (Almatti) – Pennar *                        | 13. Damanganga – Pinjal *                 |
| 6. Krishna (Srisailem) – Pennar *                      | 14. Bedti – Varda                         |
| 7. Krishna (Nagarjunasagar) – Pennar (Somasila) *      | 15. Netravati – Hemavati                  |
| 8. Pennar (Somasila) – Palar- Cauvery (Grand Anicut) * | 16. Pamba – Achankovil – Vaippar *        |
|  | * FR Completed                            |

*Figure 6: The Peninsular Component of the River Interlinking Project. Source: National Perspective Plan (NPP), National Water Development Agency, India*

Once implemented, this project is expected to support the irrigation of 35 million hectares (Mha) and power generation of 34 million kilowatts (KW). According to proponents it would also provide indirect benefits in the form of flood control, enhanced navigation, water supply, expanded fisheries, pollution control, recreation facilities, and additional employment.<sup>208</sup> The estimated initial cost was calculated at \$120 billion, a number that has risen due to delays and

<sup>208</sup> Re: Networking Of Rivers.

technical issues. Proponents have responded to concerns about cost overruns by contending that the costs remain negligible compared to the project's expected benefits.<sup>209</sup>

*Environmental and social impacts in Bangladesh from River Interlinking Project.* All of the engineering works and water routes of the river interlinking project would be located within India. The project, however, would effectively cut Bangladesh's share of water from both the Brahmaputra and the Ganges. Under the current proposal, India plans to divert 173 billion cubic meters of water per year from the Brahmaputra, amounting to 193,703 cubic feet per second.<sup>210</sup> This rate of diversion is greater than the total flow volume in the Brahmaputra River during the dry season.<sup>211</sup> Such a drastic reduction of flow could prove catastrophic for Bangladesh as a downstream country, economically, socially, and ecologically. The Brahmaputra provides the bulk of the country's total water supply—about 75% of the total available flow during the dry season—and performs the critical function of pushing back salinity.<sup>212</sup> Overall, the project would reduce the available Ganges flow in an amount roughly equal to the adverse impacts already caused by the Farakka barrage, lessening water flows in many parts of the State.<sup>213</sup>

The consequences of this project for Bangladesh would extend well beyond the loss of water for uses within Bangladesh. The proposed dams in the Himalayas would trap a significant portion of the river's sediment load and deliver clearer water to the lower delta leading to the various problems mentioned above related to soil fertility, land subsidence, and mangrove forest loss.<sup>214</sup>

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<sup>209</sup> Ibid.

<sup>210</sup> Shawkat Alam, "An Examination of the International Environmental Law Governing the Proposed Indian River-Linking Project and an Appraisal of Its Ecological and Socio-Economic Implications for Lower Riparian Countries," *Georgetown International Environmental Law Review* 19 (2007).

<sup>211</sup> Ibid.

<sup>212</sup> Member, Joint River Commission, Bangladesh in discussion with the candidate in November 2013.

<sup>213</sup> Alam, "An Examination," 212.

<sup>214</sup> Imran Ali, "Interlinking of Indian Rivers," *Current Sci.* 86 (2004): 498 – 499.

The delta regions comprising both Bangladesh and West Bengal in India would undergo erosion and submergence due to lack of sufficient fresh water and sediment supply.<sup>215</sup>

Continuous and consistent flows in the rivers are fundamental for the protection, restoration, and preservation of the aquatic environment and biodiversity. As noted, altered-flow patterns in the Brahmaputra and the Ganges would change the temperature, silt-load and other biological components of water, thereby threatening aquatic ecosystems. More particularly, already endangered aquatic species and even species now thriving in the coastal zone habitat will be vulnerable to these physical changes.<sup>216</sup> Estuarine ecosystems are sources of rich fishery resources and also serve as the critical habitat for migratory fishes and other organisms.<sup>217</sup> The proposed diversions and damming of the Ganges and the Brahmaputra would seriously affect the aquatic health of these ecosystems considered as biotic wholes.<sup>218</sup> To take an example, according to Bangladeshi forest officials, about seventeen percent of the total Sundari trees of the Sundarbans have already succumbed to the top-dying syndrome due to increased salinity, a problem that the river interlinking project would exacerbate.<sup>219</sup>

With its natural capacity to flow even during dry season, the Brahmaputra plays the pivotal role in preventing saline-water inflow. The continuation of this flow is particularly critical given the appreciably diminished dry-season flow of the Ganges due to the Farakka barrage. The expected drop in the Brahmaputra flow, together with declines in the Ganges flow, would significantly

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<sup>215</sup> Narendra Kumar Sahoo et al., "Sustainability Issues of River Linking," (Conference proceedings of the national specialty conference on river hydraulics, at M. M. University, Ambala, Haryana, India, 29-30 October 2009, 150).

<sup>216</sup> "National Water Policy: Bangladesh," Ministry of Water Resources, in Alam, "An Examination."

<sup>217</sup> Sahoo et al., "Sustainability Issues," 150.

<sup>218</sup> Ibid.

<sup>219</sup> Alam, "An Examination," 209.



worsen salinity intrusion into the Lower Meghna and throughout the south-central and north-central regions<sup>220</sup> with catastrophic impacts on agriculture and fisheries.<sup>221</sup>

Beyond its effects on surface-water bodies and flows in Bangladesh, the river interlinking project would also significantly affect the State's groundwater systems. Decreases in the surface-water flow will substantially interrupt recharge of the underground aquifers. As we have seen, the lack of recharge in those aquifers during dry season is already a concern. An additional reduction of water in the wet season would contribute further to a gradual lowering of the underground water table. This would allow more saline waters to infiltrate the coastal-region aquifers, rendering water sources undrinkable and threatening public health.<sup>222</sup>

Although one of the stated objectives of the river interlinking is to reduce flooding of the Brahmaputra during the wet season, many studies conclude that the project might well bring minimal gains given that most of the reservoirs will be placed in acute-flood areas. Other evidence suggests that the overall dams might simply spread the flooding around, into areas not typically flooded.<sup>223</sup> Further and as noted, effective flood control often creates ecological problems by disrupting natural silt deposition. Finally and most evidently, the project would worsen water shortages in Bangladesh during the dry season and accelerate the frequency of drought-like conditions.<sup>224</sup> In the process, the project would intensify river-bank erosion and lead to extensive sand-bar formation, disrupting navigation as well as fisheries.<sup>225</sup>

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<sup>220</sup> Alam, "An Examination," 209.

<sup>221</sup> Inam Ahmed & Aasha Mehreen Amin, "Bangladesh Waiting for a Miracle," 1996, accessed February 18, 2014, [http://www.sdnpsd.org/river\\_basin/bangladesh/bangladesh\\_waiting\\_for\\_miracle.htm](http://www.sdnpsd.org/river_basin/bangladesh/bangladesh_waiting_for_miracle.htm).

In Alam, "An Examination."

<sup>222</sup> Alam, "An Examination," 212.

<sup>223</sup> Ibid.

<sup>224</sup> Jahir Uddin Chowdhury (Professor, Bangladesh University of Engineering and Technology), in an interview by NIRAPAD, January, 2004, in Alam, "An Examination."

<sup>225</sup> Ibid.

India's river interlinking project has been controversial within India itself as well as internationally. The project has been continuously critiqued, by scholars, engineers, and social and environmental activists and within civil society generally.<sup>226</sup> In addition to issues of cost and feasibility, critics have expressed worries about the ecological impacts of such a massive project. In May 2003, the Government of India's Ministry of Environment and Forests raised 23 environmental concerns about the scheme.<sup>227</sup> Many independent researchers and environmental and social activists have pointed particularly to the seismic hazards, especially in the Himalayan Component;<sup>228</sup> while many others worry about the transfer of river pollution that accompanies inter-basin water transfers and about losses of forests and biodiversity due variously to submergence and losses of water.<sup>229</sup> Many states within India that would be affected by the project have raised similar environmental concerns.<sup>230</sup> Water-rich states, perhaps predictably, have been most prone to resist the project, displaying a reluctance to share their water with drier, more drought-prone states.<sup>231</sup>

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<sup>226</sup> Tushaar Shah, Upali Amrasinghe and Peter McCormick, "India's River Linking Project: The State of the Debate," (Paper in the National Workshop on National River Linking Project of India: Analysis of Hydrological, Social and Ecological Issues, Delhi, India, 9-10 October 2007).

<sup>227</sup> Ibid.

<sup>228</sup> Jayanta Bandyopadhyay and Shama Perveen, "The Interlinking of Indian Rivers: Some Questions on the Scientific, Economic and Environmental Dimensions of the Proposal," (Occasional Paper No 60, SOAS Water Issues Study Group School of Oriental and African Studies/King's College London University of London, June 2003, Paper presented at Seminar on Interlinking Indian Rivers: Bane or Boon? at IISWBM, Kolkata 17 June 2003), accessed March 9, 2017, <https://www.soas.ac.uk/water/publications/papers/file38403.pdf>.

<sup>229</sup> Mayank Aggarwal, "Will first river-interlinking project washout Panna reserve?," *DNA Daily News and Analysis*, Sunday, 24 August 2014, accessed March 9, 2017, <http://www.dnaindia.com/india/report-will-first-river-interlinking-project-washout-panna-reserve-2013144>.

<sup>230</sup> Re: Networking of Rivers, Writ Petition (Civil) No. 512 OF 2002.

<sup>231</sup> Some other states like the States of Karnataka, Bihar, Punjab, Assam and Sikkim have given their approval to the concept in-principle, but with definite reservations, i.e., arguing that the matters with regard to the environmental and financial implications, socio-economic and international aspects, such as inter-basin water transfer, need to be properly examined at the appropriate levels of the Government. Assumedly, the states fully supporting the interlinking are the recipient water deficit states like the States of Rajasthan, Gujarat, and Tamil Nadu who need water the most.<sup>231</sup> In Re: Networking of Rivers, Writ Petition (Civil) No. 512 OF 2002.

As noted, the Supreme Court of India has pushed the Government to move ahead with the inter-linking project, in part on grounds of social equity within India but also on the mistaken belief that the water diverted by the project would otherwise go to waste. Bandyopadhyaya and Praveen (2003) have countered this assumption, noting that, “from a holistic perspective, one does not see any 'surplus' water, because every drop performs some ecological service all the time. The ecosystems evolve by making optimal use of all the water available. If a decision is taken to move some amount of water away from a basin, a proportional damage will be done to the ecosystem, depending on the service provided by that amount of water. Thus, no amount of water in a river basin can be taken out without causing some damage to the ecosystem services. In other words, there is no 'free' 'surplus' water in a basin that can be taken away without a price.”<sup>232</sup> The water flowing into the sea is not wasted; it is a crucial link in the water cycle. When the link is broken, the ecological balance of land and oceans, fresh water and sea water, also gets disrupted.<sup>233</sup> Dismayed by the overall project’s delay the Supreme Court pushed the government yet again on February 27, 2012, setting a date for project completion and appointing a high-powered committee to oversee planning and implementation.<sup>234</sup> It issued a writ of mandamus to the Central and the state Governments concerned to comply with its directions effectively and expeditiously.<sup>235</sup>

*Taking neighboring States’ interests into account.* In its actions the Supreme Court in India was not heedless to international repercussions. It took notice of them by saying that implementation of the project should preferably occur with the consent of neighboring countries.<sup>236</sup> But in doing

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<sup>232</sup> Bandyopadhyay and Perveen, “The Interlinking of Indian Rivers.” 9.

<sup>233</sup> Shah, Amrasinghe and McCornick, “The State of the Debate.”

<sup>234</sup> Re: Networking of Rivers, Writ Petition (Civil) No. 512 OF 2002.

<sup>235</sup> Ibid.

<sup>236</sup> Re: Networking of Rivers, Writ Petition (Civil) No. 512 OF 2002.

so, the court referred only to Nepal, an upstream State that included the sources of some of the affected rivers. In the court's estimation, the project would bestow benefits to Nepal and in some manner uplift India's international role.<sup>237</sup> The court made no reference to Bangladesh and the project's effects on it. According to observers, even Nepal's interests have not been adequately addressed in the project design.<sup>238</sup> So far India has not agreed to speak with Bangladesh on the matter, nor provided official notification about it despite objections and protests raised by Bangladesh from the beginning.<sup>239</sup>

*The next water dispute: The Yarlung Tsangpo River Projects by China.* Yet another major dispute is arising in one of the natural water towers of the world, the Tibetan Plateau, source of no fewer than six major Asian rivers: the Indus, the Ganges, the Brahmaputra, the Salween, the Mekong, and the Yangtze.<sup>240</sup>

The Tibetan Plateau and the Himalayas accumulate water in the form of ice and glaciers, which as it melts seasonally forms or contributes to the various rivers. The region is particularly significant because both of the nearby growing powers, China and India, are looking to it for water to meet growing needs. Both countries, along with Bangladesh and seven other Asian nations (accounting together for about 47 per cent of the world's people), already depend heavily on water flows from this Plateau.<sup>241</sup> Experts warn that, due to global warming, the Himalayan glaciers are shrinking at twice the rate of other glaciers worldwide. This reality, combined with increasing water consumption, desertification, rapid industrialization and pollution, mean that

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<sup>237</sup> Ibid.

<sup>238</sup> Sahoo et al., "Sustainability Issues of River Linking, Conference," 151.

<sup>239</sup> Ibid.

<sup>240</sup> Kimberley Layton, "Tibetan Waters: Coming Conflict?" Institute of Peace and Conflict Studies, accessed March 9, 2017, <http://www.ipcs.org/article/india/Tibetan-waters-coming-conflict-2923.html>.

<sup>241</sup> Ibid.

demand for the pristine and previously plentiful water of the Tibetan Plateau is increasing.

Aware of the problem, China and India have taken steps to grab larger shares of it.

Against this backdrop, even more disputes are likely to swirl around the Brahmaputra River. The river, again, originates in the Tibetan plateau and passes through China, India and Bangladesh.

Although not traversed by the river, Bhutan is entirely within its catchment basin and contributes water to it through four tributaries. The river is known as Yarlung Tsangpo River in China, as the Psangpo River in Tibet, and as Brahmaputra in both Bangladesh and India.

Until recently this great Himalayan River has been among the least engineered, largely due to its route: it flows directly eastward along the Himalayas through the Tibetan plateau before taking a sharp turn to enter India, cutting through largely impassable mountain terrain. In India, the river travels a relatively narrower stretch of the Arunachal Pradesh before making its way into Bangladesh. The remoteness of this area and the significant fall of the river have discouraged countries from attempting to control it. Only recently have India and China focused on this river, recognizing its suitability for large reservoirs to store monsoon runoff, regulate floods, augment dry-season flows, and produce hydroelectricity.<sup>242</sup>

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<sup>242</sup> Kunda Dixit, "A New Himalayan Game," *the Fletcher Forum of World Affairs* 34, No 1 (2010) 125.



Figure 7: The GBM Drainage Basin Area

As seen earlier, India is moving ahead with its plan to divert Brahmaputra River water through its river interlinking project. On its side, China has also initiated large-scale plans. Currently, Chinese engineers are working on a series of hydropower projects. According to several media reports (unconfirmed by China) some twenty eight dams are either planned or under construction along the Yarlung Tsangpo/Brahmaputra river.<sup>243</sup>

Apparently the most ambitious of these Chinese projects is one proposed on the Great Bend of the Brahmaputra River, close to the Indian border. From here the river enters India and meanders to reach Bangladesh. China seeks to use the river's 8,000-foot elevation drop in the Great Bend to generate electricity. This proposed mega-hydro project of about 38-49 GW would entail almost twice the generating capacity of the Three Gorges Dam, now the world's largest hydropower plant.<sup>244</sup> For the lower riparian States—India and Bangladesh—the hydropower

<sup>243</sup> Y. C. Dhardhwa, "China's Controversial Plans for Dam on Yarlung Tsangpo in Tibet," *The Tibet Post International*, 25 May, 2010, accessed March 9, 2017, <http://www.thetibetpost.com/en/features/environment-and-health/898-chinas-controversial-plans-for-dam-on-yarlung-tsangpo-in-tibet>.

<sup>244</sup> Ibid.

aspects of the project are less worrisome than China's intent to divert water from this area as part of the South-to-North Diversion Scheme. The Chinese Ministry of Water Resources' 2005 report envisions three man-made rivers, channeling water from the Tibetan Plateau to China's arid north.<sup>245</sup> Of the three, it is the planned Yarlung Tsangpo diversion that is the most controversial and technologically challenging.<sup>246</sup> The scheme would supply water to relieve the stressed Yellow River basin in northern China, supporting irrigation, farming and domestic needs.<sup>247</sup>

For Bangladesh, these Chinese plans are especially troubling given that China's water diversions would add to those planned by India. Individually the projects would likely have grave effects. In combination the consequences would be even more severe.<sup>248</sup> As noted, the country receives most of its surface water from the Brahmaputra during dry season.<sup>249</sup> A sharp fall in the dry-season water flow of the Brahmaputra due to these projects could devastate Bangladesh in its agriculture, fishing, and ecology with particular harm coming from the reductions in needed sediment deposition and due to increased salinity.

Although China has yet to officially disclose the full scale of the project, the country has, on different occasions, described the proposed Tsangpo projects as run-of-the river (ROR) type projects in which water is diverted away from the river to generate electricity and then reunited with the river. The dams would allegedly help alleviate flood problems and erosion in downstream India and Bangladesh, thereby aiding them. But the mountain water in these projects – mostly from snow melt – is not the water that causes flooding; that water comes from the

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<sup>245</sup> Layton, "Tibetan Waters."

<sup>246</sup> Ibid.

<sup>247</sup> A. Dan Tarlock, "Changing Currents: Perspectives on the State of Water Law and Policy in the 21st Century: Four Challenges for International Water Law," *Tulane Environmental Law Journal* 23 (2010): 369.

<sup>248</sup> Layton, "Tibetan Waters."

<sup>249</sup> Member, interview.

monsoon rains on the southern side of the Himalayas. Given the locations of China's planned hydropower projects, it might (Bangladesh fears) hold water during the dry season, using it for power generation or irrigation, and freely release water during the rainy season with damaging consequences for the lower-riparian countries

A further serious threat related to China's vision comes from the seismic activities linked to the geophysical mountain-building processes at work in this region. The Great Bend area has high seismic activity due to its proximity to the geological fault line where the Indian Plate collides with the Eurasian Plate. Ruptures of dams due to seismic activity could be disastrous for the Tibetan region of China as well as for downstream India and Bangladesh.

These three major development programs—the Farakka barrage, the Indian river interlinking project, and China's plans for the Yarlung Tsangpo (Brahmaputra) River—put in stark form the vulnerabilities of Bangladesh. The challenges facing that nation are unique in detail, but in important ways resemble challenges facing other high-risk nations located at the mouths of major international watercourses.

Chapter 4 continues the study of Bangladesh by examining further the legal responses the various basin countries have employed in order to resolve contentions and meet their reciprocal interests. It assesses how well these legal responses have addressed the underlying concerns, paying particular attention to the ecological ones.



## **Chapter 4: Bangladesh and Current Law in the Region**

This chapter builds upon the previous one by looking more closely at the experience of Bangladesh in using diplomacy and other legal means to protect itself against the adverse effects of watercourse modifications by upstream States. Over the decades the nation (and Pakistan, before the independence of Bangladesh) has entered into various arrangements and understandings with India concerning the Ganges/Padma River. Apart from India, as noted in the last chapter, no substantive agreements of significance exist between Bangladesh and other States in the region. Nepal has expressed interest on several occasions in becoming involved in tripartite treaty negotiations but has not yet done so; so far, the two States have only set up a Joint Commission of Experts to examine their water relations. India, in contrast, has at least three major treaties with Nepal. As explained, all existing agreements in the GBM basin concern water allocation and none of them, except the Mahakali treaty of 1996, addresses environmental conservation or the protection of minimum flows. These agreements are all bilateral ones, with no other co-basin States involved. Neither Bangladesh nor India has any treaty with China, although Memoranda of Understanding do cover the sharing of flood-season hydrological data.

This chapter reviews these various arrangements, including ones to which Bangladesh is not a party, noting more carefully their terms and consequences and assessing their effectiveness from the point of view of Bangladesh. It concludes with observations about the limitations on current diplomatic efforts and the challenges under current international law of achieving

basin-wide management plans fair to all States. By doing so it sets the stage for considering, in the next chapter, watercourse law set at the international level.

### Bangladesh – India

As reviewed in the last chapter, Bangladesh is a downstream riparian neighbor of India in the Ganges-Brahmaputra-Meghna river basin, and shares 54 transboundary rivers with India.

Following Bangladesh's independence in 1971 a good neighborly relation began between the countries, leading in time to the adoption of the Statute of the Indo-Bangladesh Joint River Commission.<sup>250</sup> The statute created the Indo-Bangladesh Joint River Commission, which was charged with maintaining a liaison between Bangladesh and India on questions relating to their common rivers. Although the statute was signed at a time when Bangladesh inherited the Farakka dispute from then Pakistan, it did not make explicit reference to the existing Farakka barrage. Predictably enough, the Farakka issue soon emerged on the ground and led to the 1977 Ganges agreement as a temporary solution. Upon the termination of that treaty five years later, two more Memorandums of Understanding (MoUs) came into being. They too lapsed according to their terms, leaving the Farakka barrage unregulated. Following a series of ups and downs in the countries' water relations over the ensuing two decades, disagreements on the Ganges water at Farakka were finally settled by a treaty in 1996, written to last for thirty years.

It is noteworthy that, with the exception of the Statute of the Indo-Bangladesh Joint River Commission, these various agreements have all dealt with the Ganges River, especially with the contentious Farakka issue. Bangladesh has no diplomatic or regulatory arrangement with

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<sup>250</sup> Statute of the Indo-Bangladesh Joint River Commission Dhaka, Bangladesh – India, 24 November, 1972, accessed March 9, 2017, <http://jrcb.gov.bd/new/index.php/9-link-page/2-statute>.

India relating to the Brahmaputra River, despite its major concerns—reviewed in the last chapter—about India’s river interlinking project. As explained below the two countries did initiate diplomatic efforts to regulate dry-season water allocation of a second river, the Teesta, but the diplomacy has yet to yield results.

*Statute of the Indo-Bangladesh Joint River Commission, 1972.* The Indo-Bangladesh Joint River Commission was established on a permanent basis pursuant to a joint declaration of the Prime Ministers of Bangladesh and of India on March 19, 1972. The declaration was soon followed by a statutory charter, signed on November 24, 1972, which assigned to the Joint River Commission (hereinafter JRC) the task of promoting joint efforts to maximize benefits from the common river systems.<sup>251</sup> The JRC was specifically charged, as an intermediary between the States, to generate ideas, programs, proposals and projects to promote the overall goal of cooperative river managements. Article 4 of the statute enumerates five overlapping functions of the JRC, including repeated references to flood control and flood forecasting.<sup>252</sup> Both article 4(i)(a) and article 4(i)(d) reinforce the objective of managing the common rivers to maximize *benefits* for the two countries and their people.

Bangladeshis had high hopes that the JRC would make progress on contentious river issues, given its role as the only institutional forum for addressing the issues. Results, however, have been meager. The JRC has made significant progress only toward its goal of accurate and timely

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<sup>251</sup> “Joint River Commission Bangladesh,” Ministry of Water Resources, accessed March 9, 2017, [http://www.jrcb.gov.bd/about\\_jrc.html](http://www.jrcb.gov.bd/about_jrc.html).

<sup>252</sup> Among others, the Commission was called upon to maintain liaison between the participating countries in order to ensure the most effective joint efforts in maximizing the benefits from common river systems to both the countries; to formulate flood control works and recommend implementation of joint projects; to formulate detailed proposals on advance flood warnings, flood forecasting and cyclone warnings; to study flood control and irrigation projects so that the water resources of the region can be utilized on an equitable basis for the mutual benefit of the peoples of the two countries; and to formulate proposals for carrying out coordinated research on problem of flood control affecting both the countries. In Article4 (i) of the Statute.

flood forecasting. Its other anticipated efforts, including research projects, have yet to take place.<sup>253</sup> The statute creating the JRC has little to say about environmental impacts or the sustainable use of water. Also absent from the statute is an arbitration clause with a well-defined mechanism to resolve differences. Given this deficiency, it has been easy for the two States to hold tight to clashing policy stances that frustrate joint action.

The use of the words “for harnessing the rivers common to both countries” at the onset of the statute’s preamble implies that the powers and duties of the JRC extend beyond any particular river or rivers to encompass all fifty four of the common, trans-boundary rivers. Such a wide jurisdiction has the potential to promote uniform policies, an approach that, certainly on the surface, would seem efficient. But such a goal is a lofty one, and its achievement in retrospect required a more robust and stronger institution, better able to reconcile strong conflicts. In its current form and structure, the JRC lacks the power and leadership to take on the fifty-four rivers, particularly to deal with the enormous challenges posed by the Ganges, the Meghna, and Brahmaputra Rivers and the human and natural demands placed on them.<sup>254</sup>

The overall vision of the JRC suffers from another practical inefficiency. In operation the JRC is not really a single jointly run entity. It is more accurate to say that it comprises, in effect, two parallel national river commissions operating in tension. The existence of the dual commissions makes decision-making more challenging and time consuming and makes cooperation even more

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<sup>253</sup> Member, Joint River Commission, Bangladesh, in discussion with the candidate in November, 2013.

<sup>254</sup> Anumita Raj, “Achieving Water Security, Part 3: Striving for “Blue Peace” in the Eastern Himalayas Toward a True India-Bangladesh Joint Rivers Commission,” *EarthDesk*, Dyson College Institute for Sustainability and the Environment (DCISE) at Pace University (2013), accessed March 9, 2017, <https://earthdesk.blogs.pace.edu/2013/07/17/achieving-water-security-part-3-striving-for-blue-peace-in-the-eastern-himalayas/>.

intractable. Without question a single commission with representatives of both countries would manage the shared water resources in a more meaningful and collaborative manner.

Despite the weakness of this record the JRC marked an important forward step in cooperation on water issues by Bangladesh and India. If it has not brought resolution to any critical issue it has nonetheless usefully functioned as a forum for raising and addressing important trans-boundary water concerns. With just a few adjustments to its structure and overall mandates the JRC could become stronger and more effective, at least in dealing with widely recognized problems.

*Agreement between the Government of the People's Republic of Bangladesh and the Government of the Republic of India on sharing of the Ganges waters at Farakka and on augmenting its flows, 1977 and the two Memorandums of Understanding.* As explained in chapter three, the 1977 agreement was entered into between Bangladesh and India for an immediate, temporary resolution of the Ganges water problems at Farakka. In the wake of continued diversions of Ganges water at Farakka, Bangladesh presented a protest claim to the United Nations General Assembly.<sup>255</sup> The international community pressed the States to find an amiable solution at the General Assembly. The States accepted the guidance and worked together, particularly to address the then-urgent dry season situation at Farakka. The resulting document—the 1977 agreement—devised a formula for sharing the water at Farakka between the State parties.<sup>256</sup> The agreement created a specialized Joint Committee, charged with

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<sup>255</sup> Concluded on November 5, 1977.

<sup>256</sup> According to Art. II of the 1977 Agreement, the dry season availability of the historical flows was to be established from the recorded flows of the Ganges from 1948 to 1973 on the basis of 75% availabilities. The shares of India and Bangladesh of the Ganges flows at 10-day periods were fixed, the shares in the last 10-day period of April (the leanest) being 20,500 and 34,500 cusec respectively out of 55,000 cusec availability at that period. It was further understood that in order to ensure Bangladesh's share in the event of any lower availability at Farakka, Bangladesh's share should not fall below 80% of the stated share in a particular period shown in a schedule annexed to the agreement.

providing data to the two governments, overseeing the water sharing, and submitting annual reports. It also included a modestly detailed process for conflict resolution. Under the agreements, the Joint Committee would examine any difficulty arising out of the agreement's implementation. Any dispute not resolved by the Committee would go to a panel of an equal number of experts nominated by the each government. If still unresolved, the matter would be resolved through diplomacy by the two governments.<sup>257</sup>

The agreement was designed to last for five years with the option of renewal by mutual agreement. The Joint Committee was tasked, during this period, to undertake a feasibility study for a long-term solution to problems within the basin. The Committee failed to formulate a solution by the time the five-year life of the agreement concluded and the agreement lapsed due to non-renewal by the parties.

*The two Memorandums of Understanding.* After the expiration of the 1977 agreement in 1982 Bangladesh and India negotiated two interim arrangements, designed as temporary solutions to the Farakka problem, in lieu of any long-term understanding. The two memorandums of understanding were signed in 1982 and again in 1985 respectively, each for two-year term. The expiration of the latter MoU in 1987 was followed by a legal vacuum that extended through 1996. During the period, India, unrestricted by any agreement, continued diverting water at Farakka during the lean seasons.

*The Treaty between the Government of India and the Government of the People's Republic of Bangladesh on Sharing of the Ganga/Ganges Waters at Farakka, 12 December, 1996.* The

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<sup>257</sup> If the dispute was still not resolved, it was supposed to be referred to the two Governments which would meet urgently at the appropriate level to resolve it by mutual discussion and failing that by such other arrangements as they may mutually agree upon.

Ganges Treaty of 1996 marked a breakthrough in cooperation between India and Bangladesh on the question of Ganges water by setting a formula for overall water allocation at Farakka that would last for thirty years. Like its 1977 counterpart, this treaty includes a special formula for water-sharing during the dry seasons.

Along with these provisions dealing with water sharing the treaty in its preamble includes objectives for making optimum utilization of the water resources in terms of flood management, irrigation, river-basin development and hydropower generation for the mutual benefit of the peoples of the two countries. Under the treaty, both parties recognize in particular the desirability of augmenting the flows of the Ganges over the long term and they commit to formulate an augmentation plan in a spirit of mutual accommodation. Indeed, the goal of long-term augmentation is put forth as equal in importance to water sharing. The treaty, however, does not detail any criteria or guidelines of formulating the desired plan and no plan has been produced. Even loftier are the provisions in the treaty dealing generally with all present and future water problems relating to the other 53 rivers shared by the two nations. The treaty encourages both nations to reach water-sharing agreements covering these rivers, guided by principles of equity, fairness and no harm to either party. To date no such agreements have been concluded.<sup>258</sup>

The 1996 Farakka treaty led many Bangladeshis to hope that the water disputes related to Farakka had ended. The treaty, as noted, does establish a water-allocation regime, an important and valuable step. But it fails in any significant way to take account of the geographical features of the Ganges River. Like its earlier 1977 counterpart, the treaty remains

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<sup>258</sup> Treaty between the Government of India and the Government of the People's Republic of Bangladesh on Sharing of the Ganga/Ganges Waters at Farakka, art. IX.

silent on any environmental protection, ecological needs or the practice of sustainable water use.

*Framework Agreement on Co-operation for Development between Government of the Republic of India and Government of the People's Republic of Bangladesh, 2011.* A mostly symbolic but nonetheless important further step took place with the signing on September 6, 2011, of a general cooperation agreement between Bangladesh and India for achieving common goals and developments. The agreement emphasizes the desirability of promoting trans-border cooperation on the management of shared water resources, not just for a fair-sharing of water flows but also on hydropower development, on ecosystem preservation, and in the areas of connectivity, trade and economic cooperation.

Although written only in broad, generic terms, the 2011 agreement touches on, for the first time in any bilateral treaty between Bangladesh and India, environmental or ecosystem considerations. In Article 6, for example, the parties agree to develop and to implement programs for environmental protection and to respond to the challenges of climate change through means of adaptation. In addition, the parties are called on to collaborate on projects of mutual interest to preserve common ecosystems and, as far as possible, to coordinate their responses in international fora.

Another notable feature of the agreement is that it goes beyond the strictly confined bilateral cooperation, and envisions sub-regional and regional cooperation to enable both countries to realize their developmental aspirations, their shared destiny and their common vision of a peaceful and prosperous South Asia. This undoubtedly is a stepping stone in the right direction, and raises hope for more concrete and comprehensive regional frameworks or pacts in near future.



*Teesta River Agreement: a treaty still awaiting.* In recent years, much of the continuing discussion on watercourses between Bangladesh and Indian has had to do with the Teesta River and a proposed agreement covering it. If concluded, the agreement would be the first one applicable to a common river other than the Ganges. As such, the discussions and the draft agreement terms are rightly viewed as precedent-setting.

The Teesta has its source in Sikkim, whence it flows through the state of West Bengal in India before entering Bangladesh. In Bangladesh, the river joins the Brahmaputra River at Fulchori. The total length of the river is 309 kilometers (192 miles), and it drains a basin of 12,540 square kilometers (4,840 square miles).

Sharing of the Teesta water has become a contested battleground between the two countries, especially between the Indian state of West Bengal and Bangladesh over dry-season water. In 1983, an ad-hoc water sharing agreement allocated to the two contestants 39% and 36% of the water flow respectively.<sup>259</sup> The possibility of a new treaty surfaced in January 2011. An amicable secretary-level meeting between the countries suggested that a Teesta water sharing agreement was imminent, one that would divide the flow equally between the parties while setting aside 20% of the water to maintain a minimum flow. A draft agreement including these terms was later agreed to by India's then-Prime Minister Dr. Manmohan Singh.<sup>260</sup>

Despite support for the draft treaty by both the Bangladeshi government and the central government of India, the Teesta River agreement stalled, apparently because of concerns

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<sup>259</sup> Aparna Ray, "India, Bangladesh: Water Disputes and Teesta River Diplomacy," Global Voices (2012), accessed March 9, 2017, <http://globalvoicesonline.org/2012/06/08/india-bangladesh-water-disputes-and-teesta-river-diplomacy/>.

<sup>260</sup> M. Inamul Haque, "How far is Teesta water sharing agreement?," *The Daily Star*, October 16, 2014, accessed March 9, 2017, <http://www.thedailystar.net/how-far-is-teesta-water-sharing-agreement-45831>.

raised by the state of West Bengal in India. The state government, which was a coalition partner of the central government, refused to approve the treaty, fearing that the loss of higher-volume water diversions to the lower riparian areas would cause problems in the northern region of the state, especially during drier months.<sup>261</sup> Despite this pressure tactic—in effect a demand for a higher water share—the draft treaty remains alive while India continues its efforts of domestic political consensus-building. Both countries express optimism that they can finalize the treaty in the near future.<sup>262</sup>

#### Bangladesh – Nepal

Little needs to be said about the Bangladesh-Nepal bilateral link. Large parts of the two nations are located in the Ganges basin but the States have yet to conclude any water-related treaty. In contrast, Nepal has committed to at least three major water agreements with India, which in turn, as explained, has a major water treaty with Bangladesh, all related to the waters of either the Ganges or its headwaters. An obvious next step is the development of a multilateral water management scheme involving all co-basin States. The lack of such a scheme is one of the current major shortcomings of the transboundary water framework of the Ganges-Brahmaputra-Meghna (GBM) basin in South Asia.

Bangladesh on several occasions has expressed interest in tripartite treaty negotiations concerning the Ganges but no negotiations have begun. The only step in that direction, a small one, has been the establishment by Bangladesh and Nepal of a Joint Committee of

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<sup>261</sup> Ray, “India-bangladesh.”

<sup>262</sup> Haque, “How far is Teesta.”

Experts, intended to examine water relations and the respective interests of the parties.<sup>263</sup> The Committee continues to exist, and its goals remain, but its smooth functioning as a body has been hindered due to political turmoil in Nepal since 2009.<sup>264</sup>

### Bangladesh – China

The same basic story of noncooperation applies to the links between Bangladesh and China. No water treaty is in place nor is any under consideration. The only formal tie is a Memorandum of Understanding on hydrological data sharing during the flood season. The MoU was jointly signed on September 16, 2008, and applies to hydrological information of the Yarlung Tsangpo/Brahmaputra River. According to the Memorandum, China will provide Bangladesh with hydrological information in flood season from three hydrological stations along the mainstream of the Yarlungzangbu River.<sup>265</sup>

As explained by the Chinese Ministry of Water Resources on its website,<sup>266</sup> the Memorandum was signed to further enhance bilateral cooperation on water issues between the countries and to help Bangladesh improve its flood-control measures and disaster relief in the Brahmaputra River Basin.<sup>267</sup>

### India-Nepal

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<sup>263</sup> Member, interview.

<sup>264</sup> Ibid.

<sup>265</sup> “China and Bangladesh signed MoU for hydrological information exchange,” Ministry of Water Resources, The People’s Republic of China, accessed March 9, 2017, [http://www.mwr.gov.cn/english/news/200809/t20080919\\_102801.html](http://www.mwr.gov.cn/english/news/200809/t20080919_102801.html).

<sup>266</sup> Ibid.

<sup>267</sup> Ibid.

To fill in the picture of regional water arrangements it helps to bring in bilateral agreements between regional States other than Bangladesh.

In its relation to Nepal, India plays the role of downstream nation and has found it necessary to seek protections as part of its efforts to develop its upstream rivers, control massive flooding, and capitalize on the hydroelectric potential in hilly Nepal. Bilateral understandings and treaties between India and Nepal date back to an Exchange of Letters of 1920 between the British East India Company and Nepal regarding the construction of the Sarada Barrage in the Mahakali River, and to the 1950 Treaty and the Letters of Exchange of 1950 and of 1965. The Kosi Agreement of 1954, the Gandak Agreement of 1959, the Joint Communique of 1992 regarding the Tanakpur Barrage, and finally the Mahakali Treaty of 1996 are among the significant agreements between the two nations, mostly designed to realize the hydropower potential of the rivers covered by them.<sup>268</sup> It is important to note that the Mahakali (called Sarada in India), the Kosi, and the Gandak are all tributaries of the Ganges River: they all originate in Tibet, travel through the territory of Nepal, empty into the Ganges in India, and then enter Bangladesh. Management of the rivers is thus of direct concern to Bangladesh, which is necessarily affected by changes to the timing and nature of the water flows.

The Nepal-India Joint Committee on Water Resources (JCWR) was formed pursuant to the decision taken by the prime ministers of both countries in 2000. It was envisioned as a

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<sup>268</sup> Pia Malhotra, *Water Issues between Nepal, India and Bangladesh: A Survey of Literature*, (Institute of Peace and Conflict Studies, IPCS Special Report, July 2010), accessed March 9, 2017, [http://www.ipcs.org/pdf\\_file/issue/SR95.pdf](http://www.ipcs.org/pdf_file/issue/SR95.pdf).

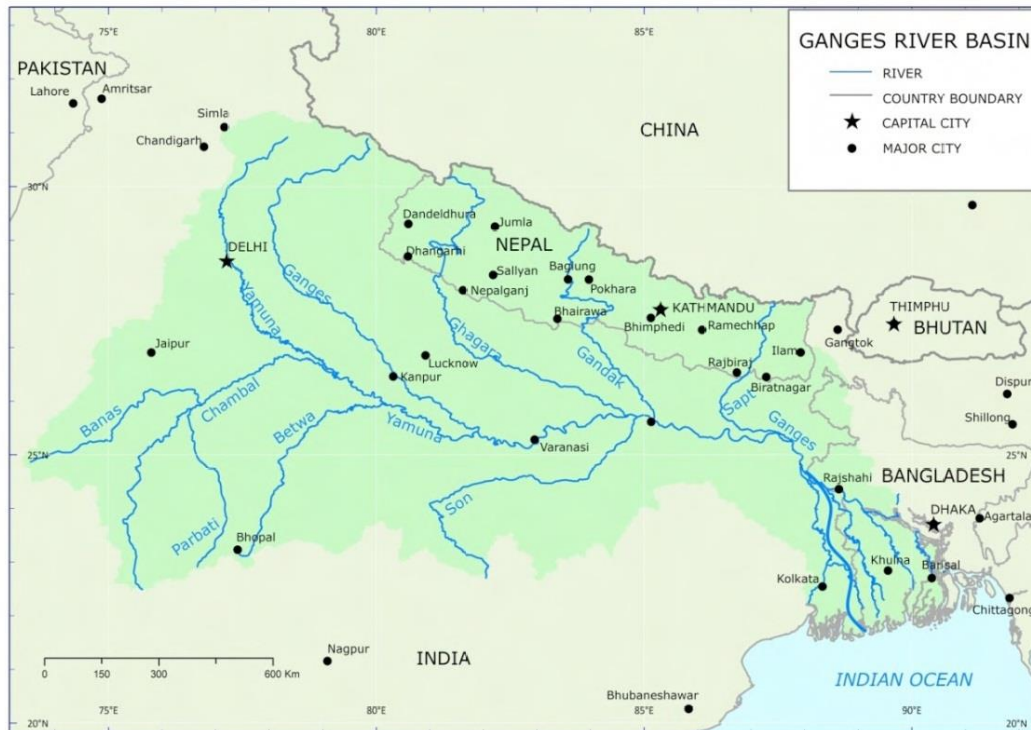


Figure 8: The Ganges River Basin. Source: CGIAR, Research Program on Water, Land and Ecosystems

procedural mechanism to manage overall India-Nepal water relations and to facilitate implementation of their various bilateral agreements.<sup>269</sup>

*Agreement between His Majesty's Government of Nepal and the Government of India on the Kosi Project, 1954.*<sup>270</sup> Originating in Tibet, the Kosi is one of the most important tributaries of the Ganges, and is Nepal's largest river. From Nepal, the Kosi flows into India in the state of Bihar. Its heavy seasonal flows bring severe and frequent floods into the state. India and Nepal signed this treaty to control the flooding, to generate hydro-electricity, and to provide water for irrigation. The treaty objectives were to be achieved by constructing a barrage, headworks and

<sup>269</sup> "Water and Energy Commission Secretariat, Government of Nepal," accessed February 21, 2014, <http://www.weecs.gov.np/>.

<sup>270</sup> "Water and Energy Commission Secretariat, Government of Nepal."

other appurtenant works. The agreement established an Indo-Nepal Kosi Project Commission to implement the objectives and to resolve any disputes arising between the parties. The Kosi Barrage, also named the Bhimnagar Barrage, was built between 1959 and 1963 and straddles the Indo-Nepal border.

This water-management facility was located within the Nepalese territory but was financed entirely by India, which retains operating control. In exchange for the use of its land, Nepal receives rental payments and a share of the hydroelectricity. The treaty includes various provisions that made the project possible, provisions (i) authorizing investigations and field surveys into Nepal's territory by India; (ii) authorizing the construction and other uses of lands in Nepal; (iii) leasing particular project areas to India for a period of 199 years; (iv) requiring payment of royalties and compensation by India; and (v) requiring the development of communication systems by India in the project area.

The agreement, within few years of its conclusion, appeared to have restricted Nepal's own use of waters for irrigation and other purposes, requiring a treaty revision on 19 December 1966 to re-establish Nepal's rights. The revised provision of the treaty relating to water rights guarantees Nepal's right to withdraw water from the Kosi River, from the Sun-Kosi River, and from other tributaries of the Kosi River within the Kosi basin as may be required for irrigation and any other purpose.<sup>271</sup> On its side India held the right to regulate all the balance of water supplies available from time to time in the Kosi River at the barrage site and to generate hydropower.<sup>272</sup>

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<sup>271</sup> Agreement between His Majesty's Government of Nepal and the Government of India on the Kosi Project, Nepal - India, April 25, 1954, art. 4(i).

<sup>272</sup> Ibid.

As noted, one of the main rationales motivating the Kosi agreement and the resulting project was to control downstream flooding. The Kosi experience, however, soon demonstrated the difficulty of achieving that goal given fluctuating water flows and the river's natural silt load. A breach of the embankment along the Kosi River in 2008 inundated lands with flood waters and displaced millions of people, both in Nepal and southward along the Ganges River within India.<sup>273</sup> The embankment breach occurred in large part because of sediment build up in the river over fifty years, which elevated the water flows in unnatural ways. Levees and other containment structures were not increased in height and strength to deal with the every-higher river.<sup>274</sup> Unless the river can regain the power to move silt further downstream the problem will only worsen, forcing efforts either to raise levees higher or to find ways to divert floodwaters into designated, controlled areas.

The Kosi agreement does not address environmental concerns of the Kosi River; i.e. sediment loads and their transportation downstream, maintenance of a minimum flow, protection of aquatic species and other riverine ecosystems, and related adverse ecological effects.

*The Sapta Kosi High Dam Project.* The governments of India and Nepal have further agreed to conduct joint investigations and relevant studies for the preparation of a Detailed Project Report (DPR) on the Sapta Koshi High Dam Multipurpose Project and the Sun Kosi Storage-cum-Diversion Scheme to meet the objectives common to both countries; i.e. development of hydropower, irrigation, flood control and navigation. The Sapta Kosi dam is envisaged as an 883-foot high, concrete or rock-filled dam, with an underground powerhouse, producing 3,000

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<sup>273</sup> Kishor Uprety & Salman M. A. Salman, "Legal Aspects of Sharing and Management of Transboundary Waters in South Asia: Preventing Conflicts and Promoting Cooperation," *Hydrological Sciences Journal* 56, Issue 4 (2011): 652.

<sup>274</sup> *Ibid.*

MW at 50% load factor. Another barrage is planned for the Sapta Kosi about 5 miles downstream of the Sapta Kosi High Dam to re-regulate the diverted water.<sup>275</sup>

After an exchange of Letters of Understanding between the two governments in June 2004, a Joint Project Office (JPO) was set up in August, 2004 to undertake detailed field investigations for preparation of a Detailed Project Report (DPR) on the Sapta Kosi High Dam Project at Barakshetra, in Nepal.<sup>276</sup> The field investigations of the JPO will include within their scope of study the field works of the Sun Kosi diversion scheme (which entailed constructing a dam at Kurule so that the Sun Kosi water could be diverted to the Kamla basin through a tunnel). In the Kamla basin, a dam coupled with a barrage is also envisaged, and included within the study efforts of the JPO.<sup>277</sup> The project is still in the early pre-construction phase, with field investigations delayed by the political climate in Nepal.<sup>278</sup>

*Agreement between His Majesty's Government of Nepal and the Government of India on the Gandak Irrigation and Power Project, 1959.*<sup>279</sup> The Gandak is another tributary of the Ganges River that originates in Tibet, flows through central Nepal, and finally enters India through the state of Uttar Pradesh where it joins the Ganges. Like the Kosi agreement, this agreement also envisioned irrigation and power generation made possible by a new barrage, canal-head regulators, and other appurtenant works. This project will also lie entirely within Nepal and is also being financed by India. Nepal is to receive benefits chiefly by taking a share in the hydro-electricity. Like its Kosi counterpart, this agreement stipulates terms regarding payment of

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<sup>275</sup> Dr. Som Prasad Khatiwada, "River Culture and Water Issue: An Overview of Sapta-Koshi High Dam Project of Nepal," *International Journal of Core Engineering & Management (IJCEM)* 1, Issue 3 (2014).

<sup>276</sup> "The India-Nepal Cooperation," Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India, accessed March 9, 2017, <http://wrmin.nic.in/forms/list.aspx?Id=4&lid=347>.

<sup>277</sup> Ibid.

<sup>278</sup> Ibid.

<sup>279</sup> Accessed March 9, 2017, [http://www.moen.gov.np/pdf\\_files/gandak\\_treaty.pdf](http://www.moen.gov.np/pdf_files/gandak_treaty.pdf).



compensation to Nepal for incidental uses of its lands and other properties and for acquisitions while doing surveys and other investigations. It also addresses the construction, operation and management of the project by India.

This agreement affirmed Nepal's rights to withdraw water for irrigation or any other purpose from time to time, but only to the extent that such withdrawals would not prejudicially affect the water requirements of the project. This qualification on water use had the effect of curtailing Nepal's right to use the Gandak's water within its territory, essentially for trans-valley uses in the months of February to April. In the wake of ensuring controversies in Nepal over the limitation, adjustments were made allowing Nepal to withdraw from the river or its tributaries, for irrigation or any other purpose, such supplies of water as may be required from time to time in the Valley. As for the trans-Valley uses of Gandak waters, it was contemplated that separate agreements would be entered into between Nepal and India covering them during the months of February to April only.<sup>280</sup>

Certainly, the revised agreement was an improvement over the previous one, although the trans-valley uses of Gandak water for the months of February to April were still restricted. This has prompted Nepal to seek further revisions dropping the clause restricting such use inside Nepal – a claim yet to be addressed.<sup>281</sup>

*Treaty between His Majesty's Government of Nepal and The Government of India Concerning the Integrated Development of the Mahakali Barrage Including Sarada Barrage, Tanakpur*

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<sup>280</sup> Agreement between His Majesty's Government of Nepal and the Government of India on the Gandak Irrigation and Power Project, Nepal – India, December 4, 1959, art. 9, accessed April 19, 2017. <https://indiamadhesi.files.wordpress.com/2008/11/agreement-between-his-majestys-government-of-nepal-and-the-government-of-india-on-the-gandak-irrigation-power-project.pdf>

<sup>281</sup> Uprety and Salman, "Legal Aspects of Sharing," 651.

*Barrage and Pancheshwar Project, 1996*. The most recent and a more comprehensive treaty between Nepal and India has been the Mahakali treaty of 1996 governing the Mahakali River, the principal tributary of the Ganges. The cornerstone of the Mahakali treaty is the implementation of the Pancheshwar Multipurpose Project. At the same time, the treaty also addresses power allocation from two other existing barrages: the Sarada barrage and the Tanakpur barrage.

A noteworthy aspect of this treaty is that the barrages it covers, the Sarada and the Tanakpur, were completed in 1920 and 1992 respectively, long before the treaty. The Mahakali Treaty in effect absorbed the management regime established by the 1920 Sarada Agreement, the 1991 Memorandum of Understanding, and the 1992 Joint Communiqué for Tanakpur Barrage.<sup>282</sup> The only substantive addition to existing arrangements was a provision in the treaty endorsing construction of the Pancheshwar Multipurpose Project.<sup>283</sup> Hence, from a structural viewpoint, the Mahakali Treaty combines three distinct treaties related to the water sharing of the Mahakali River (the Sarada Agreement, the Tanakpur Memorandum of Understanding and the Pancheshwar Multipurpose Project), and extends the legal duration of the entire framework for another 75 years from its entry into force.<sup>284</sup>

As stipulated, the Pancheshwar Multipurpose Project would be constructed on a stretch of the Mahakali River where it forms the boundary between Nepal and India. The treaty endorses the equal right of the countries to use the Mahakali waters, and requires implementation of the Project in accordance with the Detailed Project Report (DPR) jointly prepared by them. It gives

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<sup>282</sup> Uprety and Salman, "Legal Aspects of Sharing," 653.

<sup>283</sup> *Ibid.*, 651.

<sup>284</sup> *Ibid.*

each country an equal share in the energy production.<sup>285</sup> The project remains under construction. Required field investigations for the project were completed by a Joint Project Office (JPO) in 2002. The decision was made at a 2008 meeting of the Joint Committee on Water Resources (JCWR) to set up the Pancheshwar Development Authority (PDA) as soon as feasible for the development, execution and operation of the project.<sup>286</sup>

The Mahakali treaty is the only treaty involving the GBM river basin to include specific reference to ecological protection and maintenance of minimum flows. Article 1(2) of the treaty requires maintenance of a minimum water flow downstream of the Sarada Barrage in the Mahakali River to sustain and preserve the river ecosystem. In order to maintain the flow and level of the waters of the Mahakali River, Article 7 further requires each party not to use, obstruct, or divert the waters of the Mahakali River in ways adversely affecting its natural flow and level except by an agreement between the Parties. However, this does not preclude the use of the waters of the Mahakali River by the local communities living along both sides of the Mahakali River, not exceeding five percent of the average annual flow at Pancheshwar.

In order to monitor and implement its provisions, the treaty establishes a Mahakali River Commission, and proclaims that the commission shall be guided by the principles of equality, mutual benefit, and no harm to either party. One of the stated functions of the commission is to make recommendations to the parties for conservation and utilization of the Mahakali River.

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<sup>285</sup> Treaty between His Majesty's Government of Nepal and The Government of India Concerning the Integrated Development of the Mahakali Barrage Including Sarada Barrage, Tanakpur Barrage and Pancheshwar Project, Nepal – India, February 12, 1996, art. 3, accessed April 19, 2017, [http://www.internationalwaterlaw.org/documents/regionaldocs/Mahakali\\_Treaty-1996.pdf](http://www.internationalwaterlaw.org/documents/regionaldocs/Mahakali_Treaty-1996.pdf).

<sup>286</sup> “The India-Nepal Cooperation.”

The Treaty discourages any unilateral development of the river and approves the principles of cooperation, consultation and notification. It states that any project to be developed on the Mahakali River, where it is a boundary river, should be designed and implemented by an agreement between the parties based on the principles established by this treaty. It, therefore, makes it an obligation for either Party to reach an agreement before commencing any project on the Mahakali River.

In addition to these various projects and agreements other multipurpose projects are in the works, principally the Kamla and Bagmati multipurpose projects and the Karnali multipurpose project. The Joint Project Office (JPO) has been entrusted to undertake the feasibility study of Kamla Dam and a preliminary study of the Bagmati Dam Project.<sup>287</sup>

#### India – China

Like Nepal, China lies upstream of India but China's willingness to cooperate on watercourse issues has been much less. The major rivers originating in China and then entering into India are the Brahmaputra in the North-East and the Indus & Sutlej in the Northern part of the country.<sup>288</sup>

Both countries have independently developed ambitious plans to engineer the Brahmaputra (or the Yarlung Tsangpo, as it is named in China). Despite the planning—and the fact that the plans are incompatible—the nations have no watercourse agreements aside from a various

Memorandums of Understanding on data sharing.

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<sup>287</sup> “The India-Nepal Cooperation.”

<sup>288</sup> “India – China Co-operation,” Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India, accessed March 9, 2017, <http://wrmin.nic.in/forms/list.aspx?Id=4&lid=349>.

The first two Memorandums of Understanding between India and China address the sharing of hydrological data on the Brahmaputra (Yarlung Tsangpo) River and the Sutlej (Langquin Zangbu) River respectively. The first Memorandum, crafted in 2002, called upon China to provide to India, during the term of the Memorandum, flood season hydrological information on the Yarlung Tsangpo//Brahmaputra River. The information included water-level, discharge, and rainfall data from three river locations from June 1 to October 15 through 2007. The data were used by the Central Water Commission to formulate flood forecasts.<sup>289</sup> A follow-up Memorandum of Understanding with essential the same terms was signed on June 5, 2008, covering a term of five years, and further renewed for another five years on May 20, 2013.<sup>290</sup>

Another five-year flood-forecasting Memorandum of Understanding was signed in April 2005 covering the Sutlej (Langquin Zangbu) River. It was replaced upon its expiration in 2010 by a new five-year MoU.<sup>291</sup>

The latest development in India-China's water relation has been a separate and independent "Memorandum of Understanding on Strengthening Cooperation on Trans-Border Rivers" signed on October 23, 2013. This MoU does not specifically deal with any particular shared-water issue, but expands the types of hydrological information gathered at the three hydrological stations and requires disclosure to start earlier, on May 15 of each year instead of June 1 starting in 2014.<sup>292</sup> At the same time, the MoU entitles each party to "exchange views on other issues of mutual

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<sup>289</sup> "India – China Co-operation," Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India, accessed March 9, 2017, <http://wrmin.nic.in/forms/list.aspx?Id=4&lid=349>.

<sup>290</sup> Ibid.

<sup>291</sup> Ibid.

<sup>292</sup> Ibid.

interest.”<sup>293</sup> On the institutional level, India and China have set up a Joint Expert Level Mechanism to discuss interaction and cooperation on provisions of flood season hydrological data, emergency management and other issues regarding trans-border rivers.<sup>294</sup>

These various MoUs, covering merely the exchange of data, hardly begin to address the transboundary water issues between India and China, which is to say they lack any meaningful agreements on how the rivers can be used and altered and make no provision for joint use. China has tended to classify data and information relating to its various water-development projects and plans, leaving India and other affected nations largely in the dark about them. The latest MoU with India on “strengthening cooperation on trans-boundary rivers” may reflect a future willingness to become more cooperative as well as recognition of looming water tensions. But China for the most part remains committed to a go-it-alone approach, possible because of its upstream location and its overall size. The consequences of that stance, should it continue, will be significant for all downstream nations.

### Features and Challenges of South Asian Water Management

A study titled “The Himalayan Challenge” by the Strategic Foresight Group (SFG), Mumbai, India predicts that, in next 20 years, the four countries in the Himalayan sub-region (India, Nepal, China and Bangladesh) will face the depletion of almost 275 billion cubic meters of annual renewable water.<sup>295</sup> For comparison, this is more than the total amount of water

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<sup>293</sup> Wasbir Hussain, “India & China: An Assessment of October 2013 Agreements, MoU on the Brahmaputra River,” *Institute of Peace and Conflict Studies* 24 October 2013, accessed March 9, 2017, <http://www.ipcs.org/article/india/india-china-an-assessment-of-october-2013-agreements-mou-on-4149.html>.

<sup>294</sup> Ibid.

<sup>295</sup> John D. and Catherine T. MacArthur Foundation, Strategic Foresight Group, *The Himalayan Challenge: Water Security in Emerging Asia* (Mumbai: Strategic Foresight Group, 2010) accessed March 9, 2017, [http://www.strategicforesight.com/publication\\_pdf/85801himalayan-challenge.pdf](http://www.strategicforesight.com/publication_pdf/85801himalayan-challenge.pdf).

available in Nepal at present.<sup>296</sup> As things stand today, the four countries in the GBM basin lack anything close to the collaborative agreements or mechanisms needed to deal adequately with their transboundary waters. India, as explained, has bilateral agreements with both Bangladesh and Nepal separately, but not with China. Similarly, Bangladesh has agreements only with India, not with Nepal or China, except for flood forecasting MoUs with the later.

The lack of an adequate overall framework on water management, or even a joint forum for discussion, is a very significant deficiency. It presents the grave possibility that the region—the most populous on earth—will become the scene of sharply conflicting national desires and policies, and perhaps soon. The predicament is worsened by the lack of any universally accepted global platform to resolve such cross-border water conflicts. The UN convention on non-navigational uses of international water courses from 1997, which took effect in 2014 when the minimum number of signatories was reached, does provides a mechanism to address if not resolve trans-border waters. But none of the GBM basin States are yet parties to it and China in particular disputes the underlying premise that international watercourses are common resources calling for shared governance. (The 1997 convention and other international agreements are taken up in chapter five.)

*Absence of multilateral or basin-wide approach.* It is notable how South Asia, featuring one of the most important river basin systems on earth, has failed to move beyond bilateralism as the dominant approach for addressing watercourse issues even as the GBM basin includes more than two nations. Except for the Indus River Treaty, which does include a third party, all water-related agreements so far reached are bilateral. Bilateralism has traditionally been the official policy of

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<sup>296</sup> “Hydro Projects in Tibet: Why China's Neighbors are Worried,” *HubPages*, accessed March 9, 2017, <https://hubpages.com/politics/Hydro-Projects-in-Tibet-Thirsty-Dragon-Restless-Neighbors>.

India. China's very minimal cooperation has also taken this form. Only Bangladesh and, to a lesser extent, Nepal have showed interest in tripartite or regional arrangements.

India's emphasis on bilateralism is based on its assessment that multilateral negotiations are less focused, more complex, lengthier and thus difficult to reach.<sup>297</sup> Its stance might also reflect a fear that smaller countries could join hands and make common cause against the nation.<sup>298</sup> India's preference for bilateralism is clear, for instance, in its insistence on distinct institutional forums for discussing issues. The Joint River Commission (JRC), as discussed, serves as the common forum between Bangladesh and India, while the Joint Committee on Water Resources (JCWR) serves the same role for discussions between Nepal and India. India has claimed that neither commission has the jurisdiction to allow involvement in its affairs by a third nation, thus undercutting the power of either to promote larger-scale assessments and discussion.

Bangladesh, in contrast, has repeatedly expressed a desire to include Nepal within the Ganges framework. Its stance is apparently grounded in three rationales. First, inclusion of Nepal would facilitate augmentation of the Ganges water (a goal of Bangladesh and also (ostensibly) of India) by opening the option of constructing storage dams along the Ganges headwaters in Nepal to hold water for dry-season release. Secondly, Nepal could side with Bangladesh on key negotiating issues and thereby better counterbalance India's dominant strength. Finally, a three-party arrangement could improve regional stability through the sharing of electricity generated by water projects. India and Nepal have reached agreement, as seen, on the management of the Sapta Kosi barrage, expected to produce 3500 MW energy, but their discussions have remained

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<sup>297</sup> Ben Crow et al., "Impediments and Innovations in International Rivers: The Waters of South Asia," (August 1999), 8, accessed March 9, 2017, [https://people.ucsc.edu/~boxjenk/wd\\_rev.pdf](https://people.ucsc.edu/~boxjenk/wd_rev.pdf).

<sup>298</sup> Ramaswamy R Iyer, "Conflict Resolution: Three River Treaties," *Economic and Political Weekly*, 34, Issue 24 (1999), 1517.



bilateral. Bangladesh's proposal that it become involved in such projects, perhaps sharing in the energy generated, has to date found little support.<sup>299</sup>

As India contends, bilateralism does simplify negotiations and thus make agreements more likely and timely. However, it is often preferred also as a means to undercut the formation of coalitions and otherwise to preserve a nation's bargaining power.<sup>300</sup> The distinct downside is that bilateralism largely frustrates basin-wide management, breeding insecurity and limiting the mutual benefits that regional cooperation could achieve. Already the lack of shared management has resulted in different and sometimes incompatible national water policies and priorities, thereby intensifying water problems. Moreover, what the countries often ignore is that independent negotiations with neighboring States in a single basin can increase transaction costs and limit the range of water-management options.

Regional watercourse cooperation seems most likely to generate sizeable benefits if it covered the full range of relevant watercourse issues and management options. For instance, a collaborative pact could allow Nepal to supply hydroelectric power to India and Bangladesh. India could supply Nepal with navigation and transit rights, along with construction financing and engineering expertise, while promising clear minimum flows and water-storage benefits to Bangladesh. Bangladesh in turn could provide navigation and transit rights to both Nepal and India (to its eastern states).<sup>301</sup> But optimizing these resources for the common good of the region

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<sup>299</sup> Aaron T. Wolf and Joshua T. Newton, "Case Study of Transboundary Dispute Resolution: The Ganges River Controversy," *Oregon State University Program in Water Conflict Management and Transformation*, College of Earth, Ocean and Atmospheric Sciences, accessed March 9, 2017, [http://www.transboundarywaters.orst.edu/research/case\\_studies/Ganges\\_New.htm](http://www.transboundarywaters.orst.edu/research/case_studies/Ganges_New.htm).

<sup>300</sup> Salman M.A. Salman, *Reviews*, 197.

<sup>301</sup> *Ibid.*, 198.

would require a multilateral approach and a regionally constituted vision of water resources development. It would also require the involvement of China, which, as noted, as so far shown little interest in any cooperation.

*Inequalities in State power and their effects.* Cooperation in the GBM basin has been significantly strained by the unequal power relationships. India and China are viewed as much stronger parties in terms of power and strategic locations compared to the other co-basin States – Bangladesh, Nepal, and Bhutan. China has exercised its power by largely refusing offers to cooperate. India’s comparatively strong position is seen in its insistence on bilateral agreements, its slow pace of working with Bangladesh, and its practice of charging ahead as it pleases when agreements expire.<sup>302</sup> The twin dangers of big-country insensitivity and small-country anxiety are prevalent in South Asia and tend to obstruct prudent outcomes.<sup>303</sup> On the small-country side, the situation prompts weaker nations to adopt tough stances during negotiations for fear of being considered weak and to complain at later stages that negotiations have been unfair due to power imbalances. It similarly worsens the situation when difficulties or differences emerge in the course of operation of a treaty or agreement.<sup>304</sup>

During the last few decades, India’s relations with its smaller neighbors have improved significantly, but the longstanding distrust of the “big brother” has not disappeared, for either Bangladesh or Nepal. This lingering distrust fuels suspicion and mistrust, which in turn dwindles opportunities for cooperation. It also leads parties, after treaties or memorandums of understanding are signed, to worry about implementation and to signal doubts that other signatories will perform fully and in good faith. Such doubts were clearly evident during the dry

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<sup>302</sup> Wolf and Newton, “Case Study,” 7.

<sup>303</sup> Iyer, “Conflict Resolution,” 1516.

<sup>304</sup> Ibid.

season immediately following the signing of the 1996 Ganges treaty, when the Ganges water-level dropped sharply at the Farakka and left little flowing into Bangladesh.

In such complex situations, or even in cases involving unequal parties, a third-party intervention can often prove useful. Many longstanding conflicts around the globe have either been settled or reduced in magnitude because of skillful third-party mediation.<sup>305</sup> However, such a third-party involvement has always been rebuffed in South Asia with one exception; i.e. the Indus Waters treaty with Pakistan (where the World Bank plays an important role). In the Indo-Nepal negotiations on shared rivers, proposals to involve a third party were not brought forward by either party and the agreements entered into by these two nations were in fact negotiated prior to the Indus Treaty itself.

Bangladesh has long wanted to internationalize the problems relating to Ganges water, and it attempted to involve the United Nations in the negotiation process. Its effort failed partly because of resistance from India, which denied the need for third-party involvement on the Ganges and insisted that the matter be left for the parties themselves to resolve.<sup>306</sup>

As for India and China, the strength wielded by each has so far led mostly to stalemate on the Brahmaputra/Yarlung Psangpo River. China, though, has the natural advantage of controlling the upstream reaches of the river system and has far less to lose from noncooperation than does any other basin State. The same can be said of India in its dealings with Bangladesh: Its upstream location gives it much less incentive to cooperate and to respect the ecological realities and needs of Bangladesh.

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<sup>305</sup> Salman, M.A. Salman, and Kishor Uprety, "Hydro-politics in South Asia: A Comparative Analysis of the Mahakali and the Ganges Treaties." *Natural Resources Journal* 39 (1999): 198.

<sup>306</sup> *Ibid.*

What must be kept clear, perhaps above all, is that negotiating parties in water disputes are rarely if ever on an even playing field. The relative power of the bargaining States is important. Just as important if not more so is a State's location upstream or downstream. Because of these imbalances, which can at times be extreme (as in the Bangladesh-China relationship), it is far from even-handed to insist that States work out their differences simply through diplomatic negotiation. Weaker and downstream States may lack anything like the power they would need to insist that stronger and upstream States use a watercourse equitably and in ways that sustain the ecological health of the watercourse downstream. To submit a dispute to negotiation by highly unequal parties is to give preference to the stronger one.

*Institutional arrangements and dispute resolution: Role of the commissions.* India has different commissions with its neighbors to deal with inter-State water problems. The Joint River Commission operates between Bangladesh and India to deal with Ganges water dispute. Among the other shared commissions in the region are the Permanent Indus Commission, established between India and Pakistan; the Mahakali and the Gandak Commissions; and the Kosi Committee established between India and Nepal. These institutional forums have been vested with various administrative, legislative and/or judicial responsibilities.

In terms of effectiveness, the Permanent Indus Commission has so far been more effective than the other river commissions, especially the JRC with Bangladesh. This can be attributed mainly to two reasons. The Indus Commission came into being under a treaty that actually settled a water dispute, thereby freeing the commission to devote its time and resources effective monitoring of treaty performances; the JRC, on the other hand, continues to wrestle with and be

involved in a bitter, unresolved inter-country dispute.<sup>307</sup> Also, the JRC has a vastly wider and more difficult task to perform than other commissions given the number of rivers (54) within its jurisdiction and charge. Indeed, since the treaty signing in 1996 the JRC has yet to agree upon the treaty's main focus – devising a formula to augment the Ganges flow during dry seasons.

The success of any treaty depends to a considerable extent on the effectiveness of the institution entrusted with implementation of its arrangements. That effectiveness in turn is usually enhanced by the presence of a permanent entity that functions as a secretariat. None of the various commissions in South Asia take this form.<sup>308</sup>

*Dispute Resolution.* Alongside legislative functions to formulate plans and policies, the Joint Committee under the Ganges treaty in 1996 has been provided with the judicial task of resolving disputes between the parties. The Joint Committee is entrusted with examining any difficulty arising out of the treaty implementation or the operation of the Farakka Barrage.<sup>309</sup> In case of failure by the committee to resolve any difference or dispute, such difference or dispute would be referred for resolution to the Indo-Bangladesh Joint River Commission. When the Joint River Commission fails to achieve a resolution the treaty refers the matter to the two governments “which shall meet urgently at the appropriate level to resolve it by mutual discussion.”<sup>310</sup> As such, the treaty establishes a political means, not arbitration, as the method for resolving treaty-related disagreements.<sup>311</sup> This mechanism seems quite different from the Mahakali treaty of 1996

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<sup>307</sup> Iyer, “Conflict Resolution,” 1516.

<sup>308</sup> Salman, and Uprety, “Hydro-politics in South Asia,” 201.

<sup>309</sup> Treaty on Sharing of the Ganges Waters at Farakka, Dec. 12, 1996, Bangladesh-India, 36 I.L.M. 519, 525.

<sup>310</sup> *Ibid.*, art. VII.

<sup>311</sup> Similarly, none of the previous agreements specified arbitration as a method of dispute settlement over the Ganges. This is in contrast also with the Indus Waters Treaty which included detailed provisions on arbitration. In Salman M.A. Salman and Kishor Uprety, “Hydro-Politics in South Asia: A Comparative Analysis of the Mahakali and the Ganges Treaties,” *Natural Resources Journal* (1999).

between India and Nepal. The dispute resolution mechanism in the Mahakali treaty is relatively elaborate and advanced, calling for an independent arbitration in the final stage of a dispute rather than referring it to the governments themselves. The lack of an arbitration or independent tribunal between Bangladesh and India was especially felt in the wake of tensions during the first year of the Ganges treaty.

*Preeminent absence of ecological concerns in the South Asian agreements.* High among the deficiencies of the various current bilateral agreements in the GBM basin is the near total inattentiveness to ecological concerns. Only the Mahakali treaty between India and Nepal includes provisions for protecting a minimum flow and even that agreement refers only to water quantity. The Ganges treaty, as seen, is basically a water-sharing treaty between Bangladesh and India with no reference to ecological or environmental concerns. The earlier agreement in 1977 and the two ensuing memorandums between these two countries similarly remained silent on environmental issues.

All of the water treaties in the GBM basin have been entered into during the latter half of the twentieth century. Even the most recent treaties, however, have paid no real attention to the recent, significant developments in international law on the environment and on the equitable and sustainable uses of watercourses.<sup>312</sup> None but the Mahakali treaty requires the maintenance of minimum flows for ecological purposes. Not one shows concern for water temperature, sediment load transport, or the plight of aquatic species.

*Changes in the policies and interpretation of international principles depending on the location of countries; i.e. upper riparian or lower riparian.* Another notable feature of the GBM-basin

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<sup>312</sup> Salman, and Uprety, "Hydro-politics in South Asia," 196.

water governance is the variation in the interpretation of international water-law principles depending on whether the interpreting country is an upper riparian or a lower riparian and, similarly, in the relative willingness of States to commit to overarching principles. As for the later, an influential precedent has been the Indus Waters Treaty between India and Pakistan (although operates beyond the GBM basin). That treaty expressly denies that anything in it shall serve as a general principle of law or any type precedent for later arrangements.<sup>313</sup> A similar provision was included in the preamble of 1977 agreement between India and Bangladesh, and again in the preamble of 1996 agreement between these two nations. A provision of this type, barring the establishment of any principles, leaves the parties free to revert to other stances, even to noncooperation, when other problems arise. Conspicuously, the agreements between India and Nepal contain no similar provision against such precedential force. India as a downstream State is interested in setting precedents of sharing and cooperation; India as an upstream State it not.<sup>314</sup>

*Augmentation process.* As noted, one of the proposed improvements for managing waters at Farakka has been a scheme to augment the flow of the Ganges during drier months. The 1977 agreement and later ones through 1996 have all endorsed the ideas. The 1977 agreement and the 1982 MOU entrusted the Joint River Commission with the responsibility of carrying out investigations and studying schemes for augmentation and set timetables for the work.<sup>315</sup> When little got done the 1985 MOU transferred the duties to a Joint Committee of Experts established

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<sup>313</sup> Ibid.

<sup>314</sup> Ibid., 197.

<sup>315</sup> The 1977 agreement gave a three year timeline, whereas the 1982 MOU allowed 18 months to the Joint River Commission to decide on augmentation.

by the MOU. That committee thus far has similarly failed to agree on any workable augmenting scheme as the two States have pushed widely different plans.

India's augmentation proposal consists of a plan to construct a link canal to connect the Brahmaputra River with the Ganges River at a point above the Farakka Barrage. The link canal, according to India, would help increase the flow of the Ganges River during the dry season by diverting water to the Ganges River from the Brahmaputra River.<sup>316</sup> Bangladesh, fearful of the environmental, social, political, and economic consequences of India's proposal, has rejected it. Bangladesh was also concerned that the link canal might further exacerbate the flood situation in the country during the monsoon season.<sup>317</sup> Bangladesh has proposed instead the construction of storage reservoirs at the upper reaches of the Ganges in both India and Nepal to store water during the monsoon season for release during the dry season. It is important to note that India's proposal centered on using the Brahmaputra River to resolve the problems of the Ganges, whereas Bangladesh's proposal aimed at using the Ganges River itself to solve its erratic water flows. As argued by Bangladesh, water is best transferred over time; while according to India, it is best transferred over space.<sup>318</sup> India, however, rejected Bangladesh's augmentation proposal because it wanted to reserve the upstream waters of the Ganges River for its future needs. Moreover, India preferred a bilateral approach and did not want to regionalize the issue by involving another riparian, in this case Nepal.<sup>319</sup>

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<sup>316</sup> Salman, and Uprety, "Hydro-Politics in South Asia," 295.

<sup>317</sup> Ibid.

<sup>318</sup> Crow et al., "Sharing the Ganges – the Politics and Technology of River Development," (1995): 185-186.

<sup>319</sup> For a discussion of the proposal of each country for augmentation of the dry season flow, see Crow et al., and Abbas, Lyndon Johnson School of Public Affairs, University of Texas at Austin, Policy Research Project Report No. 101, Water Resources Cooperation in the Ganges – Brahmaputra River Basin (1993).



Both countries, therefore, have consistently recognized the need for a long-term solution but they remain unable to find a suitable means. The final Ganges treaty in 1996 once again recognizes the need for bilateral cooperation in “finding a solution to the long-term problem of augmenting the flows of the Ganga/Ganges during the dry season.”<sup>320</sup> But the goal has seemingly become more abstract and even more distant. Unlike the previous agreements, it takes a step back by including no terms or timetables for a joint study. Neither does the treaty create or entrust any committee with the responsibility of carrying out such a study

*Internal Domestic Politics.* The domestic politics within the nations in this region have played dominating roles in determining inter-State relations, including their water relations. Some even argue that the national leaders like to prolong such disputes for internal political purposes or sometimes to strengthen bargaining positions while dealing with other concerns or issues.<sup>321</sup> India, for example, had a relatively better relation with Bangladesh upon its independence from Pakistan. That relationship soon deteriorated because of internal political changes in Bangladesh in 1974. Relations turned upward again in 1977 with the coming of a new government in India.<sup>322</sup> Improved relations smoothed the way for the Ganges Water agreement in 1977. Upon its expiration, and the expiration of the two ensuing MoUs, the political climate was such that further agreement was elusive. Only with the coming of new governments in both States was it possible to conclude the Ganges Water Treaty of 1996 with its thirty-year term. Thus, political calculations and power dynamics within the countries have impacted water relations on a number of occasions.

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<sup>320</sup> The Ganges Treaty, preamble and art. VIII, 36 I.L.M. at 523, 525.

<sup>321</sup> Deepa Karthykeyan, “Conflict and Co-operation on Trans-boundary Waters in South Asia,” 18.

<sup>322</sup> *Ibid.*, 19.

What this record shows is that water conflicts can and do become more difficult to resolve through purely diplomatic means when domestic politics get in the way. It is not always the case of conflicts over water worsening political relationships; to the contrary, difficult political relationships can easily render water disputes more intractable.<sup>323</sup> Diplomatic means of dispute resolution, in short, are weakened and delayed by political instability. This reality is usefully linked to the conclusion reached above, about the distorting effects on negotiated water arrangements of overall imbalances in State power and in the relative location of States upstream and downstream. When these major factors are combined, they cast serious doubt on the likelihood that State diplomacy will yield equitable, ecologically sound plans of water management. Some of these problems might be lessened when all States within a basin negotiate together, just as the managements options expand. But new problems arise in multi-party diplomatic discussions and the tendency exists for negotiations to skip over the most contentious points.

Diplomatic negotiations, in short, are gravely limited as methods of addressing watercourse issues, even as they are, in some settings, the only available option. Far better in many ways is rule-setting that occurs at the international level, through processes that weaken if not eliminate imbalances in States' negotiating power and that are not dragged down by political turmoil within particular States. It is for this reason that pressures have risen for the increased use of international law and lawmaking. In the view of many it is the only means to promote ecologically healthy river-management regimes that are fair to all States, the weakest included.

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<sup>323</sup> Iyer, "Conflict Resolution," 1516.

## **PART III: International Watercourse Law**

### **Chapter 5: The Road to the 1997 UN Watercourse Convention**

The various bilateral agreements considered in the last chapter emerged against the backdrop of a body of law governing international watercourses set at the global level. This Part looks critically at that global-level law, paying special attention to the recent developments—mostly beginning in 1992—that are of greatest continuing importance. This chapter begins that inquiry by offering an historical account of the guiding principles and agreements on transboundary water uses up to and including the 1997 UN Watercourse Convention. The next chapter takes the story beyond that date, looking most closely at the Berlin Rules of 2004, intended by drafters as both a full expression of existing law and a prescription for future legal change. As explained in the next chapter, the Berlin Rules largely address longstanding problems and conflicts by expanding the number and nature of distinct principles that would guide the management of watercourses and their uses. In doing so, however, the Rules fail to clarify how the many principles might fit together, a deficiency that already exists and that becomes more acute in the scheme incorporated in the Rules.

In its early history, the international law of watercourses largely addressed issues of navigation, particularly matters of free passage and toll collection. In time these topics were resolved so that the law today on them is reasonably clear. Only in the twentieth century did attention turn to water allocation; that is, to dividing water flows quantitatively among riparian States. How much water could one State take given the competing demands of other nations? The first major step in addressing that question in a generalized way—apart from the particular divisions of water flows

undertaken in bilateral agreements—came in 1966 in the form of Rules prepared by the International Law Association, known as the Helsinki Rules. These Rules, as explained below, set forth a framework centered on the right of each State to claim a “reasonable and equitable share” of uses of a watercourse subject to obligations to avoid causing pollution that substantially injures another State. It gave particular preference to existing uses when they conflicted with later uses, thus emphasizing priority in time. By slow steps these Rules formed the basis in 1997 of a UN Convention on non-navigable uses of waterways, which stands today as the single most important document in international water law. This convention similarly declared the right of States to make reasonable and equitable use of a watercourse, but it juxtaposed that principle with a second one, that States avoid causing substantial harm. The UN Convention incorporated environmental concerns at greater length but, as discussed below, failed to reconcile the environmental provisions with the principles of equitable utilization and harm-avoidance. It also did not meaningfully address the challenges of dams and reservoirs—one of the most significant issues of the time. The UN Convention added various new ideas and principles into the mix, including the idea that watercourse uses be reasonable and that they be consistent with sustainable development, and it largely pushed aside the preference for existing uses contained in the Helsinki Rules. The result of these various elements was a document rich with normative ideas, so much so, however, that States with widely differing desires could typically point to one or more provisions that seemed to legitimate the practices that furthered their particular interests. The document was confusing also on whether it was aimed chiefly at stimulating bilateral and regional agreements or whether it was aimed instead at setting standards at the international level.

Meanwhile, work progressed on dealing with the particular issues of watercourse pollution, a move that produced, most prominently, a 1992 Convention of the United Nations Economic Commission for Europe (ECE), originally meant for signature by European States and recently opened for signature by all States.<sup>324</sup> This convention committed States to the national adoption of water pollution laws and programs. It, too, however, failed to address the challenges of dams and reservoirs, and did not explain with any clarity how its environmental provisions fit together with the equitable utilization principle or with the principle of sustainable development.

This chapter reviews this historical trajectory, beginning with several early international instruments that drew attention to the non-navigational uses of international waterways prior to the 1966 Helsinki Rules. It then analyzes those Rules and the two subsequent international water law instruments, the 1992 ECE Convention on pollution and waterway degradation and the 1997 UN Watercourse Convention. By way of preface the chapter lays out the principal background theories of sovereign control over water resources along with the normative idea, most developed in U.S. water law, that rights to use waterways should be allocated based on priority of appropriation, regardless of the location of the use and its comparative social value.

### The Principal Theories in International Water Law

Historically, different States have resorted to different positions on the foundational question of State power over watercourses that cross national borders. The competing views, variously

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<sup>324</sup> Amended agreement accessed April 19, 2017, [http://www.unece.org/fileadmin/DAM/env/documents/2013/wat/ECE\\_MP.WAT\\_41.pdf](http://www.unece.org/fileadmin/DAM/env/documents/2013/wat/ECE_MP.WAT_41.pdf),

supported over time, are commonly divided into four categories that reflect widely differing views of sovereign power: absolute territorial sovereignty; absolute territorial integrity; limited territorial sovereignty; and community of interests. Existing alongside them—although not really part of international law—is the doctrine of prior appropriation, best known from its widespread application in western States of the United States. This doctrine is usefully added to the consideration because it offers an alternative to the four principal international theories, an alternative that puts far greater stress than any of the four theories on protecting existing water uses at the expense of new ones.

*Absolute territorial sovereignty.* Absolute territorial sovereignty is a legal stance that recognizes the power of a State to control and use waterways within its boundaries as it sees fit, without concern for effects on other States. Under it, a State using water has no legal responsibility for harm caused to a downstream State. The position is considered extreme in that it maximizes the power of a State to act as it likes while minimizing its corresponding power to complain about the actions of other States. Predictably, this view has appealed over time to strong upstream States, those that, for physical reasons, need not worry about diversions and pollution occurring upstream of them.

The idea of absolute territorial sovereignty is often associated with the “Harmon Doctrine,” a legal stance named after an opinion delivered in the late nineteenth century (1895) by a U.S. Attorney General in a dispute between the U.S. and Mexico concerning the Rio Grande. The controversy stemmed from diversions of the Rio Grande water by the farmers and ranchers in Colorado and New Mexico in the U.S. that sharply reduced the water flowing into Mexico. In his opinion on the conflict, Attorney General Judson Harmon concluded that “the rules, principles and precedents of international law impose no liability or obligation upon the United

States” and that any acceptance of the claim made by the Mexican farmers would be “entirely inconsistent with the sovereignty of the United States over its national domain.”<sup>325</sup> Harmon grounded his stance in part on the alleged absolute sovereignty of every nation, as against all others, to control and use waters within its own territory,<sup>326</sup> a principle he found embedded in international law. The legal stance benefitted the United States under the circumstances, given its upstream location. It has held similar appeal over the decades to other States similarly located.<sup>327</sup>

While there was some support at the time in favor of the Harmon doctrine, and as such for the theory of absolute territorial sovereignty, the principle was already then losing traction. Within a half century it had declined significantly in influence as nations and observers paid more attention to non-navigational uses of watercourses.<sup>328</sup> Even as support declined, however, the theory continued to appear in occasional diplomatic exchanges and in disputes between and among co-riparians, though it was rarely reflected in the actual resolutions of those controversies.<sup>329</sup> The authority of the doctrine was weakened in particular by the fact that the very dispute that gave rise to its common name was not resolved based on it. In the end the U.S. entered into a treaty with Mexico apportioning the waters of the river into national shares.<sup>330</sup>

*Absolute territorial integrity.* In stark contrast to the principle of absolute territorial sovereignty is the principle of absolute territorial integrity. Under it, each State enjoys the right to an uninterrupted flow of water in international watercourses; each State has a legal right, that is, to

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<sup>325</sup> Stephen C. McCaffrey, *The Law of International Watercourses: Non-Navigational Uses*, (Oxford: Oxford University Press, 2001), 114.

<sup>326</sup> *Ibid.*

<sup>327</sup> *Ibid.*, 115.

<sup>328</sup> *Ibid.*, 123.

<sup>329</sup> *Ibid.*, 127.

<sup>330</sup> *Ibid.*

the natural integrity of a watercourse within its territory, free of significant alterations by any other State. This too is an extreme position—the flip side of absolute sovereignty—in that it maximizes the power of a State to complain about harms it suffers while necessarily reducing the powers of States to use waters intensively, at least when their actions harm other States. This principle is generally associated with downstream States that seek to challenge interferences with natural flows by upstream States. Strictly applied the principle would severely limit the ability of an upstream State to develop the waters of a transboundary river should it cause any harm to a downstream State.<sup>331</sup> A State at the mouth of a river would be much less constrained, given the lack of any further downstream State, but some river alterations do have upstream consequences and thus could be challenged based on this doctrine. (Upstream consequences arise when migrating fish are disrupted; perhaps more importantly, they can arise when downstream diversions lead to salt water intrusions the spread upstream.) In general, this principle protects rivers as ecological wholes and for this reason appeals to environmental interests.

This principle, like the principle of absolute sovereignty, falls short of balancing the interests between upstream and downstream nations. One complaint is that the principle unfairly hampers upstream States that develop their water resources more slowly than their downstream neighbors. Taken literally it could effectively prohibit any development in such upstream States that may adversely affect the water flow to a downstream State.<sup>332</sup> This would prohibit not only diminutions in water quantity or quality but also dams and other sorts of river engineering that alter the timing of water flows (often by moderating natural seasonal flow variations).<sup>333</sup> Because

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<sup>331</sup> Peter Beaumont, “The 1997 UN Convention on the Law of Non-navigational Uses of International Watercourses: Its Strengths and Weaknesses from a Water Management Perspective and the Need for New Workable Guidelines,” *International Journal of Water Resources Development* 16:4 ((2000): 477, doi: 10.1080/713672536.

<sup>332</sup> McCaffrey, *The Law of International Watercourses*, 128.

<sup>333</sup> *Ibid.*



of this imbalance and its tendency to hamper development the principle of absolute territorial integrity has not enjoyed broad international support. Even the few States that have relied upon the principle in isolated controversies have not seemed to resort to in an absolute manner.<sup>334</sup>

*Limited territorial sovereignty.* The first two principles are in essence factually myopic and legally anarchic, as the prominent legal scholar Stephen McCaffrey has put it.<sup>335</sup> They look at water use from an extreme, rights-based approach with little concern for corresponding duties and other co-riparians' rights. Appropriately, more moderate, balanced views gained ground during the twentieth century. Among them was the principle of limited territorial sovereignty, a stance soon widely embraced as States negotiated over watercourse conflicts. According to this legal principle, the sovereignty of a State over its territory is qualified by an obligation to avoid using the territory in a way that causes significant harm to another State.<sup>336</sup> Put otherwise, States sharing an international watercourse have rights to use its waters, rights that are, in principle, equal, which means each State must respect the similar rights of others. The ideal of "equality of rights" of States when it comes to watercourses<sup>337</sup> is thus the core feature of limited territorial sovereignty. Various State practices and the decisions of international tribunals now support this proposition, which was proclaimed as early as the Madrid Declaration of 1911.<sup>338</sup> The very concept of equality of right comports with the principle enunciated in Article 2(1) of The UN Charter, which proclaims the sovereign equality of all U.N. Members.<sup>339</sup>

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<sup>334</sup> Herbert A. Smith, *The Economic Uses of International Rivers* (London: King and Son Ltd., 1931), 147-148.

<sup>335</sup> McCaffrey, *The Law of International Watercourses*, 135.

<sup>336</sup> Lucius Calfisch, "The Law of International Waterways and its Sources," in *Essays in Honor of Wang Tieya*, edited by R. St. J. Macdonald, 55. The Hague: Martinus Nijhoff, 1993.

<sup>337</sup> Jerome Lipper, "Equitable Utilization," in *International Drainage Basins*, Chapter 2, 44-45.

<sup>338</sup> McCaffrey, *The Law of International Watercourses*, 138.

<sup>339</sup> Charter of the United Nations, San Francisco, June 26, 1945, at the conclusion of the United Nations Conference on International Organization, *came into force* on 24 October 1945, accessed March 9, 2017, <http://www.un.org/en/charter-united-nations/>.

Among the rulings consistent with this third principle is the well-known ruling in the Lake Lanoux Arbitration.<sup>340</sup> That ruling rested upon what the arbitrators viewed as a binding “rule prohibiting the upper riparian State from altering the waters of a river in circumstances calculated to do serious injury to the lower riparian State.” The guiding principle as thus phrased was linked to the causation of serious or significant injury from the alteration or reduction of a water flow. The principle received strong support in the more recent and widely cited *Gabcikovo-Nagymaros* dispute, discussed below.<sup>341</sup>

Two other disputes, although not involving international watercourses per se, also yielded prominent endorsements of the ban on significant border-crossing harm—the *Corfu Channel* case<sup>342</sup> and the *Trail Smelter* case.<sup>343</sup> In *Corfu Channel*, the International Court of Justice (ICJ) re-affirmed “every State’s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.” Similarly, the arbitral tribunal between the USA and Canada in the *Trail Smelter* dispute stated that, under principles of international law, no State has the right to use or permit the use of its territory in such a manner as to cause injury (by fumes, in this instance) to the territory of another when the injury is serious and is established by clear and convincing evidence.

*Community of interest.* Related to this third principle is the fourth one, sometimes termed the “community of interest” stance. It expresses the idea that a community of interests in the water is created by the natural, physical unity of a watercourse. Although the principle can be found in

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<sup>340</sup> Lake Lanoux Arbitration (France v. Spain), (1957) 12 R.I.A.A. 281, 24 I.L.R. 101, (Arbitral Tribunal, November 16, 1957).

<sup>341</sup> *Gabčikovo-Nagymaros Project, Hungary v. Slovakia*, Judgment, Merits, ICJ GL No 92, (1997) ICJ Rep 7, (1997) ICJ Rep 88, (1998) 37 ILM 162, ICGJ 66 (ICJ 1997), 25th September 1997, International Court of Justice (ICJ).

<sup>342</sup> *United Kingdom v. Albania*, I.C.J., 1949 I.C.J.4.

<sup>343</sup> *Trail Smelter Arbitration (United States v. Canada)*, Arbitral Trib., 3 U.N. Rep. Int’l Arb. Awards 1905 (1941).

the writings of some philosophers,<sup>344</sup> it was first expressly upheld by the Permanent Court of International Justice (PCIJ) in its 1929 decision concerning the *Territorial Jurisdiction of the International Commission of the River Oder*.<sup>345</sup> In the ruling, the Court stated that common legal rights arose from the existence of a navigable waterway separating or traversing several States, rights that extend to the whole navigable course of the river and that do not stop at the border of the most upstream nation. Another prominent manifestation of this fourth principle appeared in the *Gabcikovo-Nagymaros* case, which reaffirmed that all riparian States enjoy perfect equality in the use of the whole course of the river. In its ruling, the ICJ drew jointly on the principles of limited territorial sovereignty and community of interest. As the court explained the situation, “the community of interest in a navigable river becomes the basis of a common legal right, the essential features of which are the perfect equality of all riparian States in the user of the whole course of the river and the exclusion of any preferential privilege of any one riparian State in relation to the others.”

*Doctrine of prior appropriation.* One of the central tasks of international watercourse law is to prescribe principles for reconciling competing uses of watercourses. Among the simplistic ways of doing so—along with the first two principles above—is the idea of favoring and protecting uses based entirely on the date when they began. Many legal approaches pay attention to the relative dates of competing activities reconciling conflicts between them. The doctrine of prior appropriation gives that single factor not just influence by dominance. First in time becomes first in right without regard for other factors, including the location of the water use and its comparative economic and social utility.

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<sup>344</sup> McCaffrey, *The Law of International Watercourses*, 150.

<sup>345</sup> *Territorial Jurisdiction of Int'l Comm'n of River Oder (U.K. v. Pol.)*, 1929 P.C.I.J. (ser. A) No. 23 (Sept. 10).

Prior appropriation is most prominently used as the basis of water-law systems among the Western States of the United States. Under the doctrine in its original, pure form, the earliest users of a watercourse have the right to claim their full amounts irrespective of the needs of any subsequent users. This priority gives early users the right to veto newcomers claiming a share of the available water resources if there is not enough to go around.<sup>346</sup> Before States began requiring permits, a water use was dated from the moment that the user physically diverted the water from the stream and put it to a use that was deemed beneficial under standards that considered nearly all uses beneficial: Physical diversion and beneficial use were the only requirements. Unlike the first two absolute territory-based principles, prior appropriation favors neither the upstream user of water nor the downstream user. Commonly, however, downstream States develop their water first, particularly when upstream uses depend upon the construction of dams, reservoirs, and other major projects. The approach thus more often favors downstream States.

Prior appropriation has worked tolerably well in most Western States of the U.S. although problems with it continue to mount as later, higher-valued uses have pressed against the longstanding claims of earlier, low-valued water uses. In international settings, however, the principle seems highly problematic, even as it does often make sense to offer limited protection to existing water uses when they clash with later ones. Practically speaking, it is usually much easier to determine the temporal priority of use between two non-State parties within a single State, unless one of the uses in an interstate dispute is clearly new. No international tribunal

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<sup>346</sup> Peter Beaumont, “The 1997 UN Convention on the Law of Non-navigational Uses of International Watercourses: Its Strengths and Weaknesses from a Water Management Perspective and the Need for New Workable Guidelines,” *International Journal of Water Resources Development*, 16:4 ((2000): 477, doi: 10.1080/713672536.

provides an effective, low-cost way to resolve conflicting temporal claims. Even within the United States, where disputes between States can be taken to the U.S. Supreme Court, the relative priority of particular water uses located in different States is not viewed as determinative. (Temporal priority, that is, is determinative only in conflicts between users within a single State.) Interstate disputes in the U.S. are litigated between States as such, not between users, and are resolved by an allocation of water between the States. As between States, the guiding doctrine is that of equitable apportionment, which pays attention to overall patterns of use in the competing States but does not prioritize individual uses on any fine-tuned calculation of temporal priority.

As will be seen, one of the key issues in international law has to do with the degree of protection of existing water uses. Existing uses were granted quite considerable protection in the early Helsinki Rules. That preference did not carry over with anything like the same strength into later international documents.

### The Emergence of International Water Law

As different non-navigational uses of water became more common, the need arose for a body of law to govern them, establishing rights and resolving disputes. The need for legal standards seemed particularly apparent when States chose to assert absolute sovereignty, using something like the reasoning of the Harmon Doctrine. Clear guidance also seemed more needed as actual State practices over the decades seemed to give rise to a discrete body of customary norms. Over the past century, this important job of clarifying and codifying customary principles applicable to

international waters has been collectively carried out by three international bodies, the International Institute of Law (IIL), the International Law Association (ILA) and the International Law Commission (ILC). The first ever effort at codification was undertaken by the International Institute of Law (IIL) and resulted in the Madrid Declaration of 1911.

*The Madrid Declaration, 1911.*<sup>347</sup> As suggested by its hefty name, the *International Regulation regarding the Use of International Watercourses for Purposes other than Navigation - Declaration of Madrid* set out, for the first time, international rules regarding the use of international watercourses for purposes other than navigation. The document marked a significant development in international law. It acknowledged for the first time the fact that riparian States are in a position of permanent physical interdependence, a reality that weakened or even undercut the idea that a State might claim sovereign autonomy over a watercourse section within its borders. The document thus directly challenged the sovereignty ideas incorporated in the Harmon doctrine. The Madrid Declaration highlighted the various non-navigational uses of rivers and acknowledged the failure of international law at that time to regulate and protect them. The Declaration divided international streams into two kinds – those that form the border of two States and those that traverse the territories of two or more States. It sought to regulate both types.

In the principles it put forth, the Declaration set a responsibility-oriented tone by calling on States to protect watercourses and their uses. It prohibited any injurious alterations of water flows and attempted to prevent the discharge of any injurious matter into them. It prohibited detrimental injuries to the banks and enjoined States not to seriously modify the constitution or

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<sup>347</sup> International Regulation regarding the Use of International Watercourses for Purposes other than Navigation, Institute of International Law, 1911, accessed March 9, 2017, <http://www.fao.org/docrep/005/W9549E/w9549e08.htm#bm08.1.2>.

the essential character of a stream. The Declaration also cautioned States not to interfere with the utilization of the common stream by other States or individuals. Although the principle of reasonable and equitable use had not yet appeared in the law, the Madrid Declaration nonetheless supplied a sound and useful start for the development of international water law involving non-navigational uses.

*The Dubrovnik Statement, 1956.*<sup>348</sup> Next after the Madrid Declaration came another work of the Institute of International Law (IIL) in 1956, popularly known as the Dubrovnik Statement. It marked another significant phase in the development of international water law by introducing new concepts that would soon become of central importance—the requirement for consultation in the case of proposed new waterway projects, principles of dispute resolution, and a requirement that river basins be understood as integrated units.

As for the terminology, the Dubrovnik Statement went from using the term “common stream” to “international river,” which it defined more simply as a river that flows through or between the territories of two or more States. The Statement significantly muted the claimed principle of absolute territorial sovereignty by requiring that a State exercise its control over a watercourse segment with due consideration for its effects upon other riparian States.<sup>349</sup> In general terms it called on a State to avoid injury to other States when it could do so through the exercise of reasonable diligence.<sup>350</sup> The Statement also required States to prevent any pollution of water that causes substantial injury to another.

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<sup>348</sup> Statement of Principles - Resolution of Dubrovnik, 1956, accessed March 9, 2017, <http://www.fao.org/docrep/005/W9549E/w9549e08.htm>.

<sup>349</sup> The Dubrovnik Statement, principle III.

<sup>350</sup> The Dubrovnik Statement, principle IV.

In terms of interstate agreements and dispute resolution, the Dubrovnik Statement encouraged riparian States to devise a mechanism of weighing the benefit to one State against the injury done to another through a particular use of water. It listed several factors for this weighing analysis, including the right of each State to make reasonable use of water. Other listed factors including the extent of dependence of each State upon that water; the comparative social and economic gains accruing to each and to the entire river community; pre-existent agreements among the States concerned and pre-existent appropriations of water by one State. As explained below, the Helsinki Rules, finalized a decade later, would draw upon these factors by incorporating them into its complex definition of the reasonable and equitable utilization of water.

As mentioned earlier, this Statement introduced the idea of mandatory consultation in the case of new works on international rivers and called for arbitration in case of any differences. Even more significant as a further legal development was the Statement's description of a river basin as an integrated whole, not a fragmented collection of water-flows and stream segments. The Statement thus went beyond the concept of an international river, one that formed or crossed State borders, to a much broader concept of a river basin including all of its water flows. Further, it called upon States to join each other in making full utilization of such waters, both from the viewpoint of the river basin as an integrated whole and from the viewpoint of the widest variety of uses of the water. In retrospect the Madrid Declaration of 1911 displayed a pro-downstream tone; the Dubrovnik Statement, in contrast, sought to balance for the first time the interests of upstream and downstream users with the goal of assuring the greatest benefits to all riparians.



*The Resolution on the Use of International Non-Maritime Waters - Salzburg, 1961.*<sup>351</sup> Following soon after the Dubrovnik Statement was a 1961 Resolution of the Institute of International Law (IIL), issued in Salzburg to deal with the rise in major waterway construction projects. The Resolution recognized the common interest of riparian States in maximizing the use of available natural resources, including water, and it nudged States toward greater joint planning and reciprocal concessions in order to achieve this goal. As it did so, it reiterated the principle that a State should take steps to avoid causing prejudice to another State.

Like the earlier two instruments, this Resolution upheld a State's right to make use of the waters flowing across or bordering its territory but only subject to the limitations imposed by international law and also to the exercise of similar rights by other States concerned. In case of any disagreement upon the extent of such rights of use, the Resolution recommended settling it on the basis of equity, taking into consideration the respective needs of the States as well as any other circumstances relevant to any particular case.

The focal point of concern in the Salzburg Resolution was relatively different than that of the earlier two works of the IIL. It mostly addressed the then-widespread application of modern techniques on shared watercourses, particularly hydro-electric powers, storage dams, and modern irrigation facilities, and sought to generate a regulatory framework that allowed them to proceed in ways that did not unduly disturb other States' rights on water.

The Resolution made clear that each State may proceed with such works or watercourse uses only on the condition of preserving for other States the benefits to which they are entitled, with adequate compensation for any unavoidable losses or damages. A further condition was that

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<sup>351</sup> <http://www.fao.org/docrep/005/W9549E/w9549e08.htm>.

such a work or use may only be initiated after due advance notice to those States. The Resolution included a detailed negotiation and dispute-resolution process to address objections by another State to a proposed watercourse project or new use. It further provided that disputes that States could not resolve on their own be submitted to judicial or arbitral settlement.

### The Helsinki Rules

A major step forward in the emergence of a developed, authoritative law of international watercourses covering non-navigable uses came with the completion in 1966 of *The Helsinki Rules on the Uses of the Waters of International Rivers*.<sup>352</sup> The document was legally non-binding yet it soon gained influence and remained the most quoted set of principles and rules until the adoption of the UN Watercourse Convention in 1997. The Rules were crafted by the International Law Association (ILA) with work extending for more than a decade. The effort began when the ILA established a committee in 1954 with the aim of clarifying and restating existing international law as it applies to the rights of States to utilize international waters. The committee first reported at a conference held in Dubrovnik in 1956. The final Rules consisting of thirty seven articles were approved by the ILA as the Helsinki Rules at its 52<sup>nd</sup> conference held in 1966.

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<sup>352</sup> The Helsinki Rules on the Uses of the Waters of International Rivers, *adopted* by the International Law Association, Helsinki, Finland, August, 1966.

Unlike the previous works by the IIL, the Helsinki Rules govern both navigational and non-navigational uses of international waters. The Helsinki Rules further hold importance as the first full iteration of key notions in the realm of international water law; i.e. regulation extending to international drainage basins; the introduction of the principle of reasonable and equitable utilization of waters; the applicability of these rules to tributary ground water as well as surface water; and the incorporation of rules for basic environmental protection. The Rules define a drainage basin in Article II as “a geographical area extending over two or more States determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus.”

As perhaps its central principle the Helsinki Rules provide (in Article IV) that each State is entitled, “within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.” The various competing principles are brought together in an overall assessment of competing uses and of whether, in a given situation, a State is or is not exceeding its reasonable and equitable share. The terms “reasonable,” “equitable,” and “beneficial” are not separately defined although they are terms that are borrowed from other legal settings—U.S. water law in particular—where they have been (and still are) used separately and with different meanings. The Helsinki Rules in effect blend the terms and their meanings into a single assessment test that considers the many relevant factors, including the type of use (beneficial?), how and where the use is undertaken and with what efficiency, caution, and consequences (reasonable?), and whether a State exceeds its fair share of the water uses (equitable?). Article V lists many relevant factors while cautioning that its list is not exhaustive. Factors include the geography of the drainage basin and how it is divided among the basin States; the hydrology of the basin, including the contribution of water by each basin State; the

climate affecting the basin; past utilization of the waters of the basin, including existing utilization; the economic and social needs of each basin State; the population dependent on the waters of the basin in each basin State; the comparative costs of alternative means of satisfying the economic and social needs of each basin State; the availability of other resources; the possible avoidance of unnecessary waste in the utilization of waters of the basin; the practicability of compensation to one or more of the co-basin States as a means of adjusting conflicts among uses; and the degree to which the needs of a basin State may be satisfied without causing substantial injury to a co-basin State. Remarkably in light of later legal developments, the Rules do not include a separate reference to a State's obligation to avoid harming another State. That principle plays a role in the Rules more indirectly, as it relates to various of the enumerated factors used in the reasonable and equitable analysis.

The Helsinki Rules devote separate chapters for all different concerns such as pollution, navigation, and timber floating. The Rules refer to "water pollution" as any detrimental change resulting from human conduct in the natural composition, content, or quality of the waters of an international drainage basin. It requires a basin State—"consistent with the principle of equitable utilization"—to prevent any new form of water pollution or any increase in the degree of existing water pollution which would cause substantial injury in the territory of a co-basin State; and to take "all reasonable measures" to abate existing water pollution to such an extent that no substantial damage is caused in the territory of a co-basin State. In case of a violation of these requirements, the Rules require the responsible State to cease the wrongful conduct and compensate the injured co-basin State or to enter into negotiations with a view to reaching a settlement. With regard to navigation, the Rules incorporate the customary international law principle that grants each riparian State the right of free navigation on the entire course of the

river or lake on a reciprocal basis. It seeks to equate all uses of international rivers by stating that no use or category of uses is entitled to any inherent preference.

Finally, the Rules include a chapter for the prevention and settlement of disputes, and require notification to other riparians of any proposed construction or installation that would alter the regime of the basin or give rise to a dispute.

Two aspects of the Helsinki rules deserve emphasis before moving on, given that later iterations of the law would deviate from them. One key issue in any water-law regime relates to the protection of existing water uses from interference by later ones. To what extent, in other words, does a legal regime allocate water use-rights based on priority in time, the cardinal principle of the prior appropriation system? The issue draws considerable attention in the Helsinki Rules, which give qualified but nonetheless emphatic protection to earlier uses, a protection that (as we shall see) diminishes in later formulations. The overall assessment of a State's reasonable and equitable share of a basin's water includes attention to "the past utilization of the waters of the basin, including in particular existing uses." (Art. V, II, 4). The topic returns, and receives special attention, in Article VIII. It protects "an existing reasonable use" of water "unless the factors justifying its continuance are outweighed by other factors leading to the conclusions that it be modified or terminated so as to accommodate a competing incompatible use." Perhaps significantly, this qualified protection for existing uses is not linked to a State's reasonable and equitable share" of water; it is a freestanding protection. Added to these provisions dealing with existing uses is the above-mentioned material on water pollution. It also protects existing uses by directing States to avoid pollution that causes substantial injury—typically, one supposes, injury to existing uses—insofar as this can be done "consistent with the principle of equitable utilization." In short, while the protections for existing uses are qualified, existing uses

nonetheless are singled out in the Helsinki Rules as somehow different, and more worth of protection, than other water uses.

Also noteworthy in the Helsinki Rules, in light of later developments, is the broad definition of pollution contained in them. As defined in Article IX, pollution includes “any detrimental change . . . in the natural composition, content, or quality” of a waterflow. As thus defined pollution would seem to include (as is does under the U.S. Clean Water Act), any alteration in water temperature and the addition or removal of silt, as well as the addition of chemical compounds commonly understood as pollution. The water-temperature element is important in that discharges from reservoirs are commonly much cooler than undisturbed natural water flows. At the same time, rainfall running off denuded lands is often warmer in temperature. As for siltation, the importance of the issue was highlighted in earlier chapters. Again, reservoirs commonly capture silt, thus altering downstream flows and depriving lower riparian lands of the benefits silt can provide. Importantly, the definition of pollution, while broad, does not reach to alterations in the timing of water flows; that issue, and the harms sometimes associated with it, enter the Rules only as they relate to the issue of reasonable and equitable share.

Although it is a non-binding instrument, the Helsinki Rules has had immense influence in the development of international water law. It codified for the first time the prevalent customary norms and rules relating to international waters, thereby creating a framework or structure for States to follow. The document restated key principles, and put forth, front and center, the principle of reasonable and equitable share as the cardinal rule of international water law.

Although the Rules did not include an overarching, separate duty on a State to avoid causing significant harm—a duty that would soon make overt appearance—the idea was embedded in several parts of the Rules, including the multi-factor test for reasonable and equitable share and

protections for existing uses. Overall, the Helsinki Rules gained immediate respect. It was soon accorded the status of customary international law.

### The Problem of Pollution

The legal documents described so far in this chapter have all dealt principally with issues related to water allocation; with conflicts over diversions of water flows and water structures that alter the quantity and timing of those flows. Pollution as such was an ancillary although rising concern. While the Helsinki Rules were gaining support, proceeding slowly to become (as it would in 1997) a U.N. Convention, the United Nations Economic Commission for Europe (UNECE) turned its attention to pollution as a distinct problem. Drawing heavily upon the U.S. Clean Water Act and similar pollution statutes inspired by it, the Commission in 1992 released its *Convention on the Protection and Use of Transboundary Watercourses and International Lakes*. Negotiated and adopted by the member States of the UNECE in Helsinki, it entered into force in 1996.<sup>353</sup> Initially designed as a regional instrument, amendments to it that took effect in February 2013 opened the convention to signing by any UN Member State, thus making it a universally applicable legal framework for transboundary water cooperation.<sup>354</sup>

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<sup>353</sup> The Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Helsinki, 17 March, 1992, U.N.T.S. 33207, accessed March 9, 2017, [https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-5&chapter=27&clang=en](https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-5&chapter=27&clang=en).

<sup>354</sup> In 2003, the Water Convention was amended to allow accession by countries outside the UNECE region. The amendment entered into force on 6 February 2013, turning the Water Convention into a legal framework for transboundary water cooperation worldwide.

While the ECE convention preceded the 1997 UN Watercourse Convention (discussed below), it was nonetheless influenced by the ILC's then-on-going negotiating process over it, resulting in similarities with respect to provisions relating to pollution control and reduction, reasonable and equitable use, and cooperation between riparian States.<sup>355</sup> This difference in focus between the two documents—the ECE convention focused on pollution; the UN effort on reasonable and equitable use<sup>356</sup>—can be attributed to several facts: the number of negotiating parties was smaller for the ECE Convention; the nations involved shared homogenous geographic traits and conditions; and water problems in the ECE region had more to do with the protection of water quality and of related ecosystems than with water allocation.<sup>357</sup>

As its title suggests, the ECE convention aims at protecting the environment of transboundary waters. It directs signatories to engage in the ecologically sound and rational management of transboundary water resources. In doing so, it recognizes the protection and use of transboundary waters as important and urgent tasks, and expresses concerns over the existence and threats of adverse changes in their conditions. This is in part a framework agreement in the sense that it provides an intergovernmental platform for the day-to-day development and advancement of transboundary cooperation, leaving the specificities to be addressed in other bilateral or multilateral agreements. But key parts of the convention impose obligations on signatories directly, including obligations to control and license pollution sources and to require point-source polluters, and dischargers of hazardous wastes, to use the best available technology to reduce their pollution. It is thus an example of duties imposed at the global level, limiting

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<sup>355</sup> A. Tanzi, "Regional Contributions to International Water Cooperation: the UNECE Contribution," in *International Law and Freshwater: The Multiple Challenges*, edited by L. Boisson de Chazournes, C. Leb, and M. Tignino.

<sup>356</sup> Laurence Boisson de Chazournes, *Fresh Water in International Law* (Oxford: Oxford University Press, 2013) 33.

<sup>357</sup> *Ibid.*



how individual States can use waters without regard for the outcomes of any bilateral and regional agreements. It protects downstream States, that is, even when they are unable to protect themselves through bilateral and regional agreements.

In pursuit of its pollution-reduction aims the ECE convention imposes a general obligation on parties to use “all appropriate measures” to prevent, control and reduce any “transboundary impact,” a term that includes “any significant adverse effect on the environment resulting from a change in the conditions of transboundary waters.” Effects on the environment in turn include not only direct effects on water, but also effects on human health and safety, flora, fauna, soil, air, climate, landscape and historical monuments or other physical structures or the interaction among these factors. Indeed, effects encompass consequences to the cultural heritage or social-economic conditions of a State resulting from alterations to those riparian factors.

“Transboundary water” is defined with similar breadth. It includes any surface or ground waters that mark, cross or are located on boundaries between two or more States. With respect to ground waters, both confined and unconfined aquifers are covered by the convention.

In using transboundary waters, the convention requires parties to do so in a reasonable and equitable way. It directs them to cooperate on the basis of equality and reciprocity for developing harmonized programs and strategies. The convention seeks to accomplish the stated objective of preventing and reducing transboundary impact by requiring parties to undertake relevant legal, administrative, economic, financial and technical measures. These measures mostly involve the adoption of various anti-pollution efforts through the application of best available technology and best environmental practices. Apart from these measures, the convention enjoins parties to carry out necessary environmental impact assessments and to promote the sustainable management of the water resources based on an ecosystem approach.

Each party is additionally required to define and establish water-quality objectives and water-quality criteria for the purpose of reducing transboundary impacts.

Overall the convention is quite forward-looking with respect to institutional mechanisms and provides for meeting of the parties for continuous review and implementation of its provisions.<sup>358</sup>

As part of the convention's joint-management mechanisms, the parties are called upon to draw up joint monitoring and assessment programs, to facilitate joint research and development activities, to establish channels for continued exchange of information, and to set up warning mechanisms for critical situations. One innovative approach of the Helsinki Convention is its emphasis on public participation and its requirement to make available to the public all pertinent information relating to the conditions of transboundary waters.

Several elements of this convention are worth emphasizing.

First, while directed at pollution the convention includes a requirement that parties to it take "all appropriate measures" to use waters "in a reasonable and equitable way," a requirement that goes well beyond pollution concerns. Of interest here is that the convention borrows but modifies the language used in the Helsinki Rules. The latter admonished parties to limit their water uses to a "reasonable and equitable share." The ECE convention changed "share" to "way." The shift in wording perhaps reflects the histories of the two adjectives and the different ways they have been used, chiefly (as noted above) in U.S. water law. *Reasonable* has been used to limit the ways water may be used, in terms of type and efficiency of a use and of the place and social value of the use, particularly in comparison with competing uses. *Equitable* on the other hand has typically referred to the fair sharing of water between two States; it refers to how water flows are

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<sup>358</sup> Chazournes, *Fresh Water in International Law*, 33-34.

allocated and divided, rather than to the specific ways they are used within a State. The shift in the ECE convention from “share” to “way” suggests a desire by the drafters to put less emphasis on the sharing of water and more on the need to limit particular low-valued or degrading uses of water, wherever located, and to divide water by favoring the most valuable water uses over the less valuable ones. Further, a requirement that all uses be reasonable constrains water uses *within* a State, even when the State itself is not claiming more than its equitable share of the water flow.

With this requirement for reasonable and equitable uses, even with the term relatively undeveloped, the ECE convention does qualify as an overall convention governing non-navigational uses of water, thus inviting comparison with other similar legal arrangements.

Second, the ECE convention roundly endorses three key principles long espoused by environmental advocates, and instructs that parties “shall be guided” by them. The principles are: (i) the precautionary principle, which urges preventive action even when suspected harm has not been fully proved and causation established; (ii) the polluter-pays principle, requiring that a polluter bear the costs both of pollution control and of the resulting harms; and (iii) the principle that actors today should live in ways that do not compromise the ability of future generations to meet their own needs. The convention does not add detail to these general principles, but does obligate parties to employ them.

Third, like the Helsinki Rules, the ECE convention (as noted above) employs an exceptionally broad definition of transboundary “impact” and “effect.” Given its breadth the definition seems to include changes in the temperature of water flows and their silt loads. It expressly includes effects on all life forms and, in doing so, seems to sweep broadly to draw in all physical changes

to ecosystems that humans deem degrading. Unlike in the Helsinki Rules, the convention language on transboundary effects does take the express form of an obligation to avoid harm; it is a “do-no-harm” type of provision, not merely (as in the Helsinki Rules) a list of factors relevant in determining reasonable and equitable sharing or uses of water. This ban on causing harm, however, is significantly weakened. The convention states that parties merely must “take all appropriate measures” to prevent, control and reduce their harms, guided by the three overarching principles just listed.

Fourth, the convention borrows liberally from U.S. water law by distinguishing between pollution discharged from discrete pollution points and pollution that comes instead from the runoff of rain from human land uses, what is termed “nonpoint source” pollution. Like U.S. law it mandates the use of best available technology to reduce point-source pollution and calls only for more general measures to reduce non-point pollution. The result of this differential treatment in the United States is that point-source pollution has declined markedly while nonpoint pollution has largely continued, in places even becoming worse. Polluted run-off from land-use activities has, in the United States, proved very difficult to address because it is not subject to easy technological fixes; it requires, often, fundamental changes in the ways lands are used, particularly significant increases in permanent land cover and changes to drainage practices. Supplementing these mandatory point-source controls are requirements—again, also found in U.S. law—that States prescribe water-quality standards that limit tolerable pollution levels in waterways. Here, too the U.S. experience is instructive: Water-quality standards are useful in identifying waterway segments that are unduly polluted; States must periodically identify all waterway segments that exceed maximum water-quality pollution standards. But the standards themselves prescribe no steps to diminish high pollution levels and violations of them do not

yield penalties. The ECE convention, just like U.S. law, offers no explanation on how States can and must deal with their overly polluted watercourse segments.

Finally and as noted above, the ECE convention is significant in that it does go beyond setting a framework for negotiations among States to deal with pollution problems and water uses that are not reasonable and equitable. It directly regulates State action by insisting, as noted, that measures be taken to reduce harmful effects and that States license and require pollution control technology for point sources. The convention thus stands as a prominent example of limits on waterway use set at the global level, not simply by negotiations at local levels.

#### The 1997 U.N. Convention: An Overview

The *Convention on the Law of the Non-navigational Uses of International Watercourses, 1997*, was the first attempt by the United Nations to frame a set of international rules governing nonnavigable uses of watercourses. It codifies prevalent norms and introduces some of the newer concepts in international water uses. The convention was adopted by the United Nations General Assembly on May 21, 1997, and came into force on 17 August 2014,<sup>359</sup> bringing to a close a long and turbulent law-making effort. The United Nations General Assembly first addressed the issue of international rivers in 1959. As noted above, it assigned the work of preparing a watercourse convention to the International Law Commission (ILC) in 1970. Not until 1994

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<sup>359</sup> By resolution A/RES/51/229 of 21 May 1997, the General Assembly of the United Nations adopted the Convention at its 51 session, accessed March 10, 2017, [https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-12&chapter=27&clang=en](https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&clang=en).

could the ILC agree on and complete the draft articles of the convention, which were then negotiated in the Sixth (Legal) Committee of the General Assembly, convened as a “Working Group of the Whole.” These negotiations were open to all UN member States and to State members of specialized agencies of the United Nations. Three years of negotiations produced the version adopted by the United Nations General Assembly in 1997 by a vote of 103 to 3 with 27 abstentions. Ratification proceeded slowly despite the large number of signatories. Only in 2014 had enough States (35) signed for the convention to take effect.

The U.N. Convention is designed to promote the optimal and sustainable use, development, conservation, management and protection of international watercourses for the benefit of present and future generations.<sup>360</sup> It is largely (although not entirely) a framework convention in that it addresses basic procedural aspects and a few substantive ones while leaving riparian States through negotiation to add particulars based on local needs and the characteristics of the watercourses in question. As noted below, the vagueness on this point—on the ability of regional agreements to alter (particularly weaken) the mandates of the convention—is one of its several weaknesses. Further, the convention fails to take account of grave imbalances in negotiating power due to location on a watercourse as well as to variations in political and economic strength.

The convention is divided into seven parts containing thirty seven articles and includes an annex on arbitration. Considered as a whole, the convention underscores the concept of cooperation between States and entitles every State in a river or lake basin to be party to any agreements governing that basin. It puts particular emphasis on two points: the principle of equitable and

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<sup>360</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, preamble.

reasonable use of a watercourse and the obligation of States to avoid causing significant harm to other watercourse States. Fitting uneasily with these two principles—which themselves fit together awkwardly—are several strongly worded admonitions to avoid environmental degradation. The convention also provides for regular consultation and exchanges of information, and for reliance on peaceful means of dispute resolution.

Unlike the Helsinki Rules that laid down rules both for navigational and non-navigational uses, the UN Watercourse Convention applies only to non-navigational uses of international watercourses. According to the convention, a watercourse as defined encompasses both surface water and groundwater that, by virtue of their physical relationship, constitute a unitary whole that normally flows into a common terminus. An “international watercourse” is defined to mean such a watercourse, parts of which are situated in different States.<sup>361</sup>

The convention does not affect the rights or obligations of a watercourse State arising from any existing agreement; they remain in force. Parties to such agreements, however, are urged to harmonize their agreements with the basic principles of the convention. The convention further states that an agreement may be entered into with respect to an entire international watercourse or any part thereof or a particular project, program or use. This cannot occur, however, if the agreement adversely affects, to a significant extent, uses of the watercourse by a State that has not consented to the arrangement.

The convention entitles every watercourse State to participate in the negotiation of, and to become a party to, any watercourse agreement that applies to the entire international watercourse.<sup>362</sup> When an agreement applies only to a part of the watercourse or to a particular

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<sup>361</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 2(a) and art. 2(b).

<sup>362</sup> *Ibid.*, art. 4(1).

project or use, a watercourse State is entitled to participate and to become a party to the extent its use is significantly affected.<sup>363</sup>

After setting these general objectives and initial guidelines, part II of the convention presents the cornerstone elements of the law of international watercourse—the requirement that all uses of a watercourse be “equitable and reasonable” (Art. 5) and the obligation of States to “take all appropriate measures to prevent the causing of significant harm to other watercourse States.” (Art. 7) The convention incorporates both of these principles, setting them side by side without attempting to reconcile them. In this respect it differs from the Helsinki Rules, which (as noted above) took harm into account in the “reasonable and equitable share” analysis rather than as a freestanding limit on watercourse uses. Overall, the harm-avoidance principle in the convention closely resembles the similar provision in the 1992 ECE convention.

*Equitable and reasonable utilization.* The Convention follows the same approach adopted earlier by the Helsinki Rules which established the principle of equitable and reasonable utilization as the guiding principle of international water law, and reiterates to a large extent the factors laid down in the Helsinki Rules.<sup>364</sup> (The shift in language from “reasonable and equitable” to “equitable and reasonable” does not seem significant given that the terms are not separately defined or used.) The principle as incorporated in the Convention obliges States to utilize an international watercourse in an equitable and reasonable manner so as to promote its

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<sup>363</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 4(2).

<sup>364</sup> Article 5 of the Helsinki Rules on the Uses of the Waters of International Rivers, 1966 laid out rules on Equitable and reasonable utilization and participation. Article 5(1) stated that 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. Article 5(2) then followed by stating that the watercourse States shall participate in the use, development and protection of an international watercourse in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention.



optimal and sustainable use, taking into account the interests of the watercourse States concerned and consistent with adequate protection of the watercourse.

The convention does not define what an equitable or reasonable utilization is, but lays down several factors and circumstances to be taken into account. Among these factors are the geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character; the social and economic needs of the watercourse States; the relative populations dependent on the watercourse; existing and potential uses of the watercourse; conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect; the effects of the actions in one watercourse State on other watercourse States; and the availability of alternatives to a particular planned or existing use.

The weight given to each factor is to be determined by its importance in comparison with other relevant factors. In the end, all relevant factors are to be considered together in determining whether a State's use of a watercourse is equitable and reasonable.<sup>365</sup> Under Article 10, no use of a waterway enjoys inherent priority over any other use in the absence of any agreement or custom to the contrary except that, in case of conflict, "special regard" is given to watercourse uses that serve "vital human needs."

Significantly, the UN convention gives no particular priority to existing uses of watercourses when they conflict with new ones except to the extent that existing uses are protected by the harm-avoidance principle. Indeed, the express Statement that no use enjoys inherent priority (Art. 10) seems aimed at expressly disavowing special protection for existing uses, which is to say it weakens if it does not nearly eliminate the importance of priority in time. The language in

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<sup>365</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 6(3).

the UN convention is particularly noteworthy given the strong protection for existing uses included in the Helsinki Rules, which served as the basis for the U.N. convention.

*Obligation to avoid harm.* The principle of equitable and reasonable utilization is followed by the obligation to avoid harm in Article 7 of the convention.<sup>366</sup> The no-harm principle suggests that watercourse States should take all appropriate measures when utilizing an international watercourse to avoid causing significant harm to others. If significant harm is nevertheless caused, all appropriate measures are to be taken to eliminate or mitigate such harm.<sup>367</sup> On these points, the convention largely repeats provisions of the 1992 ECE convention.

Seemingly, this harm-avoidance principle does not express an absolute limitation on causing any harm but constrains only harms that are “significant” in nature. The convention, however, fails to explain what types of harm are significant. The limit is further weakened because a State merely needs to undertake “all appropriate measures” to prevent the harm; the ban is not absolute, even when harm is significant.

*General obligation to cooperate.* One salient feature of the convention is its insistence on the obligation to cooperate. Article 8 obliges States to cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse. It specifically encourages them to consider the establishment of joint mechanisms or commissions.

*Planned measures.* The UN convention has a separate section dealing with plans to develop water-management structures within an international watercourse, what the convention vaguely

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<sup>366</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 7.

<sup>367</sup> *Ibid.*, art. 7(2).

terms (without a definition) “planned measures.” The convention imposes a duty on parties to exchange information and to consult and negotiate with other States before taking action.<sup>368</sup> For any such measures that may have a significant adverse effect on watercourse States, the information exchange needs to include available technical data and the results of any environmental impact assessment.<sup>369</sup> When a planned measure is inconsistent with Articles 5 or 7, the proposing State is required to enter into consultations and, if necessary, negotiations with a view to an equitable resolution of the situation.<sup>370</sup> Meanwhile, the convention bars work on the proposed measures while negotiations are ongoing. This legal stance is augmented in a confusing way by a later section in the convention, Article 25, dealing with “regulation,” a term—this time defined—which means “the use of hydraulic works or any other continuing measure to alter or otherwise control the flow of the waters of an international watercourse.” The Article instructs States to cooperate in efforts to regulate water flows and to share the costs of structures they have agreed to help undertake.<sup>371</sup> Importantly, it is silent on the legal consequences when a State objects to a proposed “regulation” because of its harmful effects.

Planned measures and hydraulic structures can, of course, cause radical changes to watercourses, particularly when they entail significant water diversions or alterations in the timing of water flows. Reservoirs routinely disrupt the flow of silt, block fish migrations, and alter the temperature of downstream water flows. Once in place, they also diminish water-use options downstream, in effect claiming primacy based on priority in time as against later-arising water uses downstream. All of these characteristics would seem to clash with the basic principle of

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<sup>368</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 11.

<sup>369</sup> *Ibid.*, art. 12.

<sup>370</sup> *Ibid.*, art. 17(1).

<sup>371</sup> *Ibid.*, art. 25(2).

harm-avoidance and with the seemingly deliberate decision in the convention not to give primacy based on priority in time. At bottom, the provisions on planned measures and hydraulic structures fit quite poorly with the rest of the convention. They large stand apart from, and thus curtail, the two guiding principles of equitable and reasonable utilization and harm-avoidance.

*Pollution control and the protection and preservation of ecosystems and the marine*

*environment.* Much as the planned-measures provisions seem to disrupt the overall structure of the UN convention, so too do the various provisions dealing with environmental protection. The convention's several environmental provisions appear in Part IV of the convention (Articles 20-23), entitled "Protection, Preservation and Management."<sup>372</sup> Article 20 establishes a general obligation to "protect and preserve the ecosystems of international watercourses." Although vague in phrasing, the obligation is exceptional in that it goes well beyond the principle of avoiding ecological change harmful to other States. Indeed, the principle seems to limit action by a watercourse State that degrades a watercourse located within the bounds of that State.

The convention builds on this general obligation in the following section (Article 21) by offering an equally broad ban on pollution that causes harm either to other watercourse States or, significantly, to the environment generally or "the living resources of the watercourse." Much as in the 1992 ECE convention, pollution is defined very broadly. It includes "any detrimental alteration in the composition or quality of the waters of an international watercourse that results directly or indirectly from human conduct."<sup>373</sup> As in the ECE convention, this definition would seem to include alterations in silt loads and water temperature. It also goes beyond point-source discharges of pollution to encompass land uses that resulted in polluted run-off. Section 3 of the

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<sup>372</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 25(2).

<sup>373</sup> *Ibid.*, art. 21(1).

Article obligates States to work in tandem to develop pollution-control measures similar to those envisioned in the ECE convention. Their specific obligation is to “consult” with other States, upon request, with a view to agreeing on pollution-control measures, measures that all of the consulting States would presumably be required to adopt. The measures include “techniques and practices” to reduce both point and non-point source pollution (for instance, one assumes, technology-based standards) as well as water-quality objectives and criteria.<sup>374</sup>

Supplementing the ban on pollution that significantly harms a watercourse’s “living resources” is a duty on States (Article 22) to “take all measures necessary” to prevent the introduction of any alien or new species into an international watercourse insofar as that may have detrimental effects to that ecosystem.<sup>375</sup> The wording of the duty is significant: Its call for “all measures necessary” is distinctly stronger than the Article 7 harm-avoidance principle, which calls more modestly for States to “take all appropriate measures.” The same stronger language appears also in Article 23, which requires States to protect and preserve the marine environment, including estuaries. Again, the duty is to “take all measures . . . that are necessary,” rather than simply “all appropriate measures.” Despite the strong, clear language of these provisions, the Working Group responsible for the convention in a Statement of Understanding has contended that the duties entail only a due diligence standard.

Taken as a whole the pollution-prevention provisions of the convention are open to various interpretations. Several provisions, as noted, impose clear duties on States to protect and preserve ecosystems, especially estuaries and the marine environment, and to avoid pollution that harms the environment, apparently without regard for effects on other States. On the other side,

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<sup>374</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 18(3).

<sup>375</sup> *Ibid.*, art. 22.

the only express action that a State must take is to consult with other States on methods of pollution control and on water-quality standards.<sup>376</sup> These specific action elements hardly seem sufficient to enable a State to carry out its sternly worded overall duties. A State might consult in good faith, and adopt the various pollution-control and water-quality measures reached in consultation, yet still violate the general standards in material ways. It is not clear what legal consequences might then ensue. It is similarly not clear whether States unaffected by pollution or ecosystem degradation would have standing to file complaints against an offending State, nor whether States in a region, by entering into a regional agreement, could weaken their duties for environmental protection.

Regarding installations, facilities and other works related to an international watercourse, the convention requires watercourse States to employ their best efforts to maintain and protect them.<sup>377</sup> It also directs them to consult when any State believes a facility could harm it significantly due to its operation or maintenance, to any “willful or negligent acts,” or simply to the “forces of nature.”<sup>378</sup>

*Settlement of disputes.* Article 33 of the convention addresses the important topic of dispute resolution. It calls upon parties to settle disputes by negotiation and mutual agreement.<sup>379</sup> Should that fail, the convention recommends submission of the dispute to a third party, to arbitration, or to the International Court of Justice.<sup>380</sup> Should these methods fail, disputes are to be addressed by a “Fact-finding commission” set up and operated in the manner set forth in the

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<sup>376</sup> Ken Conca, *Governing Water: Contentious Transnational Politics and Global Institution Building*, (Massachusetts: The MIT Press, 2006), 100.

<sup>377</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 26(1).

<sup>378</sup> *Ibid.*, art. 26(2).

<sup>379</sup> *Ibid.*, art. 33(1).

<sup>380</sup> *Ibid.*, art. 33(2).

convention.<sup>381</sup> Disputing States are expected to consider the report of such a commission “in good faith.”<sup>382</sup> As one commentator has observed, the recommendation of a commission should carry great moral weight even though one or more disputing States could ignore it.<sup>383</sup>

### The Tension between Reasonable Use and Harm Avoidance

During its twenty-three years of work on the UN convention, the ILC tested and incorporated different approaches and principles as it endeavored to craft a convention based on progressive principles. Its work was not done in isolation; it interacted regularly with the General Assembly and its diverse membership.<sup>384</sup> The most contentious issue surrounded the wording of articles 5 and 7 and their relationship with each other. The two articles were (and are) viewed as conflicting—the one authorizing equitable and reasonable uses, the other admonishing States to avoid significant harm. To no surprise, UN member States divided among themselves as to which principle ought to take priority. Lower riparians tended to favor the harm-avoidance rule because of their greater vulnerability to harm and the lesser chance that their own actions would cause harm.<sup>385</sup> Conversely, upper riparians tended to favor the principle of reasonable and equitable utilization because, taken alone, it provides more latitude for States to use watercourses intensively. Debate on various drafts of the convention tended to divide the UN membership between upstream and downstream nations and occupied the ILC throughout its work.

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<sup>381</sup> Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, art. 33(3) and art. 33(4).

<sup>382</sup> *Ibid.*, art. 33(8).

<sup>383</sup> Peter Beaumont, “The 1997 UN Convention on the Law of Non-navigational Uses of International Watercourses: Its Strengths and Weaknesses from a Water Management Perspective and the Need for New Workable Guidelines,” *International Journal of Water Resources Development* 16:4 (2000): 486, doi: 10.1080/713672536.

<sup>384</sup> McCaffrey, Stephen C, “The 1997 U.N. Watercourses Convention: Retrospect and Prospect,” *21 Pac. McGeorge Global Bus. & Dev L.J.* (2008): 166, accessed April 19, 2017, <http://scholarlycommons.pacific.edu/cgi/viewcontent.cgi?article=1031&context=facultyarticles>.

<sup>385</sup> Conca, *Governing Water*, 100.

Looking back, the Helsinki Rules of 1966 seemed to elevate equitable and reasonable utilization (or reasonable and equitable, as the Rules expressed it) over the harm-avoidance principle although the harmfulness of a water use made it less reasonable. In the ensuing years, the ILC tried out various ways to accommodate the two principles. One proposed approach, put forth by Stephen M. Schwebel, called for determinations of equitable and reasonable use to be resolved by consultation among the affected States.<sup>386</sup> The idea drew strong opposition from ILC representatives from the Soviet Union and Eastern Europe because it seemed to envision dispute resolution by third party, a possibility they disliked.<sup>387</sup> It was finally the East German member of the Commission, Professor Bernhard Graefrath, who proposed the final version of equitable and reasonable utilization linked to the dispute resolution provisions now in Article 33.<sup>388</sup>

Article 7 of the 1994 draft articles expressly limited the obligation of a State to avoid causing significant harm by calling only for “due diligence.” It provided that, when significant harm nonetheless occurred, the affected States were to consult on the problem, taking into account the enumerated factors in article 6, possible changes in the harm-causing water use to avoid the damage, and the possibility of compensation. This version drew opposition from downstream States, which saw it, correctly, as distinctly favoring use over harm-avoidance. Sensing a dead head, the Working Group crafted an entirely new version of the article.

In its final form, Article 7 requires a State causing significant harm to take measures to eliminate or mitigate such harm “having due regard for articles 5 and 6” (on equitable and reasonable utilization).<sup>389</sup> The tripartite formulation of articles 5, 6 and 7 quickly became known as the

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<sup>386</sup> McCaffrey, *The Law of International Watercourses*, 167.

<sup>387</sup> *Ibid.*

<sup>388</sup> *Ibid.*

<sup>389</sup> Article 7(1) of the UN Convention lays down that watercourse States shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other



“three article package” and was understood as a compromise. As Lucius Caflisch noted, the compromise seemed sufficiently neutral on the basic equitable-use-versus-harm-avoidance conflict to allow a number of lower-riparian States to accept it.<sup>390</sup>

The ultimate compromise was sufficient to achieve adoption of the convention by the General Assembly but worries on the issue lingered and they delayed the convention’s entry into force. Notwithstanding the balancing language, the prevailing view today is that the convention subordinates the harm-avoidance principle to the principle of equitable and reasonable utilization.<sup>391</sup> As Salman M.A. Salman has reasoned, the issue of harm is included in the Article 6 factors determining equitable and reasonable utilization. These factors include the effects that water uses in one watercourse State have on existing and potential uses in other watercourse States. In Salman’s view, this arrangement seems to make harm a factor relevant in evaluating equitable and reasonable use, rather than a distinct limit on use.<sup>392</sup> As for the Article 7 statement of harm-avoidance, it envisions that harm might well occur. It requires only that the State causing the harm to take “all appropriate measures, having due regard to Articles 5 and 6 in consultation with the affected State,” to mitigate it or, and where appropriate, to discuss compensation. This arrangement also implies that a particular use can be equitable and reasonable, and take place, even though it causes significant harm that cannot be mitigated. In

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watercourse States. Article 7(2) provides that where significant harm nevertheless is caused to another watercourse State, the States whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of articles 5 and 6, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.

<sup>390</sup> Caflisch, “The Law of International Waterways.”

<sup>391</sup> Salman M.A. Salman, “Entry into Force of the UN Watercourses Convention: Why Should It Matter,” *International Journal of Water Resources Development*, published online: 08 Aug 2014, <http://dx.doi.org/10.1080/07900627.2014.952072>.

<sup>392</sup> Ibid.

short, a careful reading of Articles 5 –7 of the convention in the view of many subordinates harm-avoidance to the principle of equitable and reasonable utilization.<sup>393</sup>

*Making sense of the environmental provisions.* As noted, part IV of the convention includes strongly worded provisions protecting and preserving ecosystems and curtailing pollution. Environmental concerns also appear elsewhere in the convention—in various parts of the preamble and in the sections dealing with equitable - reasonable utilization and harm avoidance.

As for the preamble, it predictably expresses all of the ideal but conflicting objectives by calling for the utilization, development, conservation, management and protection of international watercourses and the promotion of the optimal and sustainable utilization thereof for present and future generations. As it does so, it recalls the principles and recommendations adopted by the United Nations Conference on Environment and Development in the Rio Declaration of 1992 and in Agenda 21. Similarly, the utilization provisions of Article 5 insist that uses of watercourses be consistent with “adequate protection” for them. The list of relevant factors in Article 6 goes further, attending generally to “geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character” while drawing specific attention to the “conservation” and “protection” of water resources. The latter terms, in Article 6.1.(f), are weakened in their effects by being joined with other, quite different terms (development and economy of use) and by being qualified with a reference to “the costs of measures taken to that effect.”

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<sup>393</sup> Ibid.

As Charles B. Bourne points out in his Notes and Comments, the “adequate protection” language of article 5 is particularly intriguing given its placement in the convention.<sup>394</sup> It appears, not in the list of factors relevant in determining equitable and reasonable use, but directly in the opening provision authorizing uses of a watercourse in an equitable and reasonable manner. Under Article 5.1., a State’s use of a watercourse must “tak[e] account” of the interests of the watercourse States concerned and be “consistent with adequate protection of the watercourse.” Used in this way, the language seems to be part of the definition of equitable and reasonable use, not merely one of the many conflicting factors that enter into an assessment. Given this placement, should watercourse protection involve an absolute limit on watercourse uses? Should it be understood as embedded in the definition of equitable utilization?

One approach to this question begins with the common claim that equitable utilization was, prior to the convention, already a principle of customary international law, and it existed without being qualified by the “adequate protection” language. (All of the five Special Rapporteurs for the ILC’s work held this view, which appeared in the ILC’s commentary on article 5.<sup>395</sup>) In the view of some, the “adequate protection” language makes best sense, given the already established principle of equitable utilization, when it is read not as a recasting of the principle but as the expression of a particularly important factor to use when assessing the equitable and reasonable nature of a particular use.<sup>396</sup> The difficulty with this approach is that it cannot explain why the language appears where it does, in Article 5, rather than in the list of factors in Article 6. Article 6 provides that the various listed factors are to be considered together, with none having special

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<sup>394</sup> Charles B. Bourne, “Primacy of the Principle of Equitable Utilization in the 1997 Watercourse Convention,” *Can. Y.B. Int’l L.* 35 (1997): 219.

<sup>395</sup> Report of the International Law Commission (ILC) on the work of its 46<sup>th</sup> session, May 2 – July 22, 1994, GAOR, 49<sup>th</sup> Sess., Supp. No. 10 (A/49/10), 195-366.

<sup>396</sup> Bourne, “Primacy of the Principle of Equitable Utilization,” 219.

priority. Article 5 is written in a much different manner, with fewer provisions that each seem essential. Article 5 (1) states, in brief, that a State may (a) use a waterway in an equitable and reasonable manner when it (b) takes into account the interests of other States and (c) acts “consistent with adequate protection for the watercourse.” Article 5 (2) presents the same general scheme, this time from the perspective not of a single State but of all States considered together. Collectively these shall participate in the use, development, and protection of a watercourse in an equitable and reasonable manner. This includes, 5 (2) confirms, “both the right to utilize the watercourse” and the duty to cooperate in its “protection and development.” The term protection, to be sure, is not defined and thus unclear. But the structure of both 5 (1) and 5 (2) gives not hint that utilization takes priority over either cooperation or protection. When a State can engage in its equitable share of all uses that are consistent with watercourse protection, then all provisions of the article are given full effect.

This uncertainty over Article 5 is linked to the uncertain status of the convention’s principal environmental protections in Articles 20 through 23. These provisions, summarized above, provide plainly that States must protect and preserve ecosystems, avoid pollution that causes substantial harm, and take all measures necessary to avoid introducing harmful species and to protect the marine environment, including estuaries. These provisions seem absolute. How then do they fit together with the principles of equitable and reasonable utilization and harm avoidance?

According to the relevant ILC Commentary, these provisions are brought together by means of the language of Article 5 with its language on adequate protection. Particularly Articles 20 and 21 are in effect elaborations of the “adequate protection” limit on equitable and reasonable use. Indeed, the ILC commentary asserts that, due to the linkage among Articles 5, 20, and 21, States

must use watercourses only in ways that maintain them as much as possible in their natural state.<sup>397</sup> In a similar fashion, the ban on harm-causing pollution in Article 21 (2) is viewed in the ILC Commentary as giving specific content to the general principles contained in articles 5 and 7.<sup>398</sup>

This interpretative approach gives weight to all of the Articles of the convention, and indeed takes them all seriously. But in doing so it seems to curtail significantly the central principle of equitable utilization. If as the ILC Commentary proposes the environmental protection provisions are taken literally and if, further, they are given full weight by incorporation into Article 5 by way of the “adequate protection” language, then they seem to control whenever applicable and thus to override the principle of equitable utilization in any case of conflict.<sup>399</sup> States then could use their waterways only in ways that guarantee their adequate protection. This dominant role for environmental protection could be understood in two ways—either as giving primacy to environmental protection in case of conflict or as declaring that any water use that degrades a waterway or causes significant harm is unreasonable and inequitable *per se*. The latter understanding was put forth by Professor McCaffrey in his Fourth Report to the ILC.<sup>400</sup> These various approaches, however, are far from adequately clear to enjoy widespread support. Moreover, as Professor Lammers among others have pointed out, the strict application of the no substantial harm principle may in certain circumstances lead to results which are quite inequitable.<sup>401</sup> A no-harm rule could in a specific factual setting severely limit water uses by

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<sup>397</sup> Report of the International Law Commission (ILC), 282.

<sup>398</sup> *Ibid.*, 291.

<sup>399</sup> Bourne, “Primacy of the Principle of Equitable Utilization.”

<sup>400</sup> UN Doc. A/CN. 4 / 4 12/Add.2 (1988) at para. 13; II *Yearbook of the International Law Commission* 241 (1988).

<sup>401</sup> J. G. Lammers, *Pollution of International Watercourses: The Search for Substantive Rules and Principles of Law* (The Hague: Martinus Nijhoff Publishers, 1984), 367.

upstream States while allowing such uses in downstream States, an outcome that seems inconsistent with the fair sharing norm of equitable utilization. A law that sanctions unreasonable and inequitable results is, one would think, jurisprudentially and morally weak. A more just and practical interpretation of Article 5, therefore, is perhaps the one that interprets the “adequate protection” language—and indeed Articles 20 through 23—as supplements to the guiding primary principle of equitable utilization.<sup>402</sup> This interpretation of Article 5 finds support in the ILC's commentary on the article in its 1994 Report to the General Assembly, where it is stated that the second sentence of paragraph 1 elaborates upon the concept of equitable and reasonable utilization. The second sentence provides that watercourse uses should be undertaken “with a view to” achieving the goals of optimal and sustainable use, due consideration for the interests of other States, and adequate protection of the watercourse. In this interpretation, the second sentence serves as an overall goal or aspiration for water use and planning that in practice guides decisions about equitable and reasonable utilization.<sup>403</sup>

These environmental protection provisions also need to be understood in light of the general harm-avoidance principle in Article 7.<sup>404</sup> Many types of harms could run afoul of this provisions, including economic, social, and cultural harms as well as environmental ones. It appears significant that environmental harms are the only ones singled out for special elaboration in later Articles. The arrangement suggests that they are of particular concern and should draw special regard.

As noted earlier, downstream nations have tended to give priority to provisions of the convention that limit harm, including the environmental protection articles. In the common view, the harm-

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<sup>402</sup> Bourne, “Primacy of the Principle of Equitable Utilization,” 220.

<sup>403</sup> Report of the International Law Commission (ILC), 218-219.

<sup>404</sup> Conca, *Governing Water*, 100.

avoidance provisions are considered more protective of the environment, while the principle of equitable and reasonable utilization is deemed more pro-development. In practice, though, the environmental protection element of Article 7 is distinctly constrained by two key words – significant and appropriate. The convention, as noted, does not prevent States from causing any harm, but only those harms which are significant in nature. It also requires States to undertake only appropriate measures to prevent the harm; if the measures do not succeed in doing so, the harm can presumably continue. Indeed, Article 7(2) clearly envisions that significant harm can and will occur. States, again, are obligated to use “all appropriate measures” to mitigate the problem, but their actions can rightly give “due regard for the provisions of articles 5 and 6,” which is to say due regard for their own right to engage in equitable and reasonable uses. The language gives States grounds to continue practices that cause significant harm so long as they are taking steps to reduce the problem. What is left unclear is whether this latitude exists in the case of environmental harm prohibited by Articles 20 through 24. As noted, environmental harms are singled out for special attention. One can easily read the qualifications of Article 7 as inapplicable to them, particularly to harm that involve exotic species or that degrade estuaries. When those harms are involved, the stronger language of Articles 22 and 23—demanding that States employ “all measures necessary”—would seem to control over the looser language of Article 7, calling merely for “all appropriate measures having due regard for the provisions of articles 5 and 6.”

In the end, the U.N. Convention does not satisfactorily integrate the central principles that it embraces, the principles of equitable and reasonable use, of harm-avoidance, and of environmental protection. Strong provisions deal with each of these principles. The convention fails to make clear—or clear enough—how they fit together, leaving States opportunities to point

to the particular language they like best as they charge ahead with their activities. This failure is most acute when it comes to waterway construction projects, including reservoirs and diversion projects. They are among the most harm-causing and environmentally degrading activities, and yet they are pushed off to the side in the convention with no real effort to reconcile them with the convention's dominant principles.

### From Watercourses to Drainage Basins

The 1997 UN convention holds immense importance in the development of international water law. It entails a coordinated international effort to establish universal rules for regulating international watercourses, and largely reiterates and thereby strengthens customary rules as applied to their non-navigational uses. As it does so, the convention pushed strongly in the direction of greatly expanded protections for the environment.

While acknowledging these achievements, it is still important to note that the UN Convention continues to focus attention on rivers as such—on watercourses—and fails to take the needed, big step of expanding the inquiry to consider entire drainage basins as such. Watercourses are used in conjunction with surrounding lands, and waterway degradation is often caused by land uses. Alterations in water flows are similarly due in many cases not to engineered changes in the water flows but to actions taking place throughout a basin. Watercourses will not be ecologically healthy until the maintenance of their health is a guiding limit on land uses everywhere.



The 1997 Watercourse Convention is meant as a component of international law designed to address an international subject matter – international watercourses. The convention defines a watercourse 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;”<sup>405</sup> and an “international watercourse” is “a watercourse, parts of which are situated in different States.” As observed by Stephen McCaffrey and Mpazi Sinjela, such a definition accords with hydrological reality and usefully draws attention to the ways surface and underground waters interact to make up an international watercourse.<sup>406</sup> The convention’s acknowledgement of this hydrological reality is particularly worthwhile considering the restrictive definitions provided in previous instruments,<sup>407</sup> and significant also as a step that further softens the traditional conception of territorialized nature.

Despite this, however, the convention’s emphasis remains on watercourses as such, as opposed to a more holistic watershed or catchment basin concept. And although it has alleviated the territorial concept, the convention’s emphasis on international watercourses draws the traditionally sharp, territorial line between the domestic and international spheres.<sup>408</sup> The basic problem is framed as one of cooperatively managing a resource that flows across borders, rather than integrating crucial land-based ecosystemic considerations that ignore borders.<sup>409</sup> State responsibilities for “domestic” watercourses are largely beyond the scope of the regime, despite the “significant harm” inherent in the globally cumulative problems of loss of freshwater biodiversity, damage to critical ecosystems, and the depletion of natural capital.<sup>410</sup> Even where

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<sup>405</sup> UN Convention on Non-navigational Uses of International Watercourses, art. 2.

<sup>406</sup> McCaffrey, *The Law of International Watercourses*.

<sup>407</sup> *Ibid.*

<sup>408</sup> Conca, *Governing Water*, 98.

<sup>409</sup> *Ibid.*

<sup>410</sup> *Ibid.*

domestic responsibilities are invoked, the sharply territorial distinction between the domestic and international spheres is reproduced. Thus, States are charged with preserving ecosystems and controlling pollution individually and, where appropriate, jointly. They are similarly tasked with protecting marine environments tied to watercourses (e.g.; estuaries) individually and, where appropriate, in cooperation with other States. The States as such remain the primary actors, despite having boundaries that often fragment and ignore watershed lines. The States as such are instructed to pay attention to actions “in their respective territories” (Art. 5 (1)). In these provisions and others the UN Convention retains an outlook based on human-drawn national boundaries. It has not taken the bold step of addressing catchment basins at the basin level. It has not yet fostered a paradigm of integrated watershed management.<sup>411</sup>

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<sup>411</sup> Conca, *Governing Water*, 100.

## Chapter 6: Developments Since 1997

This chapter continues the story of the previous one, looking at legal developments since the adoption of the 1997 Watercourse Convention by the UN and highlighting the progressive developments of international water law. It pays particular attention to the major revisions of the Helsinki Rules by the ILA, incorporated in some haste as the Berlin Rules of 2004, and discusses various other regional and bilateral agreements entered into over the last two decades. As explained below, the Berlin Rules were intended to clarify existing and emerging customary international law on watercourses, not to step distinctly ahead of it. Nonetheless, the Rules incorporate significant changes from their predecessor and from the 1997 U.N. Convention, particularly changes to enhance environmental protection and increase the rights of injured parties. Recent agreements over the past 20 years similarly reflect and advance the movement of international law toward enhanced environmental protection and ever-stronger calls for international cooperation.

The previous chapter discussed how, from the emergence of the Harmon doctrine on State territorial sovereignty to the adoption of the UN Watercourse Convention, international water law gradually incorporated key principles applicable to uses of transboundary waters and disputes relating to them. As discussed in prior chapters, these various international documents did not for the most part really embrace the basin-wide management of international freshwater, nor did they fully integrate concerns for ecological protection except for a few general obligations for watercourse protection and related controls on transboundary water pollution. These management principles would become more important in the *Berlin Rules on Water*

*Resources* of 2004 and, to various degrees, in recent regional treaties. These documents go further to integrate environmental and human-rights concerns into the management of transboundary waters. Together they give evidence of a new era of international water law.

This chapter considers the Berlin Rules at some length, highlighting how the document both reflects and goes beyond earlier legal documents. The chapter then turns to several prominent regional agreements, ones that reflect creativity in tailoring treaty provisions to the unique hydrological and environmental realities of particular basins. The agreements considered here are: the *Danube River Protection Convention* of 1994, the *Convention on the Protection of the Rhine* of 1999, the *Revised Protocol on Shared Watercourses in the Southern African Development Community (SADC)* of 2000, the *Framework Agreement on the Sava River Basin* of 2002, the *Convention on the Sustainable Management of Lake Tanganyika* of 2003, and the *Agreement between the Council of Ministers of the Republic of Albania and the Government of the Republic of Macedonia for the Protection and Sustainable Development of Lake Ohrid and its Watershed*, 2004.

It is useful to assess these regional agreements for three reasons: When taken together they reflect the trajectory of international water law from and after the adoption of the 1997 UN Watercourse Convention; all of them except one<sup>412</sup> involve at least four State parties and feature more comprehensive efforts to address basin-wide challenges; and, finally, the agreements give special attention to the ecological needs of the concerned waterways and their surrounding environments. The agreements display a deliberate effort to address environmental concerns, to treat watercourses as biologically rich, ecologically functioning systems rather than mere

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<sup>412</sup> The Agreement between the Council of Ministers of the Republic of Albania and the Government of the Republic of Macedonia for the Protection and Sustainable Development of Lake Ohrid and its Watershed, Albania – Macedonia, 2004, <http://extwprlegs1.fao.org/docs/pdf/bi-69075E.pdf>.

channels for water conveyance, and to enhance the rights of States to participate in decisions affecting them and of parties harmed by unlawful acts to seek redress.

Despite these forward steps long-lingering problems remain, particularly in the Berlin Rules.

The Rules add various new environmental provisions—too many, it will be argued—but in the end leave largely untouched the dominant power of a State to make equitable and reasonable use of its waters, even when harm occurs to actors in other States and to the environment as such.

The Rules give no overt protection to in-stream flow uses of waterways, including silt transport and the control of salinity intrusion. With remarkable silence the Rules continue to ignore dams and reservoirs and their often calamitous consequences: Such projects are covered in provisions calling for interstate cooperation but it is unclear whether and to what extent they are subject to the general rules governing waterway uses. Still, the Berlin Rules incorporate important advances and their limitations highlight the ways that further change remains needed, both to maintain ecologically healthy waterways and to give fair treatment to vulnerable nations such as Bangladesh.

### The Berlin Rules: An Overview

The *Berlin Rules on Water Resources*, 2004 embrace a new paradigm of international water law in their heightened emphasis on ecological integrity, sustainability, public participation, and minimization of environmental harm—principles not clearly reflected in the Helsinki Rules and

only developed in fragmented ways in the UN Watercourse Convention.<sup>413</sup> The Berlin Rules are, in effect, a revised version of the 1966 Helsinki Rules and likewise are non-binding in nature except insofar as they accurately present customary law. Beginning in 1996, the International Law Association (ILA) undertook to reformulate the Helsinki Rules with the dual purposes of restating the contemporary customary norms and reflecting the progressive developments of international water law. The ensuing discussions took place during different ILA conferences. At its seventy-first conference held in Berlin the ILA gave final approval to the Berlin Rules and issued them as the latest authoritative expression of customary international law, this time applicable to all waters, national as well as international.

The Berlin Rules incorporate the experiences over the decades since the Helsinki Rules were adopted. They integrate the provisions of international environmental law, international human rights law, and international humanitarian law relating to war and armed conflict into the paradigm of shared water resources. The Rules provide, for the first time, specific provisions relating to the protection of all aquatic environments other than marine waters, including (nominally at least) the protection of ecological integrity and the maintenance of minimum ecological flows. The Berlin Rules also incorporate provisions relating to: the rights of persons for access to water; public participation; regulation of groundwater; issues of navigation; and the protection of waters and water installations during war or armed conflict. Worth noting is that the Berlin Rules include within their scope both national and international waters, putting this document in sharp contrast with the Helsinki Rules and the UN Watercourse Convention, applicable only to transboundary waters. The Berlin Rules are more comprehensive and detailed

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<sup>413</sup> Joseph W. Dellapenna, “The Berlin Rules on Water Resources: The New Paradigm for International Water Law,” (World Environmental and Water Resources Congress, 2006).

than their predecessors. They consist of 73 Articles and are divided into 14 chapters. Chapter 1 (Article 1-3) gives the document broad importance by applying the key parts of the Rules to all waters, national and international. Article 3 defines key terms used throughout the text of the Berlin Rules. Many terms are carried over with little change from the original Helsinki Rules. Others are entirely new, including the terms drainage basin, aquatic environment, ecological integrity, environment, environmental harm, groundwater, management of waters, sustainable use, and vital human needs.

Chapter II (Article 4-9) sets forth general principles applicable to all waters: the right of public participation, the obligation to use best efforts to achieve both conjunctive and integrated management of waters, and duties to achieve sustainability and minimization of environmental harm. Chapter III (Article 10-16) thereafter enumerates the basic principles applicable solely to international waters. After presenting the principles of participation and co-operation by the basin States the Chapter sets forth new versions of the two principles that dominated the 1997 UN Convention: the right of States to engage in the equitable and reasonable utilization of water and the duty on States to take all appropriate measures to avoid significant transboundary harm. As considered below, the two principles are more tightly intertwined than in the UN Convention, with revisions that arguably weaken claims that the right to use water is more important than the duty to avoid harm. These two basic principles have again been developed in significant detail in the remaining chapters of the Berlin Rules. The refinements in the Rules applicable solely to international waters (principally found in chapters III, IX, and XI) pertain mostly to environmental protection and public participation.

Chapter IV (Article 17-21) contains provisions relating to the rights of persons in the management of waters. This chapter begins by proclaiming the right of every person to

sufficient, safe, acceptable, physically accessible, and affordable water to meet that individual's vital human needs. This Chapter also lays down provisions requiring public participation and access to information, education to promote and encourage understanding of the rules, and protection of particular communities. Further, it features an obligation for States to compensate persons or communities displaced by water projects or programs.

Chapter V (Article 22-28), one of the most important chapters in the Berlin Rules, deals with the protection of aquatic environments. It requires States (i) to take all appropriate measures to protect the ecological integrity of waterways to the extent needed to sustain ecosystems dependent on particular waters, and (ii) to ensure flows adequate to protect at least minimal ecological integrity of the waters of a drainage basin. The Chapter also requires States to take steps to prevent the introduction of alien, harm-threatening species into aquatic environments and to keep hazardous substances out of the waters. Finally, Article 27 calls upon States to prevent, eliminate, reduce, or control pollution in order to minimize environmental harm. The Berlin Rules require the application of the precautionary approach in implementing all these provisions (but does not embrace polluter pays). Chapter VI (Article 29-31) requires States to undertake prior and continuing assessments of the impacts of programs, projects or activities that may significantly affect the aquatic environment, and lays down detailed procedures for the impact assessment process. Chapter VII (Article 32-35) sets forth obligations for cooperative and separate responses to extreme situations, including highly polluting accidents, floods and droughts.

Another noteworthy element of the Berlin Rules is the inclusion of all groundwater within the regulatory scope of Chapter VIII (Article 36-42), which calls for the conjunctive management of water—that is, management that treats surface water and ground water as a single,



interconnected resource. Up until 2004, groundwater was addressed at the international level mostly as an adjunct to surface waters. In the Berlin Rules groundwater is considered both in general provisions governing aquatic environments and in its own chapter. The Berlin Rules attend, for the first time, to the distinct characteristics of groundwater and lay down specific principles and provisions for the management of aquifers. The Chapter makes it explicit that the Rules apply to all aquifers, whether or not an aquifer connects to surface waters or receives any significant contemporary recharge.

Chapter IX (Article 43-49) of the Berlin Rules deals with navigation while Chapter X (Article 50-55) addresses the protection of waters and water installations during war or armed conflict. Chapter XI (Article 56-67) on International Cooperation and Administration covers a number of procedural topics, including the exchange of information; notification of programs, plants, projects or activities and detailed procedures for such notification; the establishment of basin-wide joint management; compliance review; and sharing of expenses. Chapter XII (Article 68) imposes responsibility upon States for breaches of international law relating to the management of waters or to the aquatic environment. Chapter XIII (Article 69-71). It then sets forth various legal remedies, including a right for any person, public body, or non-governmental institution to obtain redress from any threat or actual injury related to the management of water or the aquatic environment in a State. The Berlin Rules end with chapter XIV (Article 72-73), which prescribes rules for the settlement of international water disputes by peaceful means, and if necessary, by an arbitral tribunal or a competent international court.

### Berlin Rules: Breadth of Application

With this overview in place it is possible to evaluate the Berlin Rules in terms of its most significant provisions, seeking to identify the important strengths and limitations of the Rules.

As noted in the overview, the Rules seek to bring together all customary international law dealing with waters. They thus include navigational uses as well as nonnavigational ones and govern groundwater resources as well as surface waters. Many of the environmental provisions also apply to water bodies, both surface and groundwater, located within a single State. They thus push States to take steps to protect their internal water resources. These are major advances.

By applying many (though not all) of its provisions to waters within a State the Berlin Rules reach beyond the more limited provisions of the original Helsinki Rules and of the UN Watercourse Convention, which focused purely on transboundary problems. The broader reach reflects the reality that the international community is increasingly interested in sustaining the ecological of all waters (and lands), wherever located.

A longstanding problem in water management has been the historic tendency to treat groundwater and surface water as separate resources, even though they are, in the vast majority of settings, hydrologically connected. The solution, proposed for decades, has been to manage them together in what is termed conjunctive management. The Berlin Rules, in a useful advance, press States to embrace conjunctive management. Article 5, titled conjunctive management, instructs States to “use their best efforts” to manage all waters—“surface waters, groundwater, and other pertinent water”—in a manner that is “unified and comprehensive.” Article 6 goes even further, prescribing “best efforts” to integrate water management with the management of other resources. Thus, for instance, forests and farmlands should be managed so that rainfall

running off them does not degrade waterways; mining should be done so that chemicals and leachate do not contaminate rivers and lakes.

The commentary clarifies the rationale of pronouncing these two management criteria (conjunctive management and integrated management) in two different articles, which is to promote more comprehensive and rational management of water resources. It mentions that conjunctive management is a subset of the more general rule of integrated management, and that the term conjunctive management integrates the management of surface waters, groundwater, and other waters (such as atmospheric water). Conjunctive management, therefore, means management of the waters of a drainage basin as a whole by a regime that takes into account the entire hydrologic cycle.

Article 36 makes Chapter VIII dealing with groundwater applicable to all aquifers, including aquifers that do not contribute water to, or receive water from, surface waters or receive no significant contemporary recharge from any source. This stands in clear distinction with the 1997 UN Watercourse Convention, whose provisions apply only to international watercourses—systems of surface waters and groundwater constituting, by virtue of their physical relationship, a unitary whole and normally flowing into a common terminus. Transboundary aquifers do receive special attention (Article 42).

In general, all of the Berlin Rules apply to groundwater just as they do to surface water (Article 36.2). Article 38 instructs States to manage groundwater using a precautionary approach (a novel phrasing of the precautionary principle); Article 40 similarly endorses the goal of sustainability, though noting that sustainability of an aquifer can be based on artificial recharge and admitting that there is no truly sustainable way to use an aquifer lacking any

significant natural recharge. Article 41 adds specific protections for aquifers from pollution and degradation of “hydraulic integrity.” States are directed to “take special care” to prevent, eliminate, reduce or control pollution of all types. Because groundwater often moves slowly and unpredictably, it is often vulnerable to environmental damage, thus requiring special steps to assure their protection. The commentary clarifies that these provisions add to, without subtracting from, the general obligations to protect the aquatic environment (Chapter V) and provisions responding to extreme situations (Chapter VII).

### Berlin Rules: Right to Use versus Harm Avoidance

As we have seen, earlier legal documents on international watercourses have tended to put, front and center, the conflict between the right of a State to make use of the watercourses and its obligation to do so in ways that do not significantly harm water uses in other States.

Downstream States, as noted, have often wanted to give primacy to the harm-avoidance principle; upstream States have commonly given emphasis instead to the right to use water. So central has this tension been in recent decades that readers of the Berlin Rules rightly wanted to know, as their first question, what stance the Rules took on it.

Given that the Rules set out to summarize existing and emerging law, it is no surprise that this tension remains in the Rules and retains its position as the central organizing element of the Rules. In subtle ways the Rules integrate these two principles even more strongly than had prior conventions and legal summaries, giving the impression that neither principle takes priority. A closer look, however, particularly one that attends carefully to the commentary (which was not

formally adopted by the ILA), suggests that the right to use water equitably and reasonably remains dominant in the sense that all other considerations—including the environmental provisions as well as the duty to avoid harm—are largely factors that enter into a balancing-of-interests calculation by the State making use of the water. A State apparently can still proceed with a use of water, despite harm and despite environmental degradation, if the balance of all relevant factors tilts in that direction. At the same time, the Rules include numerous provisions that a harmed party can draw upon to cast doubt on a harm-causing water use. A State's decision to move ahead with a particular water use can thus be challenged, perhaps successfully.

The Berlin Rules introduce this tension in the interestingly titled Article 12, Equitable Utilization. Its predecessor in the 1997 Convention, provided (in Article 5) that a State could “utilize an international water courses in an equitable and reasonable manner,” taking into account (as discussed in the last chapter) “the interests of the watercourse States concerned” and “consistent with adequate protection of the watercourse.” Earlier, the Helsinki Rules prescribed that a State was “entitled” to “a reasonable and equitable share in the beneficial uses of the waters.” While Article 12 of the Berlin Rules retains the term “utilization” in its title, the language of the Article makes no use of that term. The Article speaks not about the “equitable and reasonable utilization” but instead about the right of a State to “manage the waters of an international drainage basin in an equitable and reasonable manner.” That management (as taken up below) should have “due regard for the obligation not to cause significant harm to other basin States.” The term “manage” is defined in Article 3(14) of the Berlin Rules to include “the development, use, protection, allocation, regulation, and control of the waters.” Governing law has thus moved from a focus on distinct “shares” for States in a waterway to the equitable and reasonable uses of waterways by States to (in the Berlin Rules) the power and duty of States to

manage their waters in ways that, overall, qualify as equitable and reasonable.<sup>414</sup> The step taken in the Berlin Rules, while retaining the words equitable and reasonable, would seem to shift the focus away from particular water uses—evaluating them as discrete activities—and to dwell instead on a State’s overall water management approach, including the steps a State has taken to protect, regulate and control water uses. Still, the drafters of the Rules sought to present this Article as if it were only a modest reformulation of the older right to use water—hence the Article title (“Equitable Utilization”) and the first sentence of the associated commentary: “Today the principle of equitable utilization is universally accepted as basic to the management of the waters of an international drainage basin.”

As seen, this Article 12 requirement to manage the waters of an international drainage basin in an equitable and reasonable manner is subject to “having due regard for the obligation not to cause significant harm to other basin States.” The Helsinki Rules addressed the obligation to avoid harm only through the factors used in determining whether a State was taking more than its reasonable and equitable share (Article IV), although the Rules did include (in Article VIII) strong protection for existing water uses—a type of indirect ban on causing harm. The UN Convention added a separate article (Article 7) on the obligation to take “all appropriate measures” to avoid causing significant harm. The Berlin Rules contain a similar harm-avoidance provision, phrased in broader terms and, like the right-to-use provision, framed in terms of waterway management. Article 16 provides that States, as they manage their waters, “shall refrain from and prevent acts of omissions within their territory that cause significant harm to another basin State.” This constraint applies more broadly than its 1997 counterpart in that it extends well beyond harm caused by discrete water uses to cover “all acts of

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<sup>414</sup> Salman M. A. Salman, 636.

omissions” within a State, including, presumably, land-use practices and public policies that indirectly affect waterways. At the same time, this broader ban on transboundary harm—no longer, importantly, framed in terms of taking “all appropriate measures”—is qualified expressly. The duty to avoid harm now shall have “due regard for the right of each basin State to make equitable and reasonable use of the waterways.”

In this manner, the Berlin Rules create a circular path. The right to use (that is, to manage waters) must be undertaken with due regard for the duty to avoid harm, while the duty to avoid harm is limited by due regard for the right to manage waters equitably and reasonably. The Commentary on Article 12, Equitable Utilization, purports to clarify this circularity, in the process drawing upon language from the Helsinki Rules—language long jettisoned. It states that “the right to an equitable and reasonable share” of a waterway “carries with it certain duties in the use of those waters.” The right to use, that is, is qualified. But to make that generalization is to leave open the harder questions. When is resulting harm so significant, in relation to the benefits of a water use, that the use must end? The tension remains.

Perhaps the single-most important sentence in the lengthy commentary on the Berlin Rules sheds more light on this clash of basic principles. The commentary to Article 12 adds that “the interrelation of these obligations”—the right to use/share versus duty to avoid harm—“must be worked out in each case individually, in particular through the balancing process expressed in Articles 13 and 14.” The ending point, then, is a multi-factor balancing effort. Article 14 provides little guidance on that balancing except to say that States, as they go about managing their waters, “shall first allocate waters to satisfy vital human needs,” which in turn are defined as immediate human survival and the immediate sustenance of a household”

(Article 3.13). Otherwise, no water uses have priority, including, importantly, uses earlier in time. It is Article 13 that sets forth the key balancing test, and as such it might well qualify as the most important Article of the Rules.

Article 13—“Determining an Equitable and Reasonable Use”—reverts back to the approach of the 1997 Convention by evaluating uses as discrete activities; it does not retain the focus of Article 12 on how a State manages its waters. Article 13 features a long list of relevant factors to take into account in making the all-important determination—including the natural features of a watercourse, the population dependent on it, the social and economic needs of the basin States concerned, the effects of a use on uses in other States, existing and potential uses of the water, the availability of alternatives, and so on. Section 3 of the Article makes clear that all factors should be assessed together, with the “the weight of each factor . . . determined by its importance in comparison with other relevant factors.” Perhaps most critically, the list includes “the effects of the use or uses of the waters of the international drainage basin in one basin State upon other basin States.” The inclusion of this element as one of many factors implies—to those inclined to read it this way—to reduce the harm-avoidance principle to the status of simply one of many factors used to evaluate whether a water use is equitable and reasonable. In this regard the Berlin Rules track the 1997 Convention almost exactly. In the Convention, the obligation not to cause significant harm appears as a separate duty (Article 7), but it also shows up (in Article 6 (d)) as one of the various factors (fewer in number than in the Berlin Rules) used to evaluate whether a water use is equitable and reasonable.



## Berlin Rules: Environmental Provisions

As the commentary to the Rules points out repeatedly, the Rules contain more numerous and, on the surface, stronger admonitions to States to manage and use their waters in ways that are environmentally sound. All of the provisions apply to all waters, both national and international. In the case of national waters, they seem to apply directly and in full. When it comes to international watercourses and interstate disputes, the picture, predictably, is less clear. Some of the environmental provisions appear on the list of factors used to determine whether uses of international watercourses are equitable and reasonable. Others seem to appear as freestanding obligations, leaving it to the accompanying commentary to explain how they fit together with the vital balancing test in the context of interstate disputes over waterways.

Article 7 of the Berlin Rules sets forth the already settled customary international norm of managing all waters *sustainably*—or, more precisely, the duty to “take all appropriate measures” to manage waters in that way. As explained in chapter 2, the essence of the idea of sustainability was implicit in the Stockholm Declaration, which later appeared in its own terms in the *Brundtland Report*,<sup>415</sup> and then more cogently in the Rio Declaration. With the passage of time and with the evolution of State practices this obligation has now obtained the status of customary international law.

The recognition of sustainability as a basic principle of international water law is essential to assure the effective balancing of development against important social, environmental, and

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<sup>415</sup> As the *Brundtland Report* summarized the concept, sustainability supports economic growth that “meets the needs of the present without compromising the ability of future generations to meet their own needs.”

ecological values.<sup>416</sup> Whether a particular pattern of development is sustainable depends upon a careful analysis of the circumstances under which the development takes place. According to the commentary, sustainability generally requires the conjunctive and integrated management of the waters of a basin and the limiting of withdrawals to the safe yield of the each water source. The commentary further states that, at the least, sustainability requires viewing waters as parts of ecosystems that cannot be managed effectively except by giving careful attention to the intimate interconnections of the parts of the system. The importance of attempting to achieve sustainability requires caution in altering these ecosystems irremediably. Determining sustainability must remain a highly fact-specific analysis of the proper uses of a particular resource in a particular setting. The basic notions captured in the phrase “sustainable use” include that the needs of future generations as well as the present generation must be taken into account in resource planning and use, that all persons should have equitable access to the resources they need (so that resources, whether renewable or not, ought not to be exhausted), and that resource management must take place in an integrated manner.

As a freestanding principle, the duty to take “all appropriate measures” to promote sustainability applies to the management and use of all waters, apparently without qualification. It is not, as the commentary makes clear, an absolute duty imposed on States; the “all appropriate measures” language amounts to, according to the commentary, a due diligence standard. In the case of interstate disputes even this due diligence standard seems to weaken. Sustainability is listed as one of the nine factors (or categories of factors) used to

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<sup>416</sup> The International Law Commission’s (ILC) Commentary to Article 7 of the Berlin Rules.

evaluate water uses under Article 13. As such, it gets weighed against the other factors, likely losing strength in the process.

The second environmental provision is Article 8, which requires States to take all appropriate measures to *prevent or minimize environmental harm*. The provision has no exact or distinctly similar predecessor in either the Helsinki Rules or the UN Watercourse Convention. As the commentary suggests, this Article reflects the emerging rule of customary international law regarding the duty of States to minimize environmental harm, and is intimately linked to sustainability, equitable utilization, and the avoidance of transboundary harm. The commentary quotes from the judgment of the *Gabcíkovo-Nagymoros Project Case*, where the ICJ recognized both the obligation of sustainability and the obligation of protecting the environment as new norms of international environmental law.

The principle of minimization of environmental harm is not spoken of in absolute terms in the Berlin Rules. As in the case of sustainability, the obligation is simply to take measures that are “appropriate.” Again the commentary makes clear that this is a due diligence standard.<sup>417</sup> Drafter of the Rules, as they explain in the commentary, made no effort to define “appropriate measures.” According to the commentary, they should include procedural obligations regarding notice and consultation, environmental impact assessment, and a balancing of the social, ecological, and financial costs of an activity, a balancing that takes account of (i) the ability of a State or States responsible for the activity to bear those costs, (ii) the importance or the need the activity is intended to satisfy, and (iii) the nature and extent of the benefits expected to be realized from the activity.<sup>418</sup>

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<sup>417</sup> The International Law Commission’s (ILC) Commentary to Article 8 of the Berlin Rules.

<sup>418</sup> *Ibid.*

Just as with sustainability, this environmental duty applies directly to water uses and management within a State. In the case of interstate disputes, it too is listed as a factor to consider in assessing whether a water use is equitable and reasonable. The likelihood, again, is that it will lose force when it must compete with other balancing-test principles that endorse intensive water uses.

Chapter V, entitled “Protection of Aquatic Environments,” contains a suite of further environmental protection provisions, building on the two just discussed. It begins, in Article 22, with an instruction that States take all appropriate measures to *protect the ecological integrity* necessary to sustain ecosystems dependent on particular waters. The ILC commentary stresses the importance of this protection by terming it “the most basic obligation of basin States” when it comes to protecting biotic communities that depend on waters (as most do). “Ecological integrity” is defined in Article 3(6) as “the natural condition of waters and other resources sufficient to assure the biological, chemical, and physical integrity of the aquatic environment.”

In environmental writing generally, integrity commonly refers to the full suite of animals and plants that inhabited a place before humans significantly disrupted it; as a normative standard, it refers to natural areas largely unaltered and used by people in any noticeable way.<sup>419</sup> In the Berlin Rules, the term is defined quite differently, or at least it operates to require much less. According to the commentary, the Rules expect only that a State will protect “some minimal level of ecological integrity”—only the “measure of integrity necessary for the survival of ecosystems.” The meaning of this language is far from clear. Ecosystems always survive: They simply change in response to human activities, often shifting to lower levels of ecological

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<sup>419</sup> J. Michael Scoville, “A Defense of Integrity as a Conservation Concept,” *Ethics & the Environment* (October 2016), DOI: 10.2979/ethicsenviro.21.2.04.

functioning and biological diversity. The commentary further confuses the issue by stating that three forms of integrity—biological, chemical, and physical—are necessary for ecosystems “to continue to function.” The trouble with these words is that integrity refers chiefly to the composition of an ecosystem, not to its ecological functioning, and in any event ecosystems always function in one way or another with lesser or greater levels of primary productivity.

As to the customary nature of this obligation, the commentary reckons that it is a recent development in the international and national legal systems, but at the same time highlights the fact that it has rapidly gained general acceptance by the States—a fact that is substantiated by reference to the obligation in Article 1(a) of the *Belgrade Rules on the Relationship of International Water Resources with other Natural Resources and Environmental Elements*, and in Article 20 of the 1997 UN Convention. Further statements of similar duties are found in the 1992 ECE Convention,<sup>420</sup> the *Ramsar Convention*,<sup>421</sup> and also in many other treaties and legal instruments relating to the environment—enough to establish the principle within international environmental law.

In the end, the duty to take “all appropriate measures” to protect ecological integrity seems to have little force to it, so little that one wonders why it was included. Aside from the ambiguity of the term as used, the commentary acknowledges that application of the principle will involve “the often difficult balancing of conflicting needs” and notes that, “to a significant extent,” the duty will be discharged “through fulfilling the obligations of other Articles” of the Rules.” Still, the principle has been introduced and in time it may gain force.

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<sup>420</sup> Articles 2(2)(b), 2(5)(c), 2(7) of the Berlin Rules.

<sup>421</sup> The Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, Iran, February 2, 1971, U.N.T.S. 14583, <https://treaties.un.org/pages/showDetails.aspx?objid=0800000280104c20>

The fourth environmental provision in the Rules—the second in Chapter V—instructs States to embrace a “*precautionary approach*” as they go about implementing all of their obligations under the Rules. This means taking “all appropriate measures” to prevent, eliminate, reduce, or control harm to the aquatic environment when there is a serious risk of significant adverse effect on or to the sustainable use of waters, even without waiting for conclusive proof of a causal relation between an act or omission and its expected effects. The commentary refers to this as the precautionary principle—the more common phrasing—without explaining why the drafters used their more novel wording.

The Berlin articulation of the precautionary principle is arguably stronger than the Rio formulation (considered in chapter 2) in the sense that Rio required States only to employ cost-effective measures for preventing environmental degradation, while the Berlin Rules call for taking all appropriate measures to that effect. (The commentary asserts that this phrasing is “somewhat stronger.”) Regarding the customary nature of the principle, the commentary mentions that the precautionary principle has appeared in almost all international environmental instruments adopted since 1990, and that it has also been affirmed by the International Law Association in principle 4 of the *New Delhi Declaration*.

Related to the ecological integrity provision is Article 24, which instructs States to take “all appropriate measures to ensure *flows adequate to protect the ecological integrity*” of waters. This sixth provision, despite its vagueness and lack of real force, interjects an important new element in watercourse law, a recognition that water flows in rivers, apart from any human use, are vital and need protection. According to the commentary, the drafters used the term “ecological flows,” rather than the more commonly used “minimum flows,” to accentuate that the flows should be adequate to maintain ecological integrity. Appropriately, the commentary

explains that the adequacy of ecological flows will take into account seasonal variations “and other attributes that mimic natural patterns of flow.” Even as it introduces an important new element in watercourse law, the provision as written suffers from the same deficiencies as the direct call to protect ecological integrity. Given that adequate flows are essential to ecological integrity, it is unclear why the content of Article 24 is not contained within Article 22.

The next two environmental provisions, in Articles 25 and 26, can be covered more quickly. Nothing is more disruptive of the biological integrity of an ecosystem than the introduction of an *alien species* detrimental to that environment. Addressing that concern, Article 25 directs States to take “all appropriate measures to prevent the introduction of alien species into the aquatic environment if they may have significant adverse effects on that ecosystem.” This requirement finds its legal basis in the Biological Diversity Convention and other environmental agreements, including agreements on internationally shared fresh waters; a similar rule appeared in Article 22 of the 1997 UN Watercourse Convention. The Berlin formulation of this requirement goes beyond the similar provision in the UN Convention by dropping any requirement that an alien species harm another basin State; it is enough if the species harms ecosystems within a State. Article 26 similarly requires “all appropriate measures” to prevent the introduction of hazardous substances into waters. The term “hazardous substances” is defined in Article 3(12) as substances that are bio-accumulative, carcinogenic, mutagenic, teratogenic, or toxic. By covering indirect as well as direct introductions the Article necessarily encompasses an obligation to regulate the storage, handling, or management of such substances.<sup>422</sup>

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<sup>422</sup> ILC Commentary to Article 26 of the Berlin Rules.

A more extended provision, Article 27, deals with *pollution generally* by imposing a general duty to “prevent, eliminate, reduce, or control pollution in order to minimize environmental harm.” Unlike related provisions of the Rules, the directive is not limited to “all appropriate measures” but is more absolute in form. On the other side, the notion of minimization of environmental harm implies permissibility of some degree of harm. Environmental harm” is defined quite broadly in Article 3(8) to cover injury to the environment, including any other loss or damage caused by such harm, as well as the costs of reasonable measures to restore the environment (actually undertaken or to be undertaken). In States that have adopted water-quality standards, all appropriate measures should be taken to assure compliance with the standards. As with the directive to control hazardous substances, this provision on pollution is not limited to pollution that harms another State (as was Article 21 of the UN Watercourse Convention); it applies also to pollution that stays within a State. Pollution-control methods should include the use of “best available techniques” and “best environmental practices”; the latter term refers to efforts to prevent or reduce the effects of *non-point* sources of pollution, while “best available techniques” refers to techniques applied to prevent or reduce the effects of *point* sources of pollution. This pollution control provision of Article 27 is supplemented in Article 28, which calls upon States to formulate and adopt *water-quality standards* sufficient to protect public health and the aquatic environment.

The final major environmental provision (Article 29) calls upon States to undertake an environmental impact assessment of any program, project, or activity that could “have a significant effect on the aquatic environment or the sustainable development of waters.” The effect of the provision, overlapping with Article 23, is to endorse a cautionary approach in the



context of programs and projects.<sup>423</sup> The impacts that are to be assessed include effects on human health and safety, on the environment, on existing or prospective economic activity, on cultural or socio-economic conditions, and on the sustainability of water uses. Article 31 gives guidance on the content of such assessments, including consideration of alternatives and possible mitigation measures. With this provision the International Law Association has recognized that the environmental-assessment practice has crystallized into a rule of customary international law, at least insofar as transboundary effects are concerned.<sup>424</sup> The World Bank has gone even beyond that and now requires prior assessments before considering a loan or grant, regardless of whether the project will have transboundary effects.<sup>425</sup>

Before turning to other provisions of the Berlin Rules, particularly their important provisions dealing with interstate consultation and the rights of injured parties, it is useful to evaluate these environmental provisions as a whole. The sheer number of the provisions, and the prominence given them, attest to a clear desire to push States to take better care of their aquatic environments. As written, the Rules feature provisions and terminology that can be used to challenge an environmentally degrading action or program. They interject a multiplicity of ways of thinking critically about projects and programs. Examined closely, however, most of the provisions are each greatly qualified. As thus qualified they do have force with respect to practices and activities *within a State* affecting domestic waters, although one wonders how these provisions would be enforced and by whom. In the context of *interstate* disputes and transboundary harms, in contrast, the provisions seem even weaker. Two of them (sustainability;

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<sup>423</sup> Alexandre Kiss, and Dinah Shelton, *International Environmental Law* (New York: Transnational Publishers, Inc., 1994), 203.

<sup>424</sup> In *Supplemental Rules on Pollution*, art. 3, and in the *New Delhi Declaration*, principle 4.2.

<sup>425</sup> The World Bank, *Operational Directive 4.01* (1991).

minimize environmental harm), as noted, merely join the long list of factors to be considered in assessing whether a water use is equitable and reasonable; as such, they can be sacrificed in the pursuit of economic development, particularly to bring water to those without it. The two integrity provisions are weakened by the vague and apparently weak concept of integrity that they employ. The hazardous substances and alien species provisions are weakened by a State's need to undertake only "appropriate" measures. The precautionary principle could bring change though it too is sufficiently vague to make enforcement difficult. The general pollution provision does seem to have force—indeed, it is the most strongly worded of the provisions—and it stands out for having real content. Also valuable is the impact assessment duty, particularly given the ways that information included in publicly accessible assessments can be put to use by opponents of a project or activity.

At bottom, States whose practices harm other States retain a strong legal position under the Berlin Rules in that they can justify a wide range of harms by pointing to the multi-factor test used to evaluate particular water uses. The general pollution and impact-assessment provisions provide some meaningful constraint. But they seem to leave key problems unaddressed, including the major problems faced by Bangladesh. The provision on ecological flows only begins to provide a foundation to challenge radical reductions caused by upstream diversions. Significantly, the Rules do not view in-stream uses by a nation such as Bangladesh—using the water for silt transportation and salinity control—as existing uses that deserve serious consideration. (Such instream-flow uses are only recognized as watercourse uses in Article 15, which authorizes a State to use more than its equitable share of a water-flow if other States in the basin are not using their full shares.) Similarly, there is no express recognition that surface water is being used when it recharges aquifers. A water project that traps silt and thus interferes

with the downstream transport of the silt would seem to violate the ban on pollution. (Silt removal would alter the composition of water flow, and thus seem to qualify as a polluting activity.) But the pollution-prevention provision has not been used in that way and no doubt many would view this as a misuse of it.

### Berlin Rules: Dams, Reservoirs, and Other Projects

Perhaps the most serious omission of the Berlin Rules is its failure to provide clear guidance with respect to the consequences of dams, reservoirs, and other major projects. Predecessor documents (conventions, law summaries) tended to put such projects to one side, calling for interstate consultation on them but not subjecting them to the various rules protecting against water-related harm. Given this, it is perhaps unsurprising that the Berlin Rules have little to say. But it would have helped if the commentary explained the situation clearly and highlighted the topic as a major deficiency of current law.

As explained in the next section, the Berlin Rules do have extensive and, in many ways, impressive rules mandating international consultation and cooperation on watercourse management. Prominent among them is the provision in Article 10, which recognizes the right of each State in a basin to participate in the management of waters in the basin. This provision does not ban agreements between and among fewer than all States within a basin, but, as Article 10 states clearly, “a [water] use by one or more basin States shall not cause a significant adverse effect on the right of or uses in another basin State without the latter State’s express consent.”

(The provision appears in the context of interstate agreements, but literally applies to a harm-causing action taken by any State even without such an agreement.)

The various notification and consultation provisions, taken alone, seem to suggest that a State such as Bangladesh needs to protect itself against big projects by neighboring States through negotiation processes. It can, as of right, demand information and opportunities to be heard; it can demand that impact assessments be undertaken in advance absent some need for special urgency. But in the end these provisions do not directly limit the power of States to construct big projects, even ones with calamitous effects.

What is left unclear is whether big projects are subject to the other provisions of the Berlin Rules. Big projects would seem to collide with many of them. Diversion projects radically reduce water flows and change their timing and temperature. When silt is trapped in reservoirs downstream waterways and adjacent ecosystems are radically altered, in ways that greatly change their ecological integrity. They would seem to run afoul of even loose limits on minimizing environmental harm. Perhaps most of all they directly undercut existing and prospective uses of watercourses by downstream States. How can these consequences not violate the general principles of the Rules?

If these general provisions of the Berlin Rules were intended to apply to big projects, the drafters certainly should have said so and illustrated how they might apply. If they were not intended to apply, then that fact should also appear, with a recognition that such projects—in many basins the main causes of degradation—have been given a pass to continue fostering degradation. The drafters then should have issued a call to the lawmaking community to craft rules to govern

them. International law will not adequately meet the needs of downstream, vulnerable States unless they are reasonably protected from the consequences of such projects.

### Berlin Rules: Notification and Consultation

Before taking up the provisions in the Rules expanding the rights of States to demand notification and opportunities to consult, a few more particular provisions can be quickly addressed. Chapter VII of the Berlin Rules deals with extreme situations and requires States to prevent, reduce, eliminate, or control all conditions of waters, whether resulting from human conduct or otherwise, that pose a significant risk to human life or health, harm to property, or environmental harm. This Chapter represents another application of the duty to minimize environmental harm. Whenever any harmful water-related condition exists within the control of a State, the State must notify others and any competent international organizations of such condition. A related provision in the same Chapter deals with floods and calls upon States to cooperate in developing and implementing flood control measures and to develop contingency plans. A shortcoming of this provision is that it requires a State to show due regard for the interests of other States likely to be affected by the flooding but includes no similar concern for the adverse environmental impacts that might ensue from flood-control measures. Chapter X incorporates provisions about protecting water and water installations during armed conflict or war, putting water projects, dams, levees, and the like off limits as military targets. It bans the poisoning of water supplies vital for civilian consumption as well as water diversions when long-term, widespread harm would ensue.

Several provisions of the Berlin Rules push States in the direction of greater cooperation on watercourse issues. Article 10, already mentioned, gives States the right to participate in managing basin-wide affairs and protects them against harm when they are not included in regional agreements. Article 11 sets out a broad duty of all States to cooperate with one another in managing basins for mutual benefit. Article 56 imposes detailed duties on States to regularly provide to other States information on their waters, water uses, pollution sources, plans, projects and activities. Indirectly a State can get even more information by participating in environmental impact assessments within another State; Article 18 makes environmental impact information available to those who participate in the process, and citizens of another State can (under Article 30) participate, just as fully as local citizens, if the nonnative person is “under a serious threat of suffering damage” from the program or project being assessed. Article 57 imposes broad duties on a State to notify “promptly” other States “or competent international organizations” that they might be affected significantly by a program or project; Article 60 adds to that by giving the affected State the right to demand an impact assessment. Article 58 puts forth a similarly broad duty for States to consult with one another and with competent international organizations on “actual or potential issues,” not just proposed or on-going projects. Articles 64 and 65 encourage joint management agreements and set forth minimum requirements for them.

These various provisions go far toward facilitating cooperation and consultation. In the end they do not compel any State to refrain from a given water use. But they do shed considerable international light on activities and increase the ability of outsiders to gain information and interject complaints. They are, by and large, simply procedural provisions, but they interject procedures that no doubt will often lead to different final decisions.

## Berlin Rules: Enforcement

In one of its most consequential provisions, Article 68, the Berlin Rules provide that States are responsible for their violations of international law relating to watercourses or the aquatic environment “in accordance with the international law of State responsibility.” The Rules do not set forth, or even summarize briefly, that separate law of responsibility; doing so, the commentary adds, would be “beyond the scope of these Rules.” Plainly, States are subject to challenge and suit in a court of competent jurisdiction if they fail to abide by mandatory requirements. To that extent the Rules have teeth.

Article 69 goes further to state that any injured party and anyone under a serious threat of harm can file suit in the courts of the State in which the harm originates or might originate. The Article expands the range of possible plaintiffs to include “public bodies and non-government organizations with a proven interest regarding waters or the aquatic environment.” Individual persons who are harmed by actions within their home State have the right to seek redress in their courts (Article 70). Going much further, Article 71 requires a State to open its courts to outsiders—to citizens of other States and public bodies and non-governmental organizations from other States who either are suffering or face a serious threat of suffering (in the case of an individual) or have a proven interest in waters or the aquatic environment (in the case of a public body or nongovernmental organization).

These various enforcement provisions provide further evidence of the ways that international law is gaining ground in the context of interstate watercourse disputes. The customary international law rules put forth in the Berlin Rules, far more than preceding documents, set forth a body of law that is binding on States apart from any treaty, convention or other agreement to which a State might have expressly agreed. The binding rules, as explained, are often vague and loose. But they do exist and, to the extent the Rules are accepted as customary law, do have force. States can be held accountable.

### Other International Agreements

This extended consideration of the Berlin Rules is usefully supplemented by quick looks at some of the more prominent regional agreements entered into over the past few decades. They too give a sense of where international law is heading, and thus provide useful materials both for a critique of that law and for reform proposals. They are drawn upon in chapter 7, which steps back from the various international and regional agreements to identify critically the major trends in the international law of watercourses.

The only truly international watercourse conventions now in force are the two considered in the last chapter—the UN Watercourse Convention (1997; in force 2005), and the 1992 ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, recently opened for signing by all States. Neither of these has attracted as many as forty ratifying States. This means that, for most States, the only binding agreements are regional ones.



In the case of States that are parties to the UN Convention, regional agreements also provide opportunities to fine-tune the general principles and, if they choose, to impose stronger duties.

The history of international water treaties dates as far back as 2500 BC, when the two Sumerian city-states of Lagash and Umma crafted an agreement ending a water dispute along the Tigris River.<sup>426</sup> Since then, a vast body of water treaties has evolved around the globe. The Food and Agricultural Organization of the United Nations has documented more than 3600 international water treaties dating from AD 805 to 1984.<sup>427</sup> Most of these agreements concern navigational issues. With increasing attention to non-navigational uses, more agreements from the last century have addressed water as a limited and consumable resource. The Transboundary Freshwater Dispute Database (TFDD) project of Oregon State University identified more than 400 water agreements signed since 1820.<sup>428</sup> That does not mean, however, that all of the world's international river basins are covered by an agreement. Many of them are not, and the extent, depth, and scope of regional agreements varies widely.<sup>429</sup> On the other end, one single river, the Danube, has been the subject of at least 22 bilateral and multilateral accords.<sup>430</sup>

Most early agreements included provisions relating to navigation, boundary delineation or fisheries. By the twentieth century agreements commonly dealt also with water allocation, hydropower, flood control, and other water resource-based uses. The trend to pay attention to environmental issues as such—to reach beyond utilitarian uses of the international rivers—

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<sup>426</sup> Aaron T. Wolf, "Conflict and Cooperation along International Waterways," *WATER POL'Y* 251, 255, accessed April 19, 2017, <http://www.ce.utexas.edu/prof/mckinney/ce397/Topics/conflict/Conflictandcooperation.pdf>.

<sup>427</sup> *Ibid.*

<sup>428</sup> Product of the Transboundary Freshwater Dispute Database, Department of Geosciences, Oregon State University. Additional information about the TFDD can be accessed at: <http://www.transboundarywaters.orst.edu>.

<sup>429</sup> Conca, *Governing Water*, 103.

<sup>430</sup> *Ibid.*

largely began after the United Nations Conference on Environment and Development (UNCED) in 1992.

The University of Maryland's Harrison Program on the Future Global Agenda conducted a detailed study of the content of international river agreements for the period of 1980 to 2000.<sup>431</sup> The study consulted a final set of sixty two such agreements paying particular attention to the core principles of the 1997 UN Convention, including that of environmental protection.<sup>432</sup> Out of 62 agreements, 44 of them (71% of the data sample) mentioned environmental protection as an agreement objective; 19 of them (31%) had the environment as the primary focus while 42 of them (68%) had specific clauses relating to environmental protection.<sup>433</sup> Overall, the environment was the second most frequently addressed issue after a requirement for consultation (82%), and consultation was often envisioned as a way to deal with environmental problems from watercourse projects. The study further divided the data set into two time periods (1980 – 1991 and 1992 – 2000) to examine patterns of temporal variation. It found that environmental protection provisions were more common during the second time frame (1992 – 2000). Seventeen agreements had environmental protection as one objective during the first decade, a number that increased to 27 during the last eight years. Similarly, 6 agreements in the Eighties listed environmental protection as the agreement's main purpose, while 13 agreements did so in the Nineties. Environmental protection now receives greater attention, most likely due as much or more to the general upsurge in environmental concerns since the 1992 Earth Summit as it does to concerns about problems in specific river basins.<sup>434</sup>

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<sup>431</sup> Conca, *Governing Water*, 106.

<sup>432</sup> *Ibid.*

<sup>433</sup> *Ibid.*, 111.

<sup>434</sup> *Ibid.*, 118.

Considered here are a few regional agreements entered into since 1992 that reflect these trends. They illustrate the creativity of States in formulating treaty provisions to meet the unique hydrological, political, and cultural realities of those particular basins.

*The Convention on the Protection of the Rhine, 1999.*<sup>435</sup> The Convention on the Protection of the Rhine was entered into by Switzerland, France, Germany, Luxembourg, Netherlands and the European Commission on April 12, 1999. Its objectives are to step up multilateral cooperation on sustainable development of the Rhine's ecosystem, protect the flora and fauna in the river and on its banks, improve sediment quality, prevent flooding using ecologically sound means, meet drinking-water needs, and help restore the North Sea.

The Convention takes account of the natural functioning of the Rhine River as it interacts with groundwater and alluvial areas. Its provisions apply equally to groundwater and to the aquatic and terrestrial ecosystems that interact with the Rhine or whose interactions with the Rhine could be re-established. More broadly it deals with the entire Rhine catchment area, as far as pollution within it adversely affects the river and as needed for flood prevention.<sup>436</sup> Overall the Convention aims at achieving sustainable development of the Rhine ecosystem in multiple ways: by maintaining and improving the quality of the Rhine's waters (including the quality of suspended matter, sediments and ground water); by protecting the population of organisms and species diversity; by preserving, improving and restoring the natural function of the stream; by ensuring sound flow characteristics taking into account the natural bed-load discharge and favoring the interactions between river, groundwater and alluvial area; by maintaining, protecting and reactivating alluvial areas as natural floodplains; by maintaining, improving and

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<sup>435</sup> The Convention on the Protection of the Rhine, 1999, Bern, April 12, 1999, accessed April 20, 2017, [http://www.iksr.org/fileadmin/user\\_upload/Dokumente\\_en/convention\\_on\\_the\\_protection\\_of\\_the\\_rhine.pdf](http://www.iksr.org/fileadmin/user_upload/Dokumente_en/convention_on_the_protection_of_the_rhine.pdf).

<sup>436</sup> The Convention on the Protection of the Rhine, art. 2.

restoring natural habitats for wild animals and plants in the water, on the river bottom and river banks as well as in adjacent areas, by improving living conditions for fish and the restoration of their free migration; by ensuring ecologically sound management of water resources; and by taking ecological requirements into account when developing the waterway, e.g., in the field of flood protection, shipping and the use of hydroelectric power.

The Rhine Convention establishes an arrangement among States solely for environmental protection of the Rhine River and its catchment areas. While it fosters and protects many watercourse uses, it envisions no development of the River except as needed to meet drinking water needs.

*The Convention on the Sustainable Management of Lake Tanganyika, 2003.*<sup>437</sup> This is a Convention among Burundi, Congo, Tanzania and Zambia to conserve the biological diversity of Lake Tanganyika and its basin and to promote the sustainable use of its natural resources. The Convention establishes sustainable development as the core principle guiding development of the Lake's resources and uses the precautionary principle to promote preventive measures to forestall development impacts that pose environmental dangers.<sup>438</sup> The Convention expressly recognizes Lake Tanganyika as a "shared heritage" of the riparian States with all States legitimately involved in its conservation and equitable utilization.

Like other freshwater agreements, this Convention promotes efforts to control pollution. It goes further to give uncommon attention to the issues of sedimentation and biological diversity. The Convention calls for preventing all causes of excessive sedimentation by way of deforestation,

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<sup>437</sup> The Convention on the Sustainable Management of Lake Tanganyika, 2003, June 12, 2003, <https://www.ecolex.org/details/treaty/convention-on-the-sustainable-management-of-the-lake-tanganyika-tre-001482/>.

<sup>438</sup> The Convention on the Sustainable Management of Lake Tanganyika, art. 5.

land degradation, destruction of wetlands, and otherwise.<sup>439</sup> The preamble re-affirms the importance of conserving biological diversity set by the 1992 Convention. It requires signatory States to develop, adopt, implement and enforce all appropriate measures to conserve rare, fragile and representative ecosystems and imperiled species and populations of flora and fauna. It further requires States to prevent the introduction of exotic species that may threaten the ecosystems, species, and genetic resources of the Lake basin.<sup>440</sup>

The Convention is particularly wide-ranging in its embrace of general principles to help achieve its lofty aims. It specifically endorses the principle of preventive action, the principle of participation, the polluter pays principle, and the principle of fair and equitable benefit-sharing in the use of the Lake and its resources. Of some note, the Convention title refers to “management” of Lake Tanganyika, not to its “development.” Management implies more of a duty-oriented, coordinated oversight than does the word development.

*The Convention on Cooperation for the Protection and Sustainable Use of the Danube River, 1994.*<sup>441</sup> The Convention on Cooperation for the Protection and Sustainable Use of the Danube River, generally referred to as the “Danube River Protection Convention” or “DRPC,” is a Convention among the Danube basin States that was signed in Sofia, Bulgaria, in 1994 and came into force in October 1998. The Convention establishes a framework for bilateral or multilateral cooperation to protect the aquatic environment of the Danube River. It promotes the

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<sup>439</sup> The Convention on the Sustainable Management of Lake Tanganyika, art. 9.

<sup>440</sup> Ibid., art. 10.

<sup>441</sup> The Convention on Cooperation for the Protection and Sustainable Use of the Danube River, *signed* on June 29 1994 in Sofia (Bulgaria), *came into force* in 1998, accessed April 20, 2017, <https://www.icpdr.org/main/sites/default/files/DRPC%20English%20ver.pdf>.

conservation, improvement, and rational use of water resources of the Danubian States by establishing the International Commission for the Protection of the river Danube.

The Convention is mostly modeled after the 1992 EEC Convention in its provisions addressing pollution. It endorses the precautionary principle, the polluter pays principle, and the principle of sustainable management. The Convention requires State parties to undertake specific water-resources protection measures for the prevention or reduction of transboundary impacts; it defines transboundary impacts as any significant adverse effect on the riverine environment, resulting from a change in the conditions of waters caused by human activity, which extends beyond the jurisdiction of the impact-producing State. According to the applicable Convention provision, such impacts may affect life and property, the safety of facilities, or the aquatic ecosystems concerned.

The Convention applies to the entire catchment area of the Danube River and deals broadly with water-related construction projects of all types, with water withdrawals and transfers, with water power utilization, with run-off issues, and with water storage-level control. In brief sections it addresses environmental impacts including deterioration in the hydrological conditions, erosion, abrasion, inundation and alterations in sediment flows.<sup>442</sup>

The Convention puts central emphasis on sustainable water management. It calls for environmentally sound development that maintains the overall quality of life, sustains access to natural resources, avoids lasting environmental damage, and protects ecosystems—all using a preventive, precautionary-type approach. Particular provisions protect against water-quality

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<sup>442</sup> Convention on Cooperation for the Protection and Sustainable Use of the Danube River, art. 3(2).

harms due to planned activities and call for steps to identify and protect the various biotope elements of the riverine ecosystems.<sup>443</sup>

*Protocol on Shared Watercourses in the Southern African Development Community (SADC) (Revised), 2000.*<sup>444</sup> This is a Protocol among fourteen South African States (Angola, Botswana, Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe) designed to foster closer cooperation for the judicious, sustainable, and coordinated management, protection and utilization of shared watercourses. Given that much of Southern Africa relies on agriculture for subsistence, water is of special concern for the Southern African Development Community (SADC). Many watercourses in the region are shared among several member States, a situation that demands their development in an environmentally sound manner. To this end, the SADC initially passed its Protocol on Shared Watercourses on August 28, 1995; it was amended in August 2000.

In the Protocol, member States agree to cooperate on projects and exchange information on shared watercourses, consulting with each other and collaborating on initiatives that balance development of watercourses with conservation of the environment. The Protocol resembles the UN Watercourse Convention of 1997 in terms of setting out principles governing water use and their protection. It requires signatory States to undertake, with respect to a shared watercourse, all measures that are necessary to protect and preserve the aquatic environment, including estuaries.<sup>445</sup> On pollution, it asks parties to prevent, reduce and control such pollution and

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<sup>443</sup> Convention on Cooperation for the Protection and Sustainable Use of the Danube River, art. 6.

<sup>444</sup> Protocol on Shared Watercourses in the Southern African Development Community (SADC) (Revised), August 7, 2000, accessed April 20, 2017, <http://www.internationalwaterlaw.org/documents/regionaldocs/Revised-SADC-SharedWatercourse-Protocol-2000.pdf>.

<sup>445</sup> Protocol on Shared Watercourses in the Southern African Development Community (SADC) (Revised)A, art. 4(2)(d).

environmental degradation of a shared watercourse causing 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.<sup>446</sup> It further calls upon States to take all appropriate measures to prevent or mitigate conditions related to a shared watercourse that may be harmful to other watercourse States, whether resulting from natural causes or human conduct, such as floods, water-borne diseases, siltation, erosion, salt-water intrusion, drought or desertification.<sup>447</sup> As an aid to carrying out all these obligation the Protocol establishes an institutional framework to oversee the joint protection and development of the region's shared watercourses.

*Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, 1995.*<sup>448</sup> This is an Agreement among Cambodia, Laos, Thailand, and Viet Nam, entered into in 1995 for continuing cooperation in the sustainable development, utilization, conservation and management of the Mekong River Basin and its water resources. The Agreement has, as its broader overarching goal, collaboration in the fields of irrigation, hydropower, navigation, flood control, fisheries, timber floating, and recreation and tourism. Along with promoting these watercourses uses the Agreement seeks to protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects.<sup>449</sup> It recognizes the Mekong River Basin and its natural resources as immensely valuable for the economic and social well-being of all people in the Basin.

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<sup>446</sup> Protocol on Shared Watercourses in the Southern African Development Community (SADC) (Revised), art. 4(2)(b)(i).

<sup>447</sup> Ibid., art. 4(4)(a).

<sup>448</sup> Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, April 5, 1995, accessed April 20, 2017, <https://www.ecolex.org/details/treaty/agreement-on-the-cooperation-for-the-sustainable-development-of-the-mekong-river-basin-tre-001223/>.

<sup>449</sup> Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, art. 3.



The Agreement requires State parties to make every effort to avoid, minimize, and mitigate harmful effects that might occur to the environment—especially to water quantity and quality, to the aquatic (eco-system) conditions, and to the ecological balance of the river system—from the development and use of the Mekong River Basin water resources or from discharge of wastes and return flows. The Agreement is among the very few water agreements in Asia to specifically address water flows by protecting mainstream flows from diversions, storage releases, or other actions of a permanent nature.<sup>450</sup> The Agreement also binds parties with a stricter obligation to halt a water use or discharge when there is valid evidence of substantial damage to other riparians.<sup>451</sup>

*Agreement between the Council of Ministers of the Republic of Albania and the Government of the Republic of Macedonia for the Protection and Sustainable Development of Lake Ohrid and its Watershed, 2004.*<sup>452</sup> Signed in 2004, this Agreement between Albania and Macedonia exhibits how far States can go in managing a shared resource such as water. This Agreement describes Lake Ohrid as a site of exceptional scientific, aesthetic, and cultural value, along with its economic and environmental significance. It seeks to protect all of these values while also promoting the watershed's sustainable development. (In 2014, Lake Ohrid and nearby Lake Prespa were named a UNESCO Biosphere Reserve, fueling tourism that now threatens water quality).

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<sup>450</sup> Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, art. 6.

<sup>451</sup> Ibid., art. 7.

<sup>452</sup> Agreement between the Council of Ministers of the Republic of Albania and the Government of the Republic of Macedonia for the Protection and Sustainable Development of Lake Ohrid and its Watershed, Albania – Macedonia, 17 June, 2004, accessed April 20, 2017, <http://extwprlegs1.fao.org/docs/pdf/bi-69075E.pdf>.

The Agreement's broad range of concerns is discernible in the diverse range of international agreements or conventions that it recalls in the preamble; i.e. the *Convention concerning the Protection of World Cultural and Natural Heritage*,<sup>453</sup> the *UN Convention on Biological Diversity*,<sup>454</sup> the *Convention on Wetlands of International Importance, especially as Waterfowl habitats* (the Ramsar Convention),<sup>455</sup> the *Convention on Environmental Impact Assessment in a Transboundary Context* (the Espoo Convention),<sup>456</sup> The *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters* (The Aarhus Convention),<sup>457</sup> the *Convention on the Conservation of Wild Flora and Fauna and their Habitats in Europe* (The Berne Convention)<sup>458</sup> and the *Convention on the Conservation of the Migratory Species* (The Bonn Convention).<sup>459</sup>

The Agreement's various provisions underscore the need for a holistic approach to protecting water quality and conserving the integrity of terrestrial and aquatic ecosystems of the Lake Ohrid watershed. The subject matters of the provisions range from pollution to biological diversity to cultural values. Environmental provisions require parties to prevent and control pollution; protect soil from erosion, depletion, infections and pollution; protect biodiversity, especially endemic, rare, threatened or endangered species; prevent the introduction and breeding of non-indigenous

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<sup>453</sup> Convention Concerning the Protection of the World Cultural and Natural Heritage, adopted by the General Conference of UNESCO, on 16 November, 1972, <http://whc.unesco.org/en/conventiontext/>.

<sup>454</sup> Convention on Biological Diversity, Rio de Janeiro, 5 June 1992, U.N.T.S. 30619, [https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-8&chapter=27&lang=en](https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-8&chapter=27&lang=en).

<sup>455</sup> Ramsar, Iran, February 2, 1971, U.N.T.S. 14583.

<sup>456</sup> Convention on Environmental Impact Assessment in a Transboundary Context (the Espoo Convention Espoo, Finland, 25 February 1991, U.N.T.C. 34028.

[https://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtdsg\\_no=XXVII-4&chapter=27&clang=en](https://treaties.un.org/pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-4&chapter=27&clang=en)

<sup>457</sup> Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (The Aarhus Convention), Aarhus, Denmark, 25 June, 1998, U.N.T.C. 37770, [https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg\\_no=XXVII-13&chapter=27&clang=en](https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-13&chapter=27&clang=en).

<sup>458</sup> Convention on the Conservation of Wild Flora and Fauna and their Habitats in Europe (The Berne Convention), 1979.

<sup>459</sup> Convention on the Conservation of the Migratory Species (The Bonn Convention), Bonn, 23 June, 1979, accessed April 20, 2017, <https://treaties.un.org/pages/showDetails.aspx?objid=08000002800bc2fb>.

animal and plant species; ensure the sustainable use of natural resources of the watershed; avoid serious damage to cultural values and natural landscapes; and prevent and control economic activities that could harm the Lake Watershed. To these ends, the Agreement requires both parties to faithfully apply the environmental standards; to monitor environmental conditions in the Lake and its watershed; and to honor the rights of individuals to obtain environmental information, participate in decision making, and obtain justice for environmental matters

*Framework Agreement on the Sava River Basin, 2002.*<sup>460</sup> The Framework Agreement on the Sava River Basin was concluded between Bosnia and Herzegovina, Croatia, Slovenia, and Yugoslavia to enhance cooperation in the sustainable development of the Sava River Basin and to establish an international regime of navigation on the Sava River. While the Agreement addresses navigation at length, it also promotes sustainable water management and protects the River Basin from various harms.

Sustainable water management in the Agreement means the integrated management of surface and ground water resources in ways that preserve, protect, and improve aquatic ecosystems (including flora and fauna and ecosystems of natural ponds and wetlands) while protecting against the detrimental effects of water (flooding, excessive groundwater, erosion and ice hazards). The Agreement requires parties to foster ecological integrity and to reduce harmful transboundary impacts, with “transboundary impact” defined as any human-caused adverse effect on the river environment that stretches beyond the jurisdiction of State where the action takes place. In order to achieve that purpose, the Agreement requires each party to have a

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<sup>460</sup> Framework Agreement on the Sava River Basin, 12 March, 2002, UNTS Vol 2366, <https://treaties.un.org/Pages/showDetails.aspx?objid=0800000280069231>.

protocol on the issuance of specific regulations (licenses, permits and confirmations) for installations and activities that may have such a transboundary impact.

## **PART IV: A Path to Justice and Environmental Health**

### **Chapter 7: Directions, Currents, and Issues**

This final part of the dissertation builds upon the preceding chapters to isolate and evaluate critically the chief ongoing trends in the law of watercourses and then to offer proposals for reform taking into account the needs of vulnerable, downstream States. This body of law remains in its adolescence, even as a few longstanding issues—navigation on rivers in particular—have largely been resolved and as many central principles have gained the status of customary norms. The law has become a repository for widely differing principles, many added within the past quarter century in an effort to enhance the law’s attention to ecological concerns, to force greater international cooperation, and to curtail watercourse uses that are in some general sense not reasonable. The new principles and provisions, however, fit together rather poorly, creating considerable internal tension. Further, while they push the law in good directions they do not push it as far as it needs to go. Environmental rules need greater force if the world’s rivers are to regain their ecological health; the environment in some sense needs to come first, with watercourse uses allowed only insofar as consistent with that health. Similarly, basin-wide management—a goal identified now for several decades—is unlikely to come about so long as locally strong States can dominate their weaker neighbors. In all likelihood, more rules need to be put in place at the international level and not left to local negotiations among States with widely varied negotiating strength. As for local management, shared governance need not mean one vote for each State, regardless of size. But undue power cannot fairly go to

States simply because they reside upstream, giving them not just an earlier opportunity to divert water but immunity from many of the harms caused by diminished and altered water flows.

The proliferation of principles and ideas in the body of law reflects clear dissatisfaction with it, particularly as it existed circa 1990. They display uncertainty about the relative roles of binding international law and regional agreements. Dams and reservoirs still largely remain off to the side while pollution control measures have not yet been reconciled with longstanding principles of watercourse utilization except (under some conventions) as they directly control discrete pollution sources. As will be seen, important omissions in the current law include physical modifications of watercourses, land-cover change, and drainage practices, which in combination are likely more important forces of waterway degradation than are discrete pollution sources.

### Issues & Main Trends

*Growing recognition of international watercourses as individual units.* The first distinct trend, a positive one, is the increasing recognition of international watercourses as coherent, individual units based on drainage basins. To treat a watercourse as an individual unit is to recognize its physical unity and indivisible nature despite the presence of political boundaries. This sense of physical individuality of rivers has important implications. It strikes at our age-old assertion of territorial and sovereign division of watercourses, calling into question assertions of State power based on the fragmentation of watercourses. It recasts such watercourses as shared and common resources calling for joint management by all riparian nation States concerned—for

homogeneous policy and management throughout an entire basin rather than differential treatments to different political segments of a river.

This idea of “oneness of rivers” marks a clear divergence from the once-popular principles of absolute territorial sovereignty and absolute territorial integrity. As explained, these doctrines have given way to more moderate and forward-looking theories; i.e. limited territorial sovereignty and the concept of community of interest. The principle of limited territorial sovereignty, largely dominant today, requires the sharing of watercourses and imposes a vague but important limit on transboundary harm. This principle, however, falls short of treating an international watercourse as a single unit. Greater movement in that direction is reflected in the community-of-interest principle, promoted by judgments of the ICJ and also by recent international documents and regional agreements that honor rivers as shared treasures.

The community-of-interest principle extends the interests of all riparian countries to the whole course of a waterway, reflecting its natural, physical unity.<sup>461</sup> The idea underlying the principle—that freshwater is something that should be shared by the community—is hardly new; it was historically embraced by Roman and Greek philosophers and poets. The Permanent Court of International Justice (PCIJ) revived and endorsed this understanding, reframing it as a community-of-interest principle, in its decision, *Territorial Jurisdiction of the International Commission of the River Oder*.<sup>462</sup> That ruling had to do with a navigable river, which the tribunal described as a “single waterway” even as it ran through and along different political boundaries.<sup>463</sup> How far the course meant to apply this doctrine was a bit unclear: Did it apply

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<sup>461</sup> Stephen C. McCaffrey, *The Law of International Watercourses: Non-Navigational Uses* (Oxford: Oxford University Press, 2001), 150.

<sup>462</sup> *Ibid.*

<sup>463</sup> McCaffrey, *The Law of International Watercourses*, 151.

also to non-navigable river segments and to the full range of uses in addition to navigation? (The tribunal may have meant this when it grounded its ruling in “the principles governing international fluvial law in general.”<sup>464</sup>) Later on, the community-of-interest principle as applied to non-navigational uses of a watercourse appeared clearly in the judgment of the ICJ in the case concerning the *Gabcikovo Nagymaros Project (Hungary / Slovakia)*.<sup>465</sup>

The community- or unity-of-interest principle was endorsed in the 1997 U.N. Convention, which defines a watercourse as “a unitary whole,” even as the Convention, as discussed earlier, vested States individually with the power to use a watercourse unilaterally and did not mandate shared governance. The principle was implicit also in the Convention’s reframing of “equitable and reasonable utilization” to require that water uses by one State take account of the interests of other States and be “consistent with adequate protection of the watercourse” (Article 5)—with watercourse, again, understood as a single whole. Other implicit references appear in provisions establishing joint management mechanisms or commissions; setting joint water-quality objectives and criteria; requiring joint protection and preservation of the ecosystems; entailing joint prevention, reduction and control of the pollution of an international watercourse; and calling upon States to take steps for harmonizing national policies to that effect.

This community-of-interest idea relates to and reinforces the duty of cooperation. More than 70 years ago, Professor Herbert Smith concluded that, because of the shared nature of water as a natural resource, a duty to cooperate arises that underlies all other rights and duties pertaining to water management. The first principle for Smith was that every river system is naturally an

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<sup>464</sup> McCaffrey, *The Law of International Watercourses*, 152

<sup>465</sup> The ICJ stated: “...Modern development of international law has strengthened this principle of non-navigational uses of international watercourses as well, as evidenced by the adoption of the Convention of 21 May 1997 on the Law of the Non-Navigational Uses of International Watercourses by the United Nations General Assembly.”



indivisible physical unit, which, as such, should be developed so as to render the greatest possible service to the whole human community which it serves, regardless of State boundaries. Noticeably, Smith stressed the unity of the river to promote “development” of this shared and finite resource; today’s language tends to stress benefit-sharing, with or without development. A similar shift in focus, from the narrow approach of allocating a finite resource to the sharing of rivers understood as single wholes, appears in strategic priority seven of the World Commission on Dams Report (considered below).<sup>466</sup>

This first trend in international watercourses law, while distinct and strong, has by no means swept away alternative views more inclined to divide river flows and authorize unilateral State action. Most relevant here, the newer line of thinking has made little appearance in the bilateral agreements in South Asia.

*Growing international governance of shared watercourses.* Along with this recognition of the wholeness of rivers and river basins has come a shift toward increased governance of watercourses at the international level, restricting State liberties and displacing local flexibility. Many of the emerging, global rules of law—customary and convention-based—have dealt (as we have seen) with environmental and human rights concerns, rules that further illustrate the growing international inclination to preserve shared resources through cooperative management. International governance has spread in three ways: through legal standards set at the international level, by increased institutionalization, and through an expanding role for international dispute resolution.

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<sup>466</sup> The Report mandates riparian States to go beyond looking at water as a finite commodity to be divided and embrace an approach that equitably allocates not the water, but the benefits that can be derived from it.

The rise of *international standards* is perhaps most evident in the expansion of international customary law. This is best seen through the many provisions of the Berlin Rules, which purport to state principles that are or will soon be legally binding on States. To the extent the Berlin Rules are accepted as binding law, they represent a significant shift of lawmaking power to the international level. The 1997 UN Convention and the 1992 ECE Helsinki Convention, although binding only on signatories, are slowly expanding their international reach as more States commit to them. These conventions are particularly significant because they include provisions that are more precise than the broad principles of customary law and thus more restrictive of State and regional flexibility. Precision is even more evident in regional agreements, some of which—the Rhine Convention, the SADC Convention—cover numerous States.

The trend toward *increased institutionalization* is evident at the regional level, with the emergence of various types of jointly run organizations to structure interstate discussions and, in some instance, manage particular interstate water bodies. Along with the increase in numbers has been a broadening in the scope of functions and powers. The earliest institutions were set up to deal mostly with navigation and fishing rights. Later ones soon began to address issues such as hydropower generation, irrigation activities, flood control, environmental protection, and, in general, the joint and coordinated management of shared water resources. Today, their competencies in a few settings include the adoption of new standards and guidelines, brokering of negotiations, and information collection and dissemination. Such regional governance arrangements have been encouraged by the more broadly applicable conventions – the 1992 ECE (Helsinki) Convention and the 1997 U.N. Convention.<sup>467</sup>

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<sup>467</sup> L. Boisson de Chazournes, “The Role of Diplomatic Means of Solving Water Disputes: A Special Emphasis on Institutional Mechanisms” in *the PCA/Peace Palace Papers*, Vol 5 of *Resolution of International Water Disputes* (The Hague: Kluwer Law, 2003), 91-110.

Regional organizations and commissions vary from one basin to another and from one region to another. In general they serve as forums for information exchange, dialogue, and cooperation among the basin countries.<sup>468</sup> Some are also entrusted with resolution of disputes in the event any conflict or disagreement arises. One general trend is toward expansions of the tasks and powers vested in such organizations. Another is toward harmonization in that regional institutional arrangements that now commonly include similar provisions, including calls for integrated management and provisions for the exchange of notice and information in case of planned measures.

The third trend toward enhanced international governance has to do with the *international resolution of disputes*—more disputes are being heard today by international tribunals or arbitrations than it was done decades ago, and with disputes involving larger numbers of issues. Related to this has been an increase in the involvement of non-state actors in water-related disputes, including international intergovernmental organizations, financial or investment institutions, and non-governmental organizations. Disputes are now often heard by independent institutions dedicated for that purpose; such as locally constituted joint commissions and basin institutions (mostly set up by regional agreements), by separate fact-finding commissions, through international arbitrations, and by international formal dispute resolution bodies such as the International Court of Justice. Along with their informal modes of dispute resolution, regional joint institutions and commissions are likely to play an increasing role in managing and, more importantly, preventing disputes. Alongside these there still exists the practice of referring disputes to more formalized international avenues like the ICJ and the PCA (Permanent Court of

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<sup>468</sup> Laurence Boisson De Chazournes, *Fresh water in international Law* (Oxford: Oxford University Press, 2013), 176.

Arbitration). As for non-state forums, the Indus River Treaty between India and Pakistan designates the World Bank to serve as an independent party to facilitate dispute resolution.<sup>469</sup>

International governance, particularly when matched with international dispute resolution, reduces the power and flexibility of individual States and weakens the power of States in stronger negotiating positions. Still, many disputes—such as those involving Bangladesh—arise outside the context of any regional agreement or international convention. Customary law still applies, to the extent it is recognized. But no special dispute resolution mechanism exists nor is there, more importantly, any strong way to enforce judgments or arbitration awards. Indeed, in this area of international law as elsewhere, no strong mechanisms exist to enforce compliance with international law, just as no formal means exist to monitor compliance. This lack of effective enforcement necessarily weakens the force of the governing rules.

*The evolving tension between equitable and reasonable water use and the duty to avoid significant harm.* As explained, watercourse law, as it applies to non-navigable uses,<sup>470</sup> centers around the rights of States to make equitable and reasonable use of water and the corresponding duty to avoid significant harm. How these principles fit together, and whether one or the other enjoys dominance, remains a lively topic. The trend, as noted in the discussion of the Berlin Rules, has been for lawmakers to make ever clearer that the right to use water is a conditional right, conditioned on the avoidance of harm. More and more limits—many of them environmental—are imposed on the longstanding right to water use. Still, even as the new provisions are added, the tendency remains to talk about water law as if the new provisions were

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<sup>469</sup> The Indus River Treaty, India - Pakistan, Karachi, September 19, 1960, accessed April 18, 2017, <http://siteresources.worldbank.org/INTSOUTHASIA/Resources/223497-1105737253588/IndusWatersTreaty1960.pdf>.

<sup>470</sup> This includes the UN Watercourse Convention, other non-binding works of international scholarly bodies, various regional and bilateral agreements, judgments by international courts and tribunals, scholarly writings etc.

all subordinate to the central, two-part clash, and the issue remains: Which of the two enjoys dominance? When disputes arise they remain framed, in many instances, in terms of this dichotomy and disputing parties present their cases by endorsing one side or the other. Scholars also often keep the dichotomy as the law's central organizing feature.

In an important way the history of this body of law can be traced in terms of this central tension. The tension was put in place in the original Helsinki Rules of 1966, which formulated the principles in such a way that equitable and reasonable utilization was the more dominant. During the ILC's two decade-long work on framing what became the 1997 UN Convention, the two principles both enjoyed strong support. The ILC in its discussions and deliberations at times attempted to strengthen and then again to weaken both of the provisions relative to the other. In the advanced stages of deliberation, the wording of the two principles and their relationship turned into the most contentious issue that the 6<sup>th</sup> Legal committee and also the United Nations General Assembly faced. The negotiations and reservations finally led to a tripartite formulation (involving articles 5, 6 and 7), popularly known as the "three article package" since the formulation compromised the extreme views held by the two opposing groups. This was done with a view to induce more States to adopt the convention. A number of lower-riparian States viewed the final arrangement as reasonably neutral; it did not, they sensed, subordinate the no-harm rule to the principle of equitable and reasonable utilization as had the Helsinki Rules.

Although this arrangement proved successful to move the Convention forward and gain U.N. approval, confusion on the issue soon surfaced and many States were reluctant to ratify it. Notwithstanding the balancing language, the view emerged—and prevails today—that the Convention continued to subordinate the no-harm duty to the principle of equitable and

reasonable utilization,<sup>471</sup> chiefly because the harm resulting from a water use was expressly listed as a factor entering into the determination of equitable and reasonable use.

The Berlin Rules, as explained in the last chapter, made another attempt to bring the principles together in a way that lessened the sense of dominance. It did so by expressly conditioning the right to use with the duty to avoid harm. Under the Rules, the right to use water (that is, to assert management control over it) requires that a State act in an equitable and reasonable manner having due regard to avoid significant harm. At the same time, the duty to avoid harm is conditioned by the right of other States to use water equitably and reasonably, a provision that the commentary suggests resembles the UN Convention provisions.<sup>472</sup> At the same time, the final Rules continued to list the harm caused by a water use as one of many factors relevant in assessing whether the water use is equitable and reasonable—exactly the arrangement that led readers of the 1997 UN Convention to conclude that it gave preference to the right to use.

The inherent problem with this long-simmering discussion stems from the juxtaposition of two contradictory principles and from the tendency to apply the principles to evaluate water uses in isolation. Further, the principle that draws attention to the resulting harm looks chiefly if not solely to the harm caused to a State as such, or to another particular water use. It does not directly consider the effects of a water use on the overall health of a watercourse or river basin. Further, it does not consider the relative merits of a particular water use in comparison with all other possible uses of the water, although these considerations do work their way into the long list of reasonable-use relevant factors. The use versus harm-avoidance dichotomy, we need to

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<sup>471</sup> Salman M.A. Salman, “Entry into force of the UN Watercourses Convention: why should it matter,” *International Journal of Water Resources Development* 31 (2014): 1-13, accessed April 18, 2017, doi: 10.1080/07900627.2014.952072.

<sup>472</sup> ILC Commentary to Article 16 of the Berlin Rules.

recognize, is itself part of the problem. The harm-avoidance principle was added to modify and mitigate the effects of particular damaging water uses. It was needed because the starting point of legal analysis was the right of a State to use water. But the right of a single State to use water need not be the starting point. Other starting points are possible, and might well be more fruitful. International water law today has reached a point where the focus is shifting to the overall maintenance of a healthy, productive watercourse that fosters multiple uses. Regional water agreements, especially those entered into shortly before and after the adoption of the UN Convention, have illustrated some of the other possible ways to organize watercourse law. Of the regional agreements reviewed for the purpose of this dissertation, only two were modeled after the UN Convention insofar as they juxtaposed the equitable-and-reasonable rule and the no-harm obligation.<sup>473</sup> The other agreements embraced a more holistic approach toward integrated management and protection of the watercourses.<sup>474</sup> Several, as noted in the last chapter, referred to watercourses as sites of exceptional scientific, aesthetic and cultural value,<sup>475</sup> not simply economic and environmental amenities.

When watercourses are understood this way and their overall health made paramount, then watercourse law should put that vision front and center. It should in some way insist that all water uses, individually and collectively, be undertaken only when and as they sustain this overall health. As for which uses should go forward, the uses should be assessed against one

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<sup>473</sup> Framework Agreement on the Sava River Basin, 12 March, 2002, UNTS Vol 2366, <https://treaties.un.org/Pages/showDetails.aspx?objid=0800000280069231>, and the Protocol on Shared Watercourses in the Southern African Development Community (SADC) (Revised), 2000.

<sup>474</sup> The Convention on the Protection of the Rhine, 1999, Bern, April 12, 1999, accessed April 20, 2017, [http://www.iksr.org/fileadmin/user\\_upload/Dokumente\\_en/convention\\_on\\_the\\_protection\\_of\\_the\\_rhine.pdf](http://www.iksr.org/fileadmin/user_upload/Dokumente_en/convention_on_the_protection_of_the_rhine.pdf).

<sup>475</sup> Agreement between the Council of Ministers of the Republic of Albania and the Government of the Republic of Macedonia for the Protection and Sustainable Development of Lake Ohrid and its Watershed, Albania – Macedonia, 17 June 2004, <http://extwprlegs1.fao.org/docs/pdf/bi-69075E.pdf>.

another to identify those that generate the most benefits, with particular concern for meeting basic human needs. This needs to take place in the context of a legal framework that does away with the intractable conflict between the right to use and duty to avoid harm. As taken up in the final chapter, a new, better approach is possible.

*From fair shares to reasonable use and beyond.* As international law in the nineteenth century moved beyond crude notions of territorial sovereignty, it embraced, as we have seen, the idea that states should share watercourses. The focus at the time was on water allocation—deciding how much water each State could divert and consume—and the idea added to the law was that a State should take only its equitable portion. This principle and the language used to express it was largely borrowed from U.S. law, which had developed what it termed the equitable apportionment doctrine to divide river flows between and among U.S. states. By the mid-twentieth century, however, it had become clear that the challenge in managing interstate watercourses went beyond simply deciding how much water went to each State. A water use by one State could cause harm in another due to its effects on water quality and on the timing of water flows, even when the harm-causing State did not take more than its fair share. Simply dividing water flows among the States was not adequate.

This general problem led to the addition of another term—reasonable use. What quickly gained currency was the idea that water uses by a State should be both equitable and reasonable, with reasonable taking into account factors other than simply the quantity of water diverted or consumed. Reasonable use was also drawn directly from U.S. water law, although the general idea appeared in the laws of many States. U.S. law used the concept as the overall limit of water uses by an individual riparian landowner. Under riparian law, each landowner could use water on the riparian tract of land but had to share the river with all other riparians on an equal basis.



Early American law, borrowed from Britain, required that each riparian owner use a water flow only in modest, tightly constrained ways, in ways that left the water flow undiminished in quantity and quality except as needed to meet the most basic human and household needs. By the mid-nineteenth century, that law of riparian rights had relaxed the water-use rules so that each riparian could use the water in any way that was reasonable, taking into account the water uses by other riparian landowners. The reasonable-use limit was thus the legal mechanism for resolving disputes between and among individual riparian landowners. It was a limit that took into account all relevant factors, including the economic and social values of the competing water uses, their relative efficiencies, priority in time of use, and possibilities that one user or another might make changes in her water use so as to diminish the conflict. One influential expression of the reasonable use test would appear in the U.S. Restatement (Second) of Torts,<sup>476</sup> which lists eight factors for determining reasonableness (including, as a sort of tie-breaker, priority in time of use).

Under U.S. law, the equitable apportionment and reasonable-use rules were distinct in meaning and function. The former simply divided water flows among States; the latter resolved (or purported to resolve) conflicts among competing individual users. As the terms came together in international water law, however, they were fused into a single principle. Water uses by a State, the law began to proclaim, had to qualify as reasonable and equitable (as the Helsinki Rules expressed it) or as equitable and reasonable (as documents since then have said). When the terms were added to the law no effort was made to define them separately, and no such effort has been made since. In some interpretations, the core meaning of equitable and reasonable still has

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<sup>476</sup> S 850 (1979).

to do with the fair sharing of water among States; for others, the many factors pertaining to reasonableness are given greater emphasis.

While this was going on, concerns about the harms caused by water uses led to the addition in international water law of further provisions. The Helsinki Rules of 1966 recognized the right of each State to a “reasonable and equitable share” of a watercourse, but it added more terms to the mix. What was being shared were the “beneficial uses” of the watercourse, a term that seemed to rule out uses that did not qualify as beneficial—a term that went undefined. Further the Helsinki Rules added new provisions—in addition to a multi-factor test of “reasonable and equitable”—admonishing States to prevent water pollution “consistent with the principle of equitable utilization.” The Helsinki language was soon replaced with new language that continued the trend it began. “Reasonable and equitable share,” as explained earlier, turned into “equitable and reasonable utilization” (and later, in the Berlin Rules, to management in and equitable and reasonable manner). The language of beneficial use (a term employed in the prior appropriation system in the Western U.S. states) was dropped. The Helsinki pollution provisions were greatly expanded upon in the 1992 ECE Convention but otherwise dropped for the time being. The 1997 U.N. Convention would use, instead of specific provisions on pollution, a more general principle proscribing significant harm—although again, as discussed at length, subject to a State’s right to make equitable and reasonable utilization. The Berlin Rules would bring all the pieces together (except beneficial use), retaining the limit on significant harm and adding not just pollution-control rules but the wide suite of other environmental provisions considered in the last chapter.

Pushed aside in this legal evolution was the idea that water uses earlier in time enjoyed protection when they conflicted with later water uses. Article VIII of the Helsinki Rules

provided that an existing reasonable use could continue “unless the factors justifying its continuance are outweighed by other factors.” Prior uses were thus presumptively favored, but could be curtailed. That limited protection disappeared in the 1997 U.N. Convention, which merely stated that the effect of a water use on “existing and potential uses” was one factor in the overall balancing test. That language, in turn, would be retained in the Berlin Rules. But those Rules would add an Article (14), expressly stating that no use enjoyed a preference over any other except that States were instructed to allocate their water first “to satisfy vital human needs.” The Article’s language implicitly denied any special protection for existing uses as such.

At present, as just discussed, the international law of watercourses continues to center on the clash or at least tension between the right to use and duty to avoid harm, with supplemental provisions pushed States to protect the environment. In many commentaries—including the Berlin Rules—the term “equitable and reasonable utilization” is often reduced simply to “equitable utilization” (for instance, in the title to Article 12 and first sentence of the accompanying commentary). This practice implies, for some readers, that the core idea remains one of dividing water flows among States in an equitable manner. Equitable sharing does not mandate the equal division of water; it merely implies that all riparian States stand on an equal footing (having equality of rights) without any State reserving inherent priority. The text of the Rules—both Article 12 taken alone, and, even more, the Rules considered as a whole—do not clearly support this extra emphasis on sharing as opposed to reasonable use.

When the many relevant factors are brought together, including the harm-avoidance and environmental provisions, the result is an overall, highly complex, fact-based inquiry into the details of particular water uses, including alternatives to the uses. Because the many factors are simply thrown into the mix—they are not legal requirements that each must be satisfied—the

result is vagueness and considerable uncertainty. It is often impossible to predict in advance if a certain use will be protected against another since almost all uses of water are primarily and potentially reasonable; e.g. flood control, irrigation, power generation, recreation, and conservation. The added terms of the law, that is, have brought confusion as much as clarity, leading some commentators to conclude that guiding central principle has simply been overloaded.<sup>477</sup> The multi-factor test may come in handy once a matter or a dispute is submitted to an adjudicating body, a court (e.g. ICJ) or an arbitration; the factors provide materials to justify pretty much any outcome that the decision-makers deem appropriate. What happens in the absence of such a body remains unclear. In this regard, the articulation of the principles appears to invest States in the first instance with the responsibility of determining whether a particular use qualifies as an equitable and reasonable one.

In application, the complex balancing test seems to call upon States not to comply with a standard but to exercise due diligence to conform to international standards. It is a task that can prove onerous job in practice. A water use that may appear reasonable to one State may appear quite differently to a co-riparian. State A, an upstream State wanting to exploit its hydropower potential, may deem it a justified use in view of its need for electricity. State B, a downstream State that has long withdrawn water for irrigation, may consider its use more important and deserving of priority in a clash with A's planned use. How might such competing, yet apparently fair, uses be reconciled without formal conflict? One option is to enter into agreements to adjust competing needs on a case-by-case basis. But the multiplicity of conflicts, and of discrete agreements (costly and time-consuming to negotiate), can quickly render the approach untenable. In any event, a State making a good-faith effort to assess the reasonableness of a water use will

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<sup>477</sup> McCaffrey, *The Law of International Watercourses*, 325.

often need extensive information about present and prospective water uses in other States.<sup>478</sup>

Obtaining the information can be challenging without a central organization that routinely acquires and organizes it.

As one looks at the evolution of this law, it is clear that the law has embraced a series of overall frames, each crafted to overcome problems with the prior frame but none, so far, that has succeeded in keeping up with advances in science and senses of justice and fairness. Territorial sovereignty gave way to equitable sharing, which in turn gave way to a frame that basically endorsed both a right to use and duty to avoid harm. This third frame, though, does not fit well with the emerging beliefs that (i) rivers should be managed as a whole, not divided, (ii) the ecological health of the river as a biotic and geophysical system should be paramount, and (iii) waters should be used in ways that address the highest valued needs of people in the river basin. These rising ideas call into question the management of river sections by States acting on their own. They put the ecological health of a watercourse as a baseline requirement, limiting all waters uses, not merely (as in the existing frame) as a factor to take into account. They call into question all diversions of water outside a basin except in the rare instance in which diversions cause no noticeable ecological or social problems. And they imply that, in the competition among competing uses and users, State boundaries should have little effect: water should go to the highest valued unmet water needs, without regard for location.

*Environmental norms, their rise and proliferation.* This next trend needs little comment beyond what has already been said. Over the past few decades environmental norms have become hugely important in the management of transboundary waters and they continue to gain

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<sup>478</sup> McCaffrey, *The Law of International Watercourses*, 342.

influence. At the same time these environmental norms are broadening in terms of concerns, with clear evidence that this trend will continue. Early environmental concerns, as noted, mostly involved pollution problems. Concerns soon expanded to consider other ecological issues, including the timing and quantity of water flows. On the horizon today are growing recognitions of the problems related to silt; land subsidence; salt-water intrusion; flood plains and fish spawning; and the roles of land cover change in affecting rivers. Needless to say, these are promising developments that certainly need to continue. The looming issue however is how these environmental standards might best be set forth, and how binding they should be: Should States only be required to use due diligence to promote them or should new standards bind States with positive obligations?

The evolution of these concerns might usefully be divided into three stages, an initial stage involving pollution issues, a second, post-pollution stage aimed at general environmental protection, and the most recent stage of emerging norms involving broader ecological concerns.

The risk of pollution on international waters and their prevention have long received attention since efforts to regulate international waters commenced.<sup>479</sup> As pollution concerns gained attention the International Law Association produced several substantial rules on pollution that, by reference, applied to international waters. These rules encouraged States to strengthen their steps to prevent or correct the pollution of internationally shared waters, and gradually to bolster those strictures into obligations.<sup>480</sup> The trend continued and consequently led to the adoption of the 1992 ECE convention, which put pollution control as the focal issue. The 1997 UN

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<sup>479</sup> These provisions appeared in the original Helsinki Rules of 1966.

<sup>480</sup> The Marine Pollution Rules (1972), the Belgrade Rules on the Relationship of International Water Resources with Other Natural Resources and Environmental Elements (1980), the Montreal Rules on Pollution (1982), and the Supplemental Rules on Pollution (1996).

Convention, though not as forcefully as the ECE Convention, continued this trend and adopted pollution concerns as undertones setting forth environmental obligations. This progression matched the evolving practice of States, including multilateral and bilateral agreements, which also moved in the direction of prescribing definite obligations regarding pollution. These trends and State practices turned pollution control into a principle of customary international law. The Rio Declaration and other instruments made clear that this duty applied also to waters within a State's jurisdiction as much as it did to international waters.

With this steadily increasing recognition of pollution has come a broadening of the concept of harm or injury that international law sought to address. A clear step was taken in the ECE Convention, which drew attention broadly to “transboundary impacts,” a term that includes effects not only on the ecological environment but also on human health and safety, cultural heritage or socio-economic conditions. A common trait of such expanded definitions of harm was that the definitions were rarely clear enough to apply to real-world changes brought about by water uses. Varied documents put forth different thresholds for harm or injury.<sup>481</sup> While they used adjectives like adverse or detrimental, the adjectives were not clear enough to distinguish changes to nature that were acceptable or good from changes that seemed harmful.

The law's movement beyond pollution gained momentum in the 1990s. The movement was apparent in a number of regional and international water law instruments, including the 1992 ECE Convention, the Rhine Convention, and the UN Watercourse Convention. In varied ways these documents pushed States to protect and maintain ecosystems, to forestall introductions of alien species, and to establish and achieve water-quality standards. Even as they did so,

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<sup>481</sup> Starting with the expressions “substantial injury” or “significant harm”, it gradually expanded the scope of harm by employing the expressions “environmental harm” underscoring environmental concerns and more importantly “transboundary impacts.”

however, the documents were not so clear, as noted above, on how these principles fit together with equitable and reasonable utilization. It was simply not clear how the various principles and instructions fit together; their relative importance was not explained. This uncertainty was not diminished with the incorporation, into the equitable and reasonable-use mix, of ideals such as “optimal and sustainable utilization” and “adequate protection of the watercourse.”

What might be termed the latest phase in this gradual, indistinct evolution has been, as noted, the addition of language showing heightened concern for the ecological functioning and overall health of rivers, recognizing watercourses as intrinsically valuable and comprehending them complete, interdependent systems. These new norms reach beyond the riverine environment to consider and conserve the complex ecological integrity of even larger natural communities. Ecological flows and the timing of flows are drawing more attention. At the same time, efforts are underway to understand the functioning and interrelationships of surface water, groundwater, and alluvial plains, with efforts to protect aquifers even when not connected to surface water. On the horizon in rudimentary form are the recognitions of the problems related to sediment transportation, land subsidence, salt water intrusion, fish spawning, the roles of land cover change in affecting rivers, and the many benefits of keeping rivers connected to their floodplains. There are also increasing concerns about riverine biodiversity, especially endemic, rare, threatened or endangered species of flora and fauna.

There is so far no clear indication how these emerging norms might best fit together with existing environmental rules. It needs noting also that these norms are still emerging and have yet to attain customary status. They are primarily seen in dispersed regional agreements rather



than in overarching international instruments.<sup>482</sup> Nonetheless, they hold immense importance and would seem to represent the next era of international water law.

The addition of these new, more ecological elements gives even more cause to reconsider the still-dominant frames of international watercourse law. Ideals and principles proliferate but without an overall structure to bring them together and express plainly the guiding purposes of the law. For generations the law has chiefly sought to resolve disputes between and among competing State users of international watercourses. With the law increasingly applying to waters within States, the international connection is weakening. Many environmental provisions are inserted because people who live far from a river have become concerned about its ecological health and, in particular, its biodiversity. This trend casts further doubt on the law's preoccupation with interstate clashes. Further the welfare of ordinary people is no longer the concern merely of the State in which they live; outsiders are legitimately interested as well. A legal metamorphosis seems needed.

*Dams and reservoirs: the big elephants still in the room.* Nothing alters a waterway as much as a dam or a reservoir. Chapter 2 reviewed some of the ill effects of these projects in terms of their net social and environmental upshots. Their widespread existence across international waters and extensive, often interstate impacts give cause to formulate international governance standards. Surprisingly given their importance, international conventions have had almost nothing to say about them in express words. As noted in the last chapter, both the UN Watercourse Convention, the Berlin Rules and the 1992 ECE Convention do include provisions relating to them, but the provisions are all procedural. This nearly hands-off treatment reflects, one

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<sup>482</sup> With the exception of the Berlin Rules on Water Resources, 2004.

assumes, a reluctance on the part of the framers of international agreements to bring these structures within regulatory schemes. The reluctance may arise because lawmakers perceive dam construction as a matter of sovereign decision-making that is somehow immune from external interference. For many States, dams are viewed as indispensable means to achieve developmental or economic goals and, as such, constitute an independent and extraordinary category of water use. A rare exception at the international level is the work-product of an international collaborative, the World Commission on Dams, useful even though it is not legally binding on any party and does not purport to express customary law.

A noteworthy feature of conventions and other documents that do include provisions affecting dams and reservoirs is that lawmakers shy away from using ordinary language to discuss them. They are referenced, not using clear terms, but as “planned measures,” “installations,” “facilities,” “hydraulic structures,” or “any other work.” This indirect language raises some doubt about whether the structures are covered—if they were, why not say so expressly? But no doubt they are covered, along with other construction efforts—locks, levees, diversion ditches. The various documents that cover them typically call simply for the exchange of information, consultation and negotiation on their possible effects. The Berlin Rules, as noted in the last chapter, go further to allow a concerned State to demand preparation of an impact assessment for a worrisome project. Similar safeguards are frequently found in regional and bilateral agreements. Similarly, provisions regarding planned measures were referred to in the Gabčíkovo-Nagymaros dam case by the ICJ. Planned measures as enumerated in the UN

Convention have again found their place (as considered below) in the framework propounded by the World Commission on Dams.<sup>483</sup>

Current international water law is confusing as it applies to dams and reservoirs in that the various leading documents do not state clearly whether their main provisions apply to them. Procedural requirements that apply to planned measures and the like do apply. But as noted above, other provisions perhaps do not—a conclusion reached mostly because no accompanying commentary refers to them and because major dams in particular would seem to collide directly with their terms, particularly harm-avoidance provisions. If constructing and operating a dam or a reservoir is understood as a use of an international watercourse, then it would have to comply with the equitable-reasonableness principle and also the do-no-harm principle, just as other watercourse uses do. But if that were the case—if they were simply specific types of watercourse uses subject to the general rules—then why prescribe a distinct set of procedural rules designed only for planned measures, rules that seem to leave negotiating States to reach any end point that they like? Do they suggest that dams and similar structures are subject to more rigorous standards than other uses—the added procedural rules in addition to the principles applying to all water uses? The various documents supply no explicit answer. If higher, more rigorous standards were envisioned then big projects should have drawn mentioning in the general principles, given their importance and the need to handle them wisely to promote harmony and compatible water uses among States sharing an international drainage basin.<sup>484</sup>

The more likely interpretation is that such projects somehow stand apart, for regional negotiation that takes place in the context of the general principles but is not bound by them. In any event, it

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<sup>483</sup> Dams and Development: a new framework for decision-making, 2001, [http://www.unep.org/dams/WCD/report/WCD\\_DAMS%20report.pdf](http://www.unep.org/dams/WCD/report/WCD_DAMS%20report.pdf).

<sup>484</sup> McCaffrey, *The Law of International Watercourses*, 406.

is not easy to distinguish clearly between the general substantive principles and the procedural rules: the substantive obligation to evaluate whether water uses are equitable and reasonable may itself be thought of as a process while the substantive obligation not to cause significant harm also serves as a trigger to process.<sup>485</sup>

Further evidence that the general principles for international watercourses do not apply directly to dams comes from the important report in 2000 from the World Commission on Dams (WCD), an ad hoc study group set up by the World Bank and the International Union for the Conservation in Nature. Its final report, in 2000, discusses the challenges of large dams. In doing so it does not suggest that they are already subject to international watercourse law, implying plainly that such law does not apply. (The Report, of course, predates the Berlin Rules.)

The WCD report is worth considering, even though it lacks legal status and was not prepared, as ILA and ILC documents are, chiefly by international legal scholars. It reflects the controversies surrounding large dams as of 2000, controversy that then has become more intense since then. The group's objective was to develop internationally acceptable criteria, guidelines and standards for the planning, design, appraisal, construction, operation, monitoring and decommissioning of large dams. The body comprised members representing a broad spectrum of interests in large dams, including governments and nongovernmental organizations (NGOs), dam operators and grassroots people's movements, corporations and academics, and industry associations and consultants. Despite its lack of legal force (and lack of express grounding in international law) the Report offers a guide to States in devising national policies and negotiating agreements.

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<sup>485</sup> McCaffrey, *The Law of International Watercourses*, 397.

The WCD Report sets forth a generalized, step-by-step process for making decisions on water and energy development, called the “criteria and guidelines.” The proposed process includes an assessment of needs for the project, identification and study of alternatives, project preparation, project implementation, and pre-commissioning compliance checks, leading to project operation including adaptation to changing contexts. To help guide the process the Report sets forth seven broad strategic priorities, intended to yield more equitable and sustainable outcomes. The first priority requires *involvement of all stakeholders*, recognizing their rights, assessing the risks of the vulnerable ones, and making a transparent decision with informed participation from all stakeholders. The second requires the *comprehensive assessment* of the full range of all policy, institutional, and technical options, covering social and environmental aspects as well as economic and financial factors. The third priority draws *attention to existing dams*, encouraging States to address outstanding social issues and strengthen environmental mitigation and restoration measures. The Report stresses that modifications to existing projects will often be necessary due to changes in water-use priorities, physical and land-use changes in the river basin, technological developments, and changes in public policy expressed in environment, safety, economic and technical regulations.

Strategic priority 4 of the WCD Report is of special importance as it underscores the need for *sustaining rivers and livelihoods*. It acknowledges rivers, watersheds and aquatic ecosystems as the biological engines of the planet, and that they are the basis for life and the livelihoods of local communities. Basin-wide understanding of the ecosystem’s functions, and how community livelihoods depend on them, is thus crucial for ensuring environmental and social justice.

Decision-making processes should value ecosystems, social and health issues in the process of project and river-basin development, avoiding impacts when possible and minimizing and

mitigation harm when not. Selected rivers with high ecosystem functions—rivers in near-natural condition—should be maintained in their natural states, the Report recommends. Particular attention should be paid to the protection if not enhancement of threatened and endangered species. Priority 5 revisits the issue of concern for people, recommending impact assessments that *consider the interests of all people* in the region of a proposed dam—anyone whose property, livelihood or non-material resources might be affected by the dam or dam-related infrastructure such as canals, transmission lines, and resettlement developments. People affected in this way should be among the first to benefit from the project. Priority 6 recommends *full compliance with all applicable laws, regulations, criteria and guidelines*.

The last strategic priority of the WCD Report highlights the *shared nature of an international river* and offers recommendations to better regulate the resource. It borrows from the law of international watercourses to mandates that governing rules be based on principles of equitable and reasonable utilization and no significant harm as well as full disclosure and good-faith negotiation. At the same time, it admits that dams materially disrupt water flows in ways that make actual water-sharing less possible. The Report recommends, in place of sharing the water directly, that dam operators share the benefits generated by the dam, including hydropower. In the end, the Report proposes a number of overlapping ideals and standards that seem nearly as hard to reconcile as the Berlin Rules. As for dispute resolution, the Report recommends that conflicts States cannot resolve themselves be referred to an independent panel. External financing bodies are urged to withdraw their financial support for a project whenever a State fails to negotiate with neighboring States in good faith.

The WCD Report offers one perspective on the path ahead. In effect it seeks to bring dams under the rubric of the general law of watercourses, including the principles of reasonable and

equitable utilization and harm avoidance. Given that these principles, according to the Berlin Rules, have attained the status of customary international law, it would seem that they ought to apply, even as dams create special challenges that call for more particularized rules.<sup>486</sup> What should be fully clear, as the Berlin Rules assert, is that planning for projects should engage all affected or interested parties and that it be based on full public access to relevant information, including the results of wide-ranging impact assessments,<sup>487</sup> leading in effect to the embrace of a type of precautionary rule.<sup>488</sup> Well-researched, publicly available impact statements are particularly vital, as the Berlin Rules make clear. In today's world, most States require impact assessments for major projects, as do a growing number of international agreements, beginning (in embryonic form) with the *General Convention Relating to the Development of Hydraulic Power Affecting More Than One State*.<sup>489</sup> Particularly useful as a precedent is the *Espoo Convention* prepared by the UN Economic Commission for Europe.<sup>490</sup> Also known as the EIA Convention, it sets out the obligations of Parties to assess environmental impacts of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration—dams and reservoirs included it

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<sup>486</sup> Although absent in the Stockholm Declaration, this obligation soon made its appearance in the Rio Declaration on Environment and Development. Later, the UN Convention devotes an entire section (part III) to detailed rules on notification, consultation and negotiation concerning planned measures that may have significant adverse effects on other riparian States. During the drafting stage of the convention, these provisions did not seem to raise any disagreements among States, indicating that States began generally accepting the proposition that they have a duty to provide prior notice and relevant data to other parties. Recurrent reference of these obligations is found today in major international water law instruments, work of scholarly bodies, riparian agreements, writings of the commentators, claims by the States, dispute resolutions and so on.

<sup>487</sup> Chapter VI: Impact Assessments Article 29: States shall undertake prior and continuing assessment of the impact of programs, projects, or activities that may have a significant effect on the aquatic environment or the sustainable development of waters.

<sup>488</sup> Alexandre Kiss and Dinah Shelton, *International Environmental Law* (New York: Transnational Publishers, 1994), 203.

<sup>489</sup> Art. 2.

<sup>490</sup> Convention on Environmental Impact Assessment in a Transboundary Context, *adopted in 1991 and entered into force* on 10 September 1997.

would seem—that are likely to have a significant adverse environmental impact across boundaries. The International Law Association now recognizes this practice as a rule of customary international law, at least insofar as transboundary effects are concerned.<sup>491</sup> The World Bank, following suit, now requires prior assessment before considering a loan or grant, regardless of whether the project will have any transboundary effects.<sup>492</sup>

*More ways to improve water quality.* A final important trend in the evolution of the law of international water courses brings together the growing number of legal principles and ideals that reflect a desire to improve water quality. The continued addition of elements no doubt reflects a frustration among legal drafter and advocacy groups that prior provisions failed to accomplish the desired goals. But if earlier provisions failed to improve water quality, will the newer elements bring significant change? Perhaps in time they will, but only if they—or perhaps a subset of them—are given greater legal primacy than they now enjoy. In the meantime, the proliferation of the provisions engenders confusion and creates possibilities for people and nations to get side-tracked.

The basic principle requiring that all uses be reasonable supplies the foundation for water-quality protection, or it would if the term were clearly defined. It fails to do so, however, when it is set forth—mixed with equitable utilization, as we have seen—as a multi-factor test that allows States to reduce water quality in the name of economic development. The related principle of harm avoidance similarly bears on water-quality issues. Degradation of water quality commonly harms downstream users, within a State and across State boundaries. As explained, the harm-avoidance principle was added because of the perceived failure of the equitable and reasonable

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<sup>491</sup> The Supplemental Rules on Pollution, art. 3 and the New Delhi Declaration, principle 4.2.

<sup>492</sup> The World Bank, *Operational Directive 4.01* (1991).



utilization standard to diminish downstream harms. No doubt it has and will have some effect, but its effects are weakened when, as usual, it is qualified by the right of a State to make equitable and reasonable utilization of a watercourse and when the concept of harm is not tethered to any particular water-quality standards.

The various, more overt environmental standards working their way into the law provide more tools that water-quality advocates can draw upon even as the provisions, as noted, have not clearly taken priority of equitable utilization. Most specific, of course, are the conventions such as the 1992 ECE Convention that expressly direct States to adopt and enforce water-quality standards. Provisions protecting ecological integrity generally, or ecological water flows more particularly, also protect water quality given that reasonably clean water is typically needed to sustain native biodiversity. (Many ecosystems, to be sure, carry naturally heavy silt loads that limit the types of resident aquatic life.) A general duty to minimize environmental harm provides similar protection, though it is weakened greatly when reduced to a mere due diligence standard or when States are left free to interpret and apply the principle as they see fit. More specialty protection is offered in regional agreements that address silt, soil erosion, land subsidence, saline water intrusion, floodplains, or the protection of habitat and aquatic biodiversity.

A promising but so far little used legal approach to enhance water quality is to grant overt recognition and protection to water uses that occur with the water left in a river—commonly termed *instream-flow uses*. One longstanding instream-flow use—navigation—typically does not depend on anything like clean water. Hydropower is also relatively insensitive to water quality. But other uses do depend on clean water, sometimes very clean, including fish propagation and human contact (bathing, recreation). Water flows similarly move silt

downstream, keeping shipping channels open. They carry silt also to floodplains where they nourish soil fertility; for this purpose, as discussed, water stripped of its natural silt loads is, from the perspective of floodplain farmers, much diminished in water quality. High-quality water flows are also in use when they help sustain high-quality ecological communities or provide valuable aesthetic and recreational remedies. In the US, for example, the federal Wild and Scenic Rivers Act works to protect instream flows for these purposes. Passed in 1968, this Act can apply to segments of rivers that contain "remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values." Once designated under the federal statute such waterway segments are protected from projects that would affect their water flows.

Protection for instream-flow uses of water can go well beyond simply the preservation of *minimum* stream flows—a related but different form of environment protection. An upstream action on a river that disrupts a downstream instream-flow use interferes with another, existing use of a watercourse. It is not merely a matter of running afoul of a vague environmental protection. The purported reasonableness of a water use is lessened when it interferes with another water use. The harm caused is in that instance also clearer. The conflict is not between human use of a waterway and environmental protection; rather, it is between conflicting water uses, calling for a comparative assessment of their relative values. Instream-flow uses would typically gain protection under a scheme (such as the Helsinki Rules) that, in resolving conflicts among uses, somewhat favored water uses earlier in time given that instream-flow uses have commonly been ongoing for generations if not centuries.

Added to these various environment-protecting provisions is the general duty of States to *promote sustainability or to engage only in sustainable development*. Sustainable development entered the public arena in the 1980s in an effort to balance environmental protection and

economic development.<sup>493</sup> Notoriously vague and conflicted, sustainable development has not shown much force in terms of environmental protection. Its environmental-protection content is simply too qualified and subject to tradeoffs.<sup>494</sup> The literature on sustainability has yielded a bewildering multiplicity of criteria, meanings, and expectations in different fields. For example, the field of economics has its own peculiar notion of what sustainability means<sup>495</sup> while a different definition appears in the medicine and public health sector.<sup>496</sup> Similarly, political and social scientists again speak of sustainable development in a slightly different manner.<sup>497</sup>

As a means to protect the environment, sustainability (and, even more, sustainable development) is best understood as an early, crude tool to interject environmental concerns into development processes that paid little or no attention to them. Within States—and now even within international arenas—this vague tool has paved the way for more precise, clear environmental protections. With the emergence of more precise provisions, particularly ones not overtly qualified by development goals, sustainability and sustainable development seem no longer needed. Indeed, their vagueness and pro-development content can have the effect of weakening other, more particular environmental provisions and diminish their force. So long as a

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<sup>493</sup> The notion “sustainable development” first appeared in the *World Conservation Strategy* of the International Union for the Conservation of Nature (1980), then in the book *Building a Sustainable Society*, by Lester R. Brown of Worldwatch Institute (1981), then in another book *Gaia: An Atlas of Planet Management*, edited by Norman Meyers (1984), and then most influentially in the so-called Brundtland Report, *Our Common Future* (1987), directed by Gro Harlem Brundtland, Norwegian Prime Minister and chairwoman of the World Commission on Environment and Development.

<sup>494</sup> Donald Worster, “The Shaky Ground of Sustainable Development,” in *Global Ecology: A New Arena of Political Conflict*, ed. Wolfgang Sachs (Nova Scotia: Fernwood Publishing, 1993), 132-145.

<sup>495</sup> Economists focus on the point where societies achieve a critical take-off into long-term, continuous growth, investment, and profit in a market economy. By that standard, any and all of the industrial societies are already sustainable, while the backward agrarian ones are not.

<sup>496</sup> In medicine and public health, sustainability is a condition of individual physiological wellness, a condition to be measured by physicians and nutritionists. Thus they focus on threats on water and air pollution or on food and water availability, or they talk about the threat of diminished genetic stock to the practice of medicine and the supply of pharmaceuticals.

<sup>497</sup> Political and social scientists speak of sustainable institutions and sustainable societies apparently referring to the ability of institutions or ruling groups to generate enough public support to renew themselves and hold onto power.

convention or document honors sustainable development, it provides a tool for pro-development interests to justify actions that degrade the environment, even actions that violate other provisions in the same convention or document. If used at all, the term needs to be tied to precise environmental performance standards. Yet if that can be done, then the environmental standards themselves can be put forward as the environmental goal, with no need to confuse matters by retaining sustainability as a frame.

Two final tools deserve mention as further evidence of this sixth trend in watercourse law, the trend to proliferate provisions aimed at improving the quality of water flows. One is the rising recognition of an individual human right to clean water for personal and household use. Absent in both the original Helsinki Rules and the UN Watercourse Convention, the ideal made its entry into international water law in the Berlin Rules and a handful regional agreements. A right to water was recognized in the Dublin Statement<sup>498</sup> and the African Charter on the Rights and Duties of Peoples.<sup>499</sup> The aim of this right is to push States to provide for their people sufficient means of accessing safe and clean water. Water supply, however, is chiefly a matter of internal infrastructure and pricing. Are water lines and treatment facilities adequately developed so that plentiful water is widely distributed, and is water priced in such a way that all can afford it? For many observers, these issues are matters for individual States as such to resolve, so that a right to water is best understood as a right that a person might assert against her home State, not a legal principle applicable to relations between or among States.

A right to water would seem to add little if anything to the international law of watercourses except insofar as it gives priority, in clashes between competing uses, to water diverted to meet

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<sup>498</sup> Principle 3.

<sup>499</sup> Art. 24.

basic human needs. That category of water use certainly deserves priority. But when it is recognized as the paramount water use—as it is in the Berlin Rules that prioritize water for “vital human needs”—then there is little left for a right to water to do. It is better omitted to keep the focus on other, more central provisions.

Lastly, there is the requirement found in various conventions that a State in its actions not materially interfere with the ability of another State to comply with its obligations under international agreements. Such provisions have drawn little attention in environmental discussions but, if taken literally, they could carry force. Many States, for instance, are parties to the Convention on Biological Diversity and the Ramsar Convention on the protection of highly significant wetlands. The duties of States under both agreements call for steps to protect natural areas, including in many settings watercourses and surrounding floodplain habitats. Upstream water uses could easily diminish a State’s abilities to meet these obligations.

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These various trends in the international law of watercourses, better really than the study of any individual document, illustrate where the law has been and where it is heading. They also reveal tensions and problems within the field of law. At this point in the law’s development, the law has broadened to include nearly all of the relevant concerns. What is needed next is a way to bring the pieces together in a more coherent, satisfactory way. To do that, however, it helps to have in mind a clearer goal for the law. When the aim was simply to help States resolve their conflicts through negotiation, legal provisions could be relatively few. But the demands on this body of law today are far greater and the law’s central aims have shifted.

The final chapter of this dissertation proposes that this body of law seek to protect the ecological health of all waterways and to do so in a way that is fair to all States and all peoples, regardless of location and economic and political power. It is, to be sure, a lofty goal, well beyond political reach today. But it helps nonetheless to look at the far horizon. If we sought to accomplish this goal, if we sought to dream big, how might we reform the law that we now have?

## Chapter 8: Justice, Lasting Health, and South Asia

The critical comments in the last chapter on the major legal trends relating to watercourses provide the foundation for a new overall vision and for legal reforms to achieve that vision.

Those legal reforms, once set forth, can be evaluated by seeing how they affect Bangladesh, a highly vulnerable State substantially reliant for its flourishing on watercourses and its ability to use them.

### A Vision of Flourishing Life

As the last chapter contended, existing law on watercourses remains too centered around conflicts between individual States that seek to use watercourses in inconsistent ways. The aim of current law, it was argued, is essentially to resolve or accommodate these disputes in some way, thereby reducing international tensions. That overall frame produced the long-nagging dichotomy between one State's ability to use water and another State's right to complain about significant harm. Legal drafters have tried but not really succeeded in resolving this clash in a way that is broadly satisfying. Even if they could, however, the overall frame does not adequately take into account the interests of other States and people worldwide, who may also have serious interests in the environmental and social-justice aspects of watercourse disputes. It also fails to address discrepancies in power among States, including the power that comes from an upriver location. Another frame seems needed.

*Healthy rivers.* International law is clearly evolving in a direction that holds high the ecological health of watercourses understood as complex, interdependent biological and geo-physical communities. That ideal—the vision of a waterway that, over its entire course, is ecologically healthy—provides a different, sounder point of beginning for international law. The basic idea: start with the river itself and aim to keep it healthy, along with the riparian communities dependent on it.

The notion of an ecologically healthy river is a broad one and has several components. It means not only keeping a river free from pollution, but sustaining a flow regime that is sufficient enough to regulate its overall natural and biological processes and that of the surrounding ecosystem. It includes a river bed that features a healthy hyporheic zone; that is, an ecosystem beneath the bed of a river or stream, saturated with water that supports the invertebrate fauna upon which river life depends. Ecologically healthy rivers are hydrologically connected to groundwater to sustain hydrological cycles. They are also, for most of their length, connected to their floodplains so that high waters flow on to them, depositing silt, sustaining fish propagation, and buffering downstream flooding. Healthy rivers retain and support mixes of flora and fauna that resemble the biotic compositions present in them centuries earlier.<sup>500</sup> In brief, ecologically healthy rivers are understood and embraced as ribbons of life, operating as ecologically complex wholes, rich in biodiversity. The ever-shifting bed and banks of many rivers, the groundwater below and nearby, and the surrounding forests, marshes and floodplains—all form parts of river of life and nurture a wide variety of biodiversity.

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<sup>500</sup> Living Rivers Foundation, <http://www.living-rivers.org/Default.aspx?sifraStranica=32>.



Rivers that are ecologically healthy have greater capacity than degraded ones to accommodate natural flooding, to transport nutrient-rich silt and dissolved minerals, to maintain temperature levels adequate for resident fish, and to push back encroaching salinity. These sorts of “self-treating” or “self-healing” functions through ecological processes have been termed “regulating services” by the Millennium Ecosystem Assessment and are provided by all natural resources, rivers included.<sup>501</sup> The transport of sediment deposits, as noted in earlier chapters, is particularly essential in low-lying lands prone to subsidence. Riverine ecosystems play vital roles in water purification and waste treatment, helping to filter out and decompose organic wastes introduced into inland waters and coastal and marine ecosystems.<sup>502</sup> Finally, healthy rivers counteract natural land subsidence while keeping estuaries free of dead zones.

*Uses that respect river health.* In the new vision for international watercourse law, all uses of a waterway would be consistent with the maintenance of its ecological health. River health, that is, would supply a base limit not just on individual water uses but on the totality of all water uses in basin, with water use broadly defined to include all land uses and construction activities that could degrade that ecological health. Overall water diversions would be limited so as to maintain river flows needed for ecological health. Construction projects would be limited, in their design and/or operation, so as to sustain river health with mitigation measures as needed to protect that health. Plainly, this new vision of water uses clashes with older views that sought to use water as often and intensively as possible with little record for ecological consequences, including consequences that undercut the livelihood and even health of people downstream.

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<sup>501</sup> Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Synthesis* (Washington DC: Island Press, 2005), vii.

<sup>502</sup> Ecosystems and Their Services, *Ecosystems and Human Well-being: A Framework for Assessment* (Washington DC: Island Press, 2003), 58.

Today the ecological health of rivers is often degraded by dams, reservoirs, levees, diversion channels and similar construction projects. While such projects provide benefits in terms of economy and development—short-term benefits, often—they also take massive ecological tolls and disrupt downstream water uses. A vision that gave primacy to ecological health would not prohibit all such development activities. Instead it would mean that developers employ pre-development safety procedures, including thorough impact assessments and consideration of alternatives, and that they craft designs that in operation mimic natural flow patterns as closely as possible while providing passage routes for migratory species and adequately protecting aquatic habitat. Again, this vision clashes sharply with long-dominant views of good river management, particularly the once-influential thought that projects above all should avert water waste. It was believed in many regions (and is still alleged in South Asia) that every drop of water running to the sea without realization of its full commercial potential is a waste. This misguided view fails to recognize how water is indisputably part of a continuous system where “waste” water is recycled back to the main channels through natural processes such as evaporation and seepage. It ignores even more clearly the many ecological functions, and human river uses, sustained by instream flows.

The goal of ecologically healthy rivers requires attention to land-use practices, given that so many land uses (including irrigation and drainage practices) directly affect rivers. Land and water uses are inextricably intertwined to form a complete basin-wide whole. Changes in land cover and vegetation, for instance, can easily degrade rivers; for instance, by the conversion of wetlands or the replacement of forests with croplands or croplands with urban areas—all changes that strongly influence the timing and magnitude of runoff, aggravating floods, promoting artificial droughts, and diminishing aquifer recharge. Widespread levee-building routinely

aggravates floods downstream and degrades aquatic communities, especially for species that use floodplains for key life events.<sup>503</sup> Runoff pollution from farm chemicals has been particularly damaging worldwide; it is the principal cause of many dead zones.

This need to keep all water uses consistent with ecological health reflects not just concerns about human health and economic activities but the many strong bonds that people have with rivers. Rivers instill among many a deeply ingrained sense of collective belonging, tied to a common coordinate.<sup>504</sup> People can create intimate bonds with their local environments and nature in idiosyncratic ways, turning to rivers as emblems for spirituality, sources of inspiration, and places for recreation. To maintain river health is to help secure and sustain these defining bonds. More broadly, many social benefits depend on overall river health, including such provisional services such as drinking-water supply, supporting fishery productivity, maintaining navigability, supplying biological and pharmaceutical resources, and more.

*Justice among all basin residents.* The third element of this new vision for watercourses entails the fair sharing of water basins by all people who dwell in them. The ability to use a shared river should not vary greatly among people based on where they live—within what nation and where on the river. When water uses must be limited—as they typically do—water should go to the highest valued uses wherever located (with value, as considered below, extending well beyond economic value). People facing dire water shortages should not have to stand back while others devote water to low-valued uses. Upstream users should not enjoy water in ways that severely

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<sup>503</sup> Eric T. Freyfogle, *Our Oldest Task: Making Sense of Our Place in Nature* (University of Chicago Press, forthcoming 2017), 184.

<sup>504</sup> Ajaya Dixit, “Rivers of Collective Belonging,” *HIMAL South Asian* 16, No. 10, (October, 2003), <http://old.himalmag.com/component/content/article/1885-rivers-of-collective-belonging.html>, accessed March 24, 2017.

undercut the livelihoods of downstream basin residents. And again, all uses in combination must be consistent with the sustained health of the river as a functioning system.

Given that many existing water uses of rivers degrade the rivers, or are uses that are simply not highly valued in light of unmet needs, this element of the vision inevitably calls for revisiting land-use and realigning them with a river's functional needs. This might require readjusting the locations and changing the types of uses in the catchment area including increasing vegetative covers, breaching levees so that water can overflow some of the floodplains, and modifying wasteful irrigation practices. Wetlands, barrier islands, and other coastal zones should be well protected, less inhabited, or less intensively used<sup>505</sup> given that healthy wetlands can play a critical role in mitigating risks associated with flooding. Similarly, the presence of mangroves or coral reefs can drastically reduce the damages caused by hurricanes, tsunamis, cyclones or even large waves. All of these functions need protecting, which means water uses and other human activities that undercut them need to be curtailed. Cutbacks in such damaging water and land uses can free up water for other uses that rate higher overall, including water uses taking place within another State.

This element of the new overall new vision is perhaps the most radical in the sense that it invites us to overlook State boundaries. It focuses on the needs of all people within a basin and seeks to satisfy them fairly, insofar as possible treating all basin residents as equally worthy. This vision is not inconsistent with the principle that States are each entitled to an equitable share of uses in a watercourse, but the fair-share principle is applied in a much different way and both fairness and sharing are calibrated so that similar water uses in different States are treated similarly.

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<sup>505</sup> Freyfogle, *Our Oldest Task*, 194.

Although the prioritization of water uses might be done by local users operating through a shared-management regime, some rules might properly be put in place from above, such as a presumed ban on diversions of water outside the watershed of origin. When water is short, as it commonly is, the needs of those residing in the basin should come first or at least, in any priority ranking, enjoy a substantial boost over comparable uses taking place elsewhere.

*Diffusing power broadly.* The fourth element of this new vision—this new overall goal for international watercourse law—is that people affected by water-use decisions in a basin ought to have opportunity to participate in the decision-making. This element too is a radical shift in that it suggests people living in one nation ought to have their concerns heard in decisions made about water uses elsewhere. In the case of a transboundary river, everyone’s rights as well as corresponding duties properly stretch to the entire course of the river, including the surrounding drainage basin. This means, at a minimum, a sharing of all relevant information, including the content of impact studies. But it also goes to the nature of the governance regime that makes the key decisions. It must take seriously the views of the people affected by its decisions through a participatory framework of local people taking due notice of their lives, patterns of livelihood, cultural values, and moral aspirations resulting in the fair distribution of the benefits springing from water-related activities

*Adding flexibility.* The final defining element of this new vision interjects the need for flexibility over time. The water use regime for a watercourse must have within it the capacity to shift water to higher and better uses, including the power to terminate, quickly or gradually, activities that are no longer consistent with the above principles; no longer consistent either with the maintenance of ecological health or with the principle of applying water to meet the highest priority needs wherever located. Flexibility is needed so that use patterns can respond to shifting

conditions, evolving values, and expansions of human understanding. Flexibility can and likely should be built-in using various tools, from time-limited use rights, to meaningful beneficial use limits on water uses, to market-linked trading rights schemes.

*Management: basin-wide and flexible.* Several of these elements, it should be clear, anticipate if they do not demand the creation and operation of a basin-wide management regime with substantial power to authorize and limit water uses and other activities affecting a watercourse. What is needed is a political order and institutional framework that would foster uniform policies and facilitate organized collective conservation basin wide.<sup>506</sup> Successful basin-wide management would integrate water with other resources and establish a regime of laws or other norms facilitating such organized efforts and encouraging individuals to engage in the process. It would go beyond simply softening State boundaries that transect interstate watercourses to take account of the entire catchment basin. Good river management calls for at least rough coordination of land uses at fairly large spatial scales. No individual country along a transboundary river typically may have the sufficient means, mandate and power to take overall good care of the entire drainage basin. That task must be shared and requires an orchestrated effort by all of the riparians concerned.

The need for flexibility in this management regime is particularly critical given the looming ravages brought on by human-induced climate change. The dangers here are many and directly affect both the ways people might safely use watercourses and the increased needs for instream water flows to combat the dangers. A particularly damaging likelihood (if not certainty) is that rising sea levels and more frequent, stronger storms will push salty sea water into the freshwater

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<sup>506</sup> Freyfogle, *Our Oldest Task*, 191.

systems, contaminating the water and killing vegetation not able to withstand the salinity.

Climate change will also feature unusual seasonal variations in rainfall and water flows, leading in particular to dry-season water shortages that heighten rifts among co-riparian nations. Strong, popularly supported governance systems will be essential to handle these tensions and reallocate water uses in response to them.

A final note about this overall vision has to do with the possible intrinsic value of rivers; that is, value they might have or be thought to have that is unrelated to the many ways they promote human flourishing. The issue is likely to gain more attention in coming decades or generations, as are the claims (voiced by humans) of other species to water to meet their needs. This dissertation sets these issues aside for later, separate consideration, except to note that human senses and knowledge are inevitably limited and we cannot know for sure today what parts of nature, and what types of ecological interconnection, might promote our welfare in the future. Simple humility about human powers, apart from any overt recognition of nature's inherent value, could rightly lead to caution in depriving other species and natural areas of the water they need to survive.

### A Reformulation of the Law

*Putting aside the current frame.* For the reasons discussed, the shift toward a new vision of ecologically healthy river systems is usefully begun by setting aside the current overall frame for the law of international watercourses. The current frame has yielded a great deal of good by softening significantly the power of States to use waterways as they like and has, further,

usefully moved the discussion beyond the simple division of waterway into shares for each State. Today, water uses by one State can be challenged by others even if the State only uses its fair share, challenged either because of environmental consequences or because a particular water use significantly harms water uses in another State. To move further ahead, however, a new frame is needed.

The first step in legal reform is thus to retire the central dichotomy between the right to equitable and reasonable utilization and the corresponding duty of a State, consistent with its right to use, to take reasonable steps to avoid causing significant harm. Much of the content of these principles can and should be retained, both the fair sharing of water among States and the need to adjust or limit particular water uses when they cause harm. But these principles, or at least the normative content embedded in them, can be incorporated into the law in better ways. As introduced in the first part of this chapter (and taken up again below), this normative content can appear in an initial baseline standard for environmental protection. It can also appear in the requirement that water uses in a basin all be reasonable and that water be allocated to the most vital uses, including in-stream flow uses, with oversight by a basin-wide management regime.

*Setting minimum, baseline standards.* The first positive step in reforming existing law is to set baseline environmental-protection standards for a basin, standards that would limit the actions of all States and actors. The objective is to ensure the healthy upkeep of international freshwater bodies and to entitle vulnerable States to fair claims to water without resorting to complex negotiations and international dispute-resolution mechanisms. Basic environmental standards can help secure the overall ecological health of rivers, which in turn is vital for long-term human well-being and flourishing. After complying with these minimum bars, States may then go on to sorting out equitable and reasonable uses of the water following a multi-factor test.



Serious work, of course, is needed to decide which provisions or priorities should appear in the baseline standards. Many important and timely concerns are possible candidates for inclusion. The job is also burdensome given the apathy of many States toward environmental protection, especially upper riparians and those focused on immediate water resource development, often development that might conflict with baseline standards. However, this is the call of the day if we want to regain river health and provide vulnerable States with effective tools to seek their legitimate claims relating to water.

The first obligation that should appear in setting baseline environmental standards is a *general duty to protect and maintain freshwater quality*. A majority of the today's problems associated with shared freshwater and its resources are amplified by degraded water quality. Poor water quality invites grave humanitarian consequences, affecting human health and claiming lives of millions of people worldwide. At the same time, degraded water quality also affects fisheries, impacts agriculture, and interferes with recreational activities, not to mention its ecological tolls by degrading aquatic habitats and diminishing aquatic biodiversity.

The maintenance of good water quality, as we have seen, is already considered vital and appears—mostly clothed in pollution terms—in many national policies and international instruments. The obligation to protect water, at least so far as it relates to the protection of water quality, has thus become (or is on the verge of becoming) a customary norm of international water law. What is needed is to extend international norms beyond pollution issues to cover other components of river health. If binding environmental standards can be established and enforced, other environmental and social problems would become less acute. Basin dwellers could enjoy more of the benefits of healthy water resources. Baseline standards, as the term implies, means standards beyond which States cannot descend. States would remain free to elevate these

standards, imposing stricter normative standards themselves, though national policies or bilateral or regional negotiations.

Baseline standards on water quality should address the water's biological and chemical composition including water temperature. The pollution part will be comparatively easy to achieve since existing anti-pollution measures and water-quality standards around the world already provide clear precedents. However, existing regulations mostly target point-source pollution with less attention to diffuse sources or runoff pollution. Baseline standards would need to shore up this common deficiency by addressing all pollution sources, giving particular attention to agricultural practices and encouraging use of organic fertilizers and less harmful pesticides. Similarly, binding standards should, over time, push States to improve sewage treatment by expanding and upgrading wastewater treatment plants, at least to the point of ensuring reusability of water, curtailing waterborne diseases, and supporting aquatic species.

Three special, knotty problems have to do with salinity intrusion, water temperature, and sedimentation or siltation. The salinity danger, already mentioned, is severe in many estuaries. Ample freshwater flows are needed to keep salt from moving inland, just as ample recharges of coastal-area aquifers are needed to keep salt out of drinking water aquifers and away from barrier plants that cannot tolerate salt. As for temperatures, many fisheries depend on water temperatures within natural ranges and are degraded when temperatures are too high (often due to land cover change) or too low (commonly a problem in water flows from reservoirs). In the United States, water-quality standards include temperature stands keyed to native aquatic life. Unduly warm waters also are more prone to nurture disease bacteria. The third issue, sediment, is similar in that aquatic life can evolve to thrive under the natural sediment levels of particular rivers. Changes to those levels—increasing or decreasing sediments loads—can disrupt native

biotic communities, just as shortages of sediment, as noted, can deprive flood plains of nutrients and facilitate land subsidence. All three of these problems pose special challenges for formulating standards given that healthy or appropriate levels are so context dependent. Widely applicable numeric standards would not work; narrative standards, linking allowed changes to general standards of health, are more feasible but still difficult to formulate. In all three cases, the maintenance of minimum ecological flows would mitigate the problems and prepare the way for more specific standards later.

Next, rivers can remain healthy only if they retain stream flows that are adequate in quantity and that roughly mimic, in terms of the time of flow variations, the flow regimes to which native species have become adapted. Adequate baseline standards to protect rivers thus need to require the *maintenance of ecological flows*. It is not feasible to maintain natural flows completely; that could be done only by barring most diversions and major construction projects. It makes better sense to expect States to maintain flows adequate to sustain a river's ecological functioning. The water volume and flow timing required to sustain that functioning will also be highly context dependent. As noted, larger flows enable a river to push against salinity intrusions, recharge (or avoid draining) aquifers, and better degrade organic wastes.

The environmental goals mentioned so far would all help promote another component of the overall environmental vision, the *protection of aquatic biodiversity*. Freshwater species populations worldwide are declining at an alarming rate—on average by 50 percent between 1970 and 2000 only. Declines are largely caused by habitat loss or deterioration, the introduction of alien species, and habitat fragmentation caused by artificial barriers in rivers and lakes. The environmental baseline rules that protect rivers should obligate States in general terms to take steps to address these dangers and to avoid water uses and construction projects

that exacerbate them. Most evidently, States should take steps to modify water projects (dams and levees in particular) by, for example, constructing fish passage options (installing fish screens and ladders) and breaching levees in particular places to provide habitat for species that reproduce on floodplains.

These international-level goals should be drafted to take into account the various new environmental ideals and standards incorporated into such documents as the Berlin Rules. As taken up below, however, basin-level management entities would also play key roles in pursuing those goals and indeed would be primarily responsible for doing so, including the work of tailoring broad ideals to local circumstances. Two components of the Berlin Rules, however, are usefully eliminated from the environmental standards, at the international level and at lower levels. One is the ideal of sustainable development, which suffers, as noted, from vagueness and has a built-in tension that resists all attempts to refine it. In any event, it is best understood as a crude, early effort to interject environmental concerns into development planning. It is best set aside in favor of the more refined and useful environmental standards proposed here. So long as it is retained, it provides a tool for pro-development interests to cite when they charge forward with damaging projects. If the international community is successful in setting baseline normative standards for all (as proposed here), then these standards in combination with a comprehensive reasonable-use analysis (discussed below), supplemented by stricter obligations at the basin level, would render the principle redundant. Similarly (and again as discussed earlier), the right to clean water emanates more from the human rights context and is primarily a matter of a State's infrastructure, politics, and water pricing. Such a human right is properly asserted at the State rather than international level. Internationally and at the basin level the core

content of this right is best incorporated by giving priority, in all water allocation decisions, to meeting vital human needs.

*Favoring the highest priority uses.* As explained, the idea of beginning with environmental protections is to set overall limits on all water uses so that they do not unduly degrade watercourse. Once the ecological baseline standards are in place, all water uses must be consistent with them, collectively as well as individually. A benefit of beginning in this way is that it becomes possible to simplify the law. States still must share in their uses of waterways, and do so in an equitable manner. But the guiding principle used to judge all water uses is that they must be reasonable taking all factors into account, including the social and economic importance of the water use. When all water uses cannot be accommodated, then water should go to the most vital uses, those that rate highest on the priority scale.

The evaluation and comparison of various water uses—deciding which ones are most important—is best done with a single, multi-factor standard, a standard that incorporates all considerations and does not (as now) stand in tension, within the law, with various freestanding norms that States are admonished to respect. The basic idea is that the single test would do what multiple Articles of the Berlin Rules seek to accomplish. Such a single testing criteria, along with the initial baseline normative standards, will better serve ecological and social purposes. It would insist that all water uses be reasonable using a multi-factor test that favors the highest priority needs, wherever located, without compromising ecological and social issues.

If lawmakers prefer this multi-factor test could continue to use the language of “reasonable and equitable” to emphasize that it still includes the sharing of water among States. But sharing would come about by devoting water to its highest valued uses wherever located; that would be

the first step. If the resulting scheme seemed to favor one State unduly, adjustments could be made so that the overall sharing of water was essentially equitable among the States (calculated mostly on numbers of citizens dependent on the river and their levels and types of dependencies). But the beginning issue, to reiterate, would be about reasonableness, which would stand as the more critical and inclusive element. It is the reasonableness test that determines whether a given water use can go ahead in the face of competing water demands.

The concept of reasonableness of water use, as noted earlier, originated in the US water law jurisprudence. As a guiding principle it succeeded the natural flow theory, which gave each riparian the right to enjoy the natural flow of a stream undiminished in quantity or unimpaired in quality.<sup>507</sup> With the looming changes brought on by industrialization and urbanization the natural flow limited proved too confining because it allowed only modest water uses. More intensive water uses seemed essential, economically, socially, and politically. To accommodate new competing uses U.S. courts shifted to embrace the reasonable use rule, which allowed uses that changed river flows more significantly. As Justice Joseph Story explained it, all riparians had an equal right to make reasonable use of a stream's natural flow, provided that such use did not interfere with the reasonable use of the water by any other riparian.<sup>508</sup> The effect was to expand the powers of riparians to use water while curtailing their rights to complain about harms caused by upstream uses. As the Michigan Court of Appeals stated more recently, the reasonable-use test entails a wide-ranging inquiry looking at the types and purposes of the uses proposed and their relative effects on the watercourse with a full consideration of all benefits and injuries.<sup>509</sup>

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<sup>507</sup> *Mason v. Hoyle*, 56 Conn. 255, 14A. 786 (1888).

<sup>508</sup> *Tyler v. Wilkinson*, 24 F. Cas. 472 (CCRI 1827).

<sup>509</sup> *Three Lakes Ass'n v. Kessler*, 91 Mich. App. 371, 285 N.W.2d 300, 303 (1979).

At bottom, then, many factors are relevant to a full-scale inquiry into reasonableness, ranging from natural factors to social, economic needs to environmental protection with attention paid to both existing uses and alternatives. Current international law, as we have seen, is similarly wide-ranging in the factors it considers: geographic, hydrographic, hydrological, hydrogeological, climatic, ecological, and other natural features; the social and economic needs of the basin States concerned; the population dependent on the waters of the international drainage basin in each basin State; the effects of the use or uses of the waters of the international drainage basin in one basin State upon other basin States; existing and potential uses of the waters of the international drainage basin; conservation, protection, development, and economy of use of the water resources of the international drainage basin and the costs of measures taken to achieve these purposes; and the availability of alternatives, of comparable value, to the particular planned or existing use. Even more factors can be considered when relevant.<sup>510</sup>

This dissertation does not undertake to craft a new reasonable use test with any specificity; doing so would be premature. The basic idea, though, should be clear. The inquiry must be wide ranging, and the aim is to figure out which water uses are most important. Water shortages should be dealt with by curtailing that those are least important. The inquiry, then, is overtly comparative. It is not possible to evaluate one water use in isolation. A water use is reasonable only if it rates high in comparison with others.

For various ecological reasons, as noted, it makes sense to favor water uses within a water basin over those potential (or even actual) water uses located in another basin, in a location where the return flow would not re-enter the watercourse of origin. An out-of-basin use might still rise

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<sup>510</sup> As noted in the 1997 UN Watercourse Convention and in the 2004 Berlin Rules on Water Resources.

high in the reasonableness test, even without a return flow, particularly if it is a seasonal use that occurs only during wet period. But the presumption should be against it, and a basin-management regime might properly bar such uses completely.

When water becomes scarcer in a region—during dry seasons, for instance—sound water management requires that the least vital water uses be curtailed. The list of acceptable water uses, that is, needs to include a plan for dealing with scarcity, some means to curtail some water uses during dry times while others are allowed to continue. This issue, too, feeds into reasonable use. International law today is largely silent on the issue. Guidance is needed.

Finally, there is the matter of dams, reservoirs and other projects. They, too, are water uses, and they cannot be exempt from the comparative tests that apply to other water uses. They too must be allowed only when and so long as they qualify as reasonable in light of all relevant factors.

One practical effect of dealing with them this way is that the law becomes simpler, doing away with the need for special standards to evaluate them—special standards that would, inevitably, create tension with the standards governing other water uses. This coverage of dams and other projects should, of course, be undertaken overtly, using plain language that is clear to all. In this regard, it is useful to follow the lead of the World Commission on Dams (WCD), which did employ plain language.

Like other water uses dams and other artificial structures first need to comply with the minimum baseline standards, including standards protecting water quality, ecological flows, and aquatic biodiversity. Many projects, the most damaging, will not satisfy this first hurdle. Those that do then need evaluation in comparison with other water uses. They need evaluation also in terms of whether the project, when added to other water uses within a State, has the effect of capturing



more than the State's equitable share of water. In the case of some projects, a State that exceeds its equitable share might justify doing so by diverting some of the project benefits to citizens in another State—for instance, by providing some of the hydropower from a dam. In the case of some major projects it may help to consider them not as a single use but as a package of uses, some of which may rate highly, others that may earn lower grades.

As explored in earlier chapters, most international law dealing with big construction projects contains procedural requirements for them, rather than substantive limits. This part of the law has become better developed, particularly in the Berlin Rules and in the recommendations of World Commission on Dams. The procedural rules that they prescribe—governing notice, full information disclosure, opportunities to be heard, and the full consideration of interests of all people—are basically sound. Among the procedural rules again are obligations to carry out thorough impact assessments and consideration of better alternatives. Little is needed to do on this issue other than to embrace and make binding all these various ideas at the international level. The guidelines of the WCD, it will be recalled, are intended to govern the entire process, from the planning stage to the design, appraisal, construction, operation, and monitoring—and even, in the case of large dams, their decommissioning. The guidelines should apply to all construction projects, beyond just the dams and reservoirs considered by the WCD. They should thus apply to diversion channels, embankments, levees, barrages, and other sorts of water-engineering structures.

This dissertation does not call for an absolute ban or prohibition on constructing new dams and water structures. If development needs and other circumstances render dam-building essential, planning for it should proceed in the manner described here. Insofar as possible project designs should seek to mimic the natural attributes of water cycles, for instance by interfering as little as

possible with seasonal flow patterns, water volume, water temperature, and sediment passage. Technological adjustments are often possible in the case of a run-of-the-river type hydropower project, which return nearly all of the water used to the river of origin. In such a project, running water is diverted from a river and guided down a channel, or penstock, which leads to a generating house where the force of the moving water spins a turbine and drives a generator. Used water is then fed back into the main river further downstream. The difference between run of the river and large, conventional storage hydro therefore is the absence of a dam and reservoir. Run of the river projects thus rely on coursing rivers to generate electricity as opposed to stored water.<sup>511</sup> In doing so they disrupt natural rivers flows much less. Technological modifications can also accommodate aquatic species through the use of fish barges, fish ladders, fish screens, and so on. Such accommodations are less good for fish than a free-running river yet they can minimize many harms. Even so, technological advancements have their limits. Main-stem dams inevitably trap sediment and no modification can materially reduce the problem.

*Reasonableness and social justice.* The multi-factor reasonable test proposed here draws into consideration a wide-range of factors relating to social justice, and necessarily so. It has long been the case that people with power can harm the more vulnerable through the ways that they exploit nature. Healthy rivers, as we have seen, are vital to the well-being of the people who interact with them or merely reside near them. For them, rivers provide a variety of ecosystem services that support human flourishing. (The U.N.'s Millennium Ecosystem Assessment divided

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<sup>511</sup> Charlotte Helston and Andrew Farris, "Run of River Power," <http://energybc.ca/runofriver.html>, last updated February, 2017.

them into four categories of services—provisioning,<sup>512</sup> supporting,<sup>513</sup> regulating,<sup>514</sup> and cultural<sup>515</sup>--describing all as vital in sustaining good life, promoting the sense of security, assuring good health and fostering good social relations.<sup>516</sup>) For many others, rivers are a way of their life. In many settings, the harms caused by the degradation of ecosystem services are borne unfairly by the poor and local people who rely on those services the most, contributing to growing inequities and disparities across groups of people and sometimes serving as the principal factor causing poverty and social conflict.<sup>517</sup>

Consideration of social justice issues blends in with the next major topic, the matter of basin-wide governance. Before getting there and as a prelude, it is worth reiterating that systems of power and governance have direct relevance to social justice. Effective governance structures need to provide room and time to accommodate the voices of all affected people, particularly since damaging watercourse uses disproportionately affect people who are commonly excluded from decision-making processes. Participation in turn requires transparency in processes and ways to hold the decision-makers accountable. Among those commonly excluded are local and indigenous people, people living under poverty line, women, the youth and groups particularly dependent on ecosystem services or affected by their degradation. Means must be found to empower such people: to empower the women who are often barred from taking part in the key decision-making processes in the society, the youth who are likely to bear most of the

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<sup>512</sup> Food, Freshwater, Hydropower, Wood and Fiber, in *Ecosystems and Human Well-being: Synthesis*, Millennium Ecosystem Assessment (Washington DC: Island Press, 2005), VI.

<sup>513</sup> Nutrient Cycling, Soil formation, Primary Production, in *Ecosystems and Human Well-being: Synthesis*, Millennium Ecosystem Assessment (Washington DC: Island Press, 2005), VI.

<sup>514</sup> Climate Regulation, Disease Regulation, Flood Regulation, Water Purification, in *Ecosystems and Human Well-being: Synthesis*, Millennium Ecosystem Assessment (Washington DC: Island Press, 2005), VI.

<sup>515</sup> Aesthetic, Spiritual, Educational, Recreational, in *Ecosystems and Human Well-being: Synthesis*, Millennium Ecosystem Assessment (Washington DC: Island Press, 2005), VI.

<sup>516</sup> Ibid.

<sup>517</sup> Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Synthesis* (Washington DC: Island Press, 2005).

consequences of decisions made today, and indigenous groups who are inextricably attached to their local surroundings, are dependent on local resource exploitation, and hold on to native norms and culture for their living enrichment. Joining these voices need to be the many others that, to varying degrees, stand apart from government and from interstate negotiations—civil groups, social and environmental activists, multinational corporations, development banks, international financial organizations, and others. Due participation by relevant stakeholders contributes to decision-making processes by allowing better understanding of the impacts and vulnerabilities, the distribution of costs and benefits, and the identification of a broader range of response options. It further promotes transparency and accountability, reducing the likelihood of compromised outcomes.

One desirable outcome of this kind of full participation could be a more fair distribution of the costs and benefits of water projects and water uses. All humans are equal and deserve unvarying advantages and privileges. Yet some are more disadvantaged based on socio-political and economic factors as well as other sources of vulnerability. The same analogy is true for nation States as members of the international community. Despite their sovereign status and the notion of equality of States, some are plainly more vulnerable than others in terms of their geographic locations, the peculiar features of their watercourses and water uses, economic status, political power-play, regional influence, ecological threats and countless other factors. Just as it is critically important to hear the affected people's voices in water uses, the needs and plights of these States should be heard as well. What is needed then is a regime that would take notice of and accommodate all these concerns of inequities and ensure the vulnerable States' due participation in the decision-making process – a goal that can only be realized through a comprehensive basin-wide governance structure involving all basin States.

*A multi-level governance system and integrated basin-wide management.* The lofty goals set forth so far are only conceivable with the emergence and successful operation of watercourse management at the basin level, with important limits, as noted, put into place at the international level. Given the global, shared nature of water resources, and their unique importance to life on earth, their management deserves to be a concern to the international community as a whole, and as such its cooperative management appears to be in the interest of all States.<sup>518</sup> While States long adhered to more sovereignty-based claims in securing their national interests, as discussed in earlier chapters, the trend has gradually shifted toward an increasing sense of community. This need for more cooperative management is especially perceived among basin States by virtue of being tied physically to an interconnected river system. Basin management thus requires and seeks to stimulate high levels of cooperation and an emboldened sense of community interest among basin States. Today more than ever, the community interest is permeating international law.<sup>519</sup> We now see the emergence of a new kind of obligation *erga omnes* binding on all States, in the self-interest of each and all across the global community.<sup>520</sup> The trend, however, needs to continue pragmatically and more holistically to incorporate the concept more fully, to get to the point where local, national, and basin level water issues are interlinked within a global water system with management orchestrated at the global level.<sup>521</sup>

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<sup>518</sup> Patricia Wouters, Dan Tarlock, “The Third Wave of Normativity in Global Water Law: The Duty to Cooperate in the Peaceful Management of the World’s Water Resources: An Emerging Obligation *Erga Omnes*?,” *Journal of Water Law* 23 (2013): 58.

<sup>519</sup> Ulrich Fastenrath et al., *From Bilateralism to Community Interest: Essays in Honour of Bruno Simma*, eds., (Oxford: Oxford University Press (2011), 234.

<sup>520</sup> Wouters and Tarlock, “The Third Wave of Normativity,” 64.

<sup>521</sup> Claudia Pahl-Wostl, Holger Hoff, Michel Meybeck, and Soroosh Sorooshian, “The Role of Global Change Research for Aquatic Sciences,” editorial in special issue, “Vulnerability of Water Resources to Environmental Change: A Systems’ Approach,” *Aquatic Sciences* 34 (2002): iv – vi; GWSP, *The Global Water System Project: Science Framework and Implementation Activities*, ESSP Report No. 3, Earth System Science Partnership, 2005.

This dissertation proposes a multi-level system of governance for water resources, organized from top to bottom in hierarchy and incorporating the various elements of the foregoing approaches. At the top would be a level of international governance that undertakes various functions. It sets mandatory minimum environmental standards, applicable to all States irrespective of location and any specific agreements to which they are parties. This would entail broad-brush lawmaking, primarily by the United Nations, with details worked out by specialized agencies drawing upon the work of other international organizations and internationally respected scholarly bodies. Also needed at the international level are designated oversight bodies to supervise and monitor compliance with these normative standards and vested with the power to do so. Along with supervising the mandatory compliance in particular, an international oversight body would also support formation of, maintain liaison with, and facilitate cooperation among basin-based institutions. It basically would work as the central and overarching oversight body having jurisdiction over all individual basin States and basin organizations.

Beneath this top level in the hierarchy would be individual basin institutions for each river basin in the world. These would operate, as said, in liaison with the central overarching body. These basin institutions, operating at the whole basin level, would be more comprehensive in their scope and would play the pivotal role in managing water resources and ensuring their due compliance within the catchment area. In its practical effect, this basin-wide arrangement would discourage the current tendency of States to address interstate issues through bilateral negotiations. And if successful, it would facilitate cooperation and strengthen a sense of community among the riparian nations.

The responsibilities of the basin institutions would extend beyond efforts to resolve local disputes amicably. They would undertake intensive and thorough management planning,

devising basin-wide rules and policies, monitoring compliance with the applicable standards, mobilizing financial and technological assistance, facilitating market based approaches if needed, and sorting out differences. These institutions are particularly needed to confront the looming effects of climate change: excessive flooding, prolonged droughts, higher sea levels, more intensive and numerous storms, and the like. During such critical situations, often marked by high degrees of uncertainty, basin institutions can timely and effectively focus on those smaller geography-oriented areas by embracing effective adaptive management methods and making real-time allocations to adjust to changed conditions. Each basin institution may craft its own modes of operation based on the needs of the basin area in question, resulting no doubt in idiosyncratic features, even as they align with the broad-based international standards. In time, however, one might anticipate the sharing of lessons and further work at the international level that could lead to the harmonization of local practices and standards.

Once effective basin-wide systems are in place and operating, then would come the lowest tier—domestic governance; that is, States charged with revising their practices and policies to align them with this higher-level management. States should make sure that their domestic laws, policies and practices are all compatible with these higher norms and would apply them to internal water management decisions and uses of rivers. For some basins this tier may be complemented with yet another layer of governance at the local or root level (especially in highly decentralized power systems).

What is needed for such an effective basin-wide management is a version of Integrated River Basin Management (IRBM), a scheme entailing a dynamic, interactive, iterative and multi-sectoral approach to water resources management. Such management looks to the basin as a whole – including its lands as well as its waters, as its scope of concern, not only guiding new

development activities but promoting good land use practices in the entire basin. Similarly it acknowledges the interconnectedness of groundwater with surface water and seeks to amalgamate both in unitary management plan. Once adopted, the IBRM approach would seek to integrate socio-economic, environmental, and human health considerations in the basin-wide decision-making. It would also stimulate the design, implementation, and evaluation of projects and programs that are both economically efficient and socially appropriate within clearly defined strategies, based on an approach of full public participation. Going further, it contemplates integration of sectoral water plans and programs within the framework of national economic and social policies and seeks to incorporate them basin-wide.

Basin-wide governance systems should respect the legitimate interests of all basin States, without regard for territorial size, economic state, political power, or negotiating capacity. The framework thus must be one that checks against unilateral action by a more influential and wealthy State—such as the actions that have taken place in the GBM (Ganges-Brahmaputra-Meghna) basin. At present, as discussed, many river basins have no bilateral or multilateral treaties, let alone any basin-wide governance mechanism, and most existing treaties fail to include all the basin States concerned.

One of the chief functions at the basin level will be the work of overseeing all water uses, and other actions affecting waterways, in an effort to achieve the ideals set forth above. This work would center on the development and implementation of a standard of reasonable use, one that took into account conflicting needs (and all other relevant factors) and assigned priorities to them. Necessarily the work includes the identification of possible water uses that should be disallowed or halted because they are simply not important enough. This work requires careful attention to the needs of all basin residents. It would give priority (as do the Berlin Rules) to



meeting vital human needs first. It would also draw in the various environmental provisions that have surfaced in recent decades, what might be termed the new generation of environmental law. As considered earlier, these provisions will be taken into account in setting the minimum international environmental standards. They will be more important, though, as basin-level entities go about giving content to the principle of reasonable use. They should, to reiterate, gain traction through their incorporation into that multi-factor test. They should not remain, as they now are, as freestanding principles that fit together poorly with the many competing principles.

If needed and seems appropriate, the basin governance bodies might go beyond traditional means and try out market-based approaches to water allocation. Such approaches may not work well in many basins; they could foster ecological declines and unjust social outcomes. Nevertheless, they could prove useful in some settings, particularly basins located in dry, arid areas. Even for wet areas they may prove beneficial in times of seasonal scarcity or sudden drought conditions by promoting the most efficient uses and curtailing the wasteful ones. Given the possible dangers, it makes sense to test water-marketing in limited, cautious ways to see if they foster efficiency (the market's central aim) without deviating from the guiding ideals. An alternative means for fostering resource-reallocation over time is for the basin management entity to impose durational limits on particular water uses, a method that can free-up water over time, as limits are reached, for reallocation to higher valued uses.

In some way, basin-management entities need to pay attention also to land uses in the basin and to consider them in their water planning. It is not feasible or consistent with national sovereignty to give a regional entity over land use regulation. But the entity can highlight the many ways that changes in land uses can improve water flows and river health and, in doing so, can urge States to take action. Beyond urging action, it can consider in its own decision-making how well

or poorly a State has done in its land-use controls. Harms to a river that good land use would have avoided could be counted against a State when water uses are being approved. Put otherwise, a State could use up part of its equitable share of a watercourse by failing to make land-use changes that improve water flows and river health.

Good land use inevitably requires considerable knowledge about local nature and the history of patterns of human use. It also requires consideration of the lifestyle, social norms, and culture of the people inhabiting the catchment area as well as sound knowledge of local ecological functioning. At the larger scale, however, local details become less important and more important ecological realities take over. Urban sprawl and the conversion of forests to crop lands commonly degrade water flows in quality and timing. In a study carried out in the Spanish Basque Country, grasslands were found to supply the greatest amount of river water, followed by native woodlands, with exotic woodland plantations providing the least.<sup>522</sup> Rapid deforestation has also been a driving factor of climate change and bringing on unusual flooding and extreme drought conditions. Loss of vegetative cover may erode soils in a catchment area leading to land subsidence. Especially in the coastal areas, loss of vegetative cover along with deterioration or loss of the buffer zones (as in mangroves) has proved catastrophic during natural calamities like cyclones. Wetlands and marshlands help counteract the intensity of the flood effects by absorbing much of the floodwater. On the other side, human attempts to contain floods with artificial levees and embankments fragment floodplains from their rivers, often causing various ecological damages. Such artificial measures effectively put an end to overflow flooding, a

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<sup>522</sup> This study aimed to explore how land use decisions affect the volumes of fresh water provided by rivers and streams in the Basque Country. Fifteen catchments were studied, with similar geology, topography (shape of the land's surface) and climate. Over two years, rainfall was analyzed and related to river flow levels in areas with the following land uses: grassland pastures, native woodland, and exotic (mainly pine) tree plantations.

natural process of replenishing land fertility. Such flood-control structures may diminish the harms from disastrous floods but they come at high costs—the loss of fertility, the loss of sediment to counteract land subsidence, and the loss of critical fish spawning grounds.

These various ecological, land-use truths rise above the details of local people and their practices. They are matters that basin-level entities can and should take into account in their planning and their evaluation of competing water uses and equitable shares.

To work well, of course, this multi-tier management regime requires reasonably effective enforcement methods to ensure compliance. Enforcement has long been a weakness of international law. It is a weakness that, in this setting in particular, needs to be overcome given that sound decisions to deal with crises often need prompt implementation. Noncompliance can come at any level, and action at a higher level is needed to challenge it. International enforcement is thus needed to challenge basin-management regimes to fail to abide by international standards. Regional bodies, in turn, would be chiefly responsible for implementation and enforcement at the interstate level. How this is done—what exact powers the regional body should wield—is hard to decide in the abstract, apart from local considerations. Should it have veto power over major construction projects? Should it have similar power over major diversions—above a certain level? Should it be able to prescribe generally which categories of water uses are permissible and which are not? Should it, for instance, be able to impose standards on permissible irrigation methods and on amounts of water that can be used per hectare for particular crops in particular places (as is done in by agencies and courts in the Western U.S.)? Indeed, might it make sense, looking ahead, to consider how a regional body might have authority to issue mandatory water-use permits for all major water uses in a basin?

Could it, looking even further ahead, oversee some sort of trading-trading rights scheme in water-use rights?

All of the work of a regional management entity, enforcement included, could be aided by the involvement of officials from outside the basin region who have no loyalties to any particular basin State, officials akin to international arbiters, judges, or senior international agency staff. (The Indus Water Treaty, which uses the World Bank as a third party, offers a useful illustration.) Involvement by outsiders could be critical, particularly in the early years of operation. If the basin organization's leadership is simply made up of people from basin States, representatives from a couple of States could possibly manipulate the process to favor their home States. Involvement of an independent party would therefore enhance transparency in the basin management and promote good faith among basin States in their water relations. Similar benefits can be achieved by ensuring due participation of all people concerned and of all appropriate stakeholders. Democratic processes with ample public proceedings; expansive transparency and means of accountability in the basin-wide governance system; the involvement of neutral outsiders—all in combination might work as effective tools to promote participation and compliance by all basin States. In the end, the basin governance body should be able to admonish non-complying States, and in the case of continued noncompliance, to consider the factor in the next round of prioritizing and authorizing water uses.

Basin management entities will not end disputes among States, however sound their governance. Disputes that do arise should be handled initially by the basic management entity in an effort to find a peaceful and amicable resolutions that conforms to the basic principles set forth above. The entity's role could mostly follow the prevailing pattern: as is the case today with various specially constituted bilateral or regional commissions, the basin level management bodies could

act as the first fora for resolving disputes. Those that cannot be resolved there would thereafter be handled at a higher level, by, for instance, an arbitral tribunal or the International Court of Justice.

Finally, different States within a single basin may encounter varied difficulties and problems in making sound use of their water shares. They may be ill-suited to address these difficulties individually, without assistance from others in terms of technical and financial support or because a State goal cannot be achieved without some coordinated step by another State. The basin-based bodies should facilitate this resource sharing and technology transmission among basin States. This collaboration in mobilizing technological and financial measures should also be undertaken across basin lines. To that end, inter-basin partnerships might be launched where appropriate between, for instance, a river basin organization in the developing world and a similar organization in a more developed region for the sharing of technologies, perhaps to increase water-use efficiency, perhaps to reduce the impacts of climate change and nutrient loading. A similar role of stimulating technology sharing could be played by an internationally constituted central oversight body.

Consideration of a few particular elements of governance can round out this overview. This reformulation of current law calls for a cumulative and wider, cross-sectoral analysis of plans and actions. Within the complex and overlapping governance structures today, a conflicting policy decision affecting water resources (and land use practices) may come not only from the agencies charged with environmental and social welfare but also from other, multifaceted development agencies as well. Achieving homogeneity in national policies and goals, as well as integrating various cross-sectoral development activities, is thus important both for ecological health and social justice. In very much the same way, harmonization and collaboration among

various basin and regional institutions and their policies will be required as the basin States go on to managing their waterbodies and catchment areas in general.

In a similar manner, the sound management of river basins requires increased synchronization among various multilateral agreements. The actions a State takes to comply with one agreement should not frustrate efforts to comply with another. River basin management thus needs to pay attention to the full array of agreements applicable in the region, including environmental agreements, economic and development agreements, and human rights- related agreements.<sup>523</sup>

Below is a chart comparing the major ways this dissertation seeks to reformulate the current provisions of international water law.

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<sup>523</sup> Millennium Ecosystem Assessment, *Synthesis*, 93.

*Table 1. Current norms v. Proposed reformulations*

No.	Current norms	Proposed reformulations
1	Two independent, yet conflicting and ill-balanced principles of international water law: the equitable and reasonable utilization and the obligation of no significant harm.	<p>Retiring the dichotomy between the two central principles: the equitable and reasonable utilization and the obligation of no significant harm by introducing a new frame.</p> <p>The new frame would impose mandatory baseline environmental standards at the international level, followed by a reasonable use rule – governing and limiting all water uses.</p>
2	Environmental provisions often come as overlapping, freestanding corollaries to the two abovementioned principles and are usually conditioned by them.	<p>The international baseline standards would include specific environmental provisions:</p> <ul style="list-style-type: none"> <li>i. Duty to protect and maintain freshwater quality</li> <li>ii. Duty to maintain an ecological flow of water</li> <li>iii. Duty to protect aquatic biodiversity etc.</li> </ul> <p>Basin States would be free to impose higher environmental standards through basin-wide arrangements, giving particular regards to local sedimentation needs, salinity intrusion, water temperature, and timing of flows and so on.</p>
3	Current framework employs the term “equitable and reasonable” utilization with particular emphasis on equitable or fair allocation of water among States.	<p>Focus to be shifted from mere allocation to the comparative reasonableness of water uses.</p> <p>The allocation or sharing component would still be included in the equitable and reasonable use ideal, but the test of reasonableness would stand as the more critical and inclusive element.</p>
4	A multi-factor reasonableness test exists but with little guidance on how these factors relate to each other in terms of relative priorities.	The multi-factor reasonableness test but is framed and analyzed in a way that would favor the highest priority needs, wherever located, without compromising ecological and social issues.

Table 1 (Cont'd).

	<b>Current norms</b>	<b>Proposed reformulations</b>
<b>5</b>	Dams, reservoirs and other similar structures have not been addressed in clear terms. On many occasions, they have been made subject to a few procedural requirements only. These procedural requirements are again often conditioned by the two conflicting principles of equitable and reasonable use and no significant harm – rendering these provisions even less effective in practice.	<ul style="list-style-type: none"> <li>i. Dams, reservoirs and other similar construction structures are treated as uses of water.</li> <li>ii. As such, these structures would be brought under similar substantive provisions; i.e. mandatory baseline environmental standards, and reasonable use rule.</li> <li>iii. In addition, they would be subjected to the procedural rules (such as notification, exchange of information, environmental impact assessments etc.) as added safeguards.</li> <li>iv. Reformulation does not call for an absolute prohibition on dams or reservoirs but requires that project designs mimic the natural attributes of water cycles as much as possible and include technological modifications to minimize harmful effects on aquatic species and riverine life.</li> </ul>
<b>6</b>	Current legal framework is largely silent on how to deal with water scarcity – whether in times of droughts, or during dry season or any other unforeseeable situations induced by climate change.	Requires a mechanism to deal with such emergency situations by curtailing the least vital water uses and by real time readjustment and reallocation of water to satisfy the most basic needs.
<b>7</b>	No guidance on permissibility of out of watershed or inter-basin water transfers.	Out of watershed water transfers to be discouraged heavily, since return flow would not return to the source and for resulting ecological tolls.
<b>8</b>	Multiple approaches to improve water quality, making the whole scheme vague and ambiguous. Among them are overt environmental standards, no significant harm rule, reasonable use rule factors, interjection of the ideal of sustainable development, individual right to clean water, instream flow uses etc. – with little effort to streamline these provisions.	In addition to the above-mentioned reframing of the law, the reformulation would simplify by eliminating two other ideals as not being helpful in practice – the concept of sustainable development and the individual right to clean water.



Table 1 (Cont'd).

	<b>Current norms</b>	<b>Proposed reformulations</b>
<b>9</b>	<p>Social justice aspects largely missing from the current framework except due process concerns appearing in disperse, and only in rudimentary forms.</p> <p>Ways to assure justice among nation States, however, are absent.</p>	<ul style="list-style-type: none"> <li>i. The multi-factor reasonableness test would bring into consideration a wide-range of factors relating to social justice.</li> <li>ii. An effective governance structure would provide room and time to accommodate the voices of all affected people, as well as all stakeholders.</li> <li>iii. Enhanced transparency in processes and ways to hold the decision makers accountable.</li> <li>iv. Ensuring fair distribution of costs and benefits of water projects and water uses.</li> <li>v. Providing an equal platform to all basin States to raise their concerns on water related issues irrespective of any disparities in terms of size, geographic location, political influence, economic power and other attributes of vulnerabilities.</li> </ul>
<b>10</b>	<p>No well-articulated system of governance internationally. Fragmented arrangements mostly seen in bilateral settings, and in a few regional settings.</p>	<p>Proposes a multi-level system of governance, organized from top to bottom in hierarchy:</p> <ul style="list-style-type: none"> <li>i. International governance, entailing broad-brush lawmaking. Also needed at the international level is a designated oversight body to supervise and monitor compliance and to maintain liaison with basin-based institutions.</li> <li>ii. Individual basin institutions operating at the whole basin level, and undertaking intensive and thorough management planning.</li> <li>iii. Domestic governance – individual basin States to revise their policies and practices to align them with higher level policies.</li> </ul>

Table 1(Cont'd).

	<b>Current norms</b>	<b>Proposed reformulations</b>
<b>11</b>	With a handful of regional exceptions, no such integrated management approach exists at a broader scale.	<p>An effective basin-wide management would require a version of Integrated River Basin Management (IRBM).</p> <p>The IRBM would look at the basin as a whole, integrate water with other resources, employ cross-sectoral approach, and facilitate a participatory framework. It would also integrate socio-economic, environmental, and human-health considerations in the basin-wide decision making. In some way, the basin-management entities need to pay attention also to land uses in the basin.</p>
<b>12</b>	Market-based approaches not typically seen at the international, or even regional level.	If needed and seems appropriate, basin governance bodies might try out – in a limited setting and without deviating from the guiding ideals – non-traditional means such as market-based approaches to water allocation, especially in dry, arid regions. They might also impose durational limits on particular water uses.
<b>13</b>	Like other areas of international law, no hard and fast enforcement mechanism exists at the international level. Also lacking is any coherent compliance framework at the regional level.	<p>Enforcement needed at the international level to challenge basin wide-compliance. In turn, the basin-wide bodies would be chiefly responsible for implementation and enforcement at the interstate level.</p> <p>Exact enforcement tools and powers would be chosen based on specific local considerations.</p>
<b>14</b>	Most disputes today are resolved in this order: by diplomatic negotiations, by bilaterally constituted joint commissions and basin institutions, by separate fact finding commissions, by arbitral tribunal or by the International Court of Justice (ICJ).	The reformulation proposes to retain most of the prevailing dispute resolution patterns with an important tweaking where basin level institutions are to act as the first and primary fora for resolving disputes.

## River Health and Justice for the Vulnerable: Bangladesh

As we have seen, Bangladesh lies in the GBM (Ganges-Brahmaputra-Meghna) basin—a basin characterized by dispersed bilateral agreements and ad hoc commissions, all focused on single rivers if not single water uses. Disputes in the basin have mostly revolved around the fair sharing of the waters year-round. On the horizon are proposals to engineer the GBM rivers, particularly the Brahmaputra and the Ganges, in ways that would compromise the overall ecological health of the rivers and frustrate the ability of all States in the basin to use their waters reasonably.

Within the basin Bangladesh stands at the end of almost all transboundary rivers as empty into the Bay of Bengal. As the most downstream riparian nation in the region, the country's water flows and water quality are dependent on good upstream uses by other basin countries, not just on what takes place within Bangladesh. Further, it is a developing country with a massive population, and its people and their lifestyles are intimately connected to water. The country's geographic location, economic state, big population, and looming environmental threats—all qualify it as a highly vulnerable State.

Given these circumstance, how would Bangladesh—and by extension similar States--fare under this proposed reformulation of the international law of watercourses? Of particular interest, would the legal regime proposed here adequately sustain the health of the major rivers, allowing them to transport sediment, nourish land fertility, and flush out salinity?

Clearly Bangladesh would benefit from the mandatory baseline standards set at the international level, standards that would obligate the GBM basin States to maintain a minimum ecological flow in their rivers and otherwise protect and maintain freshwater quality and biodiversity. These

binding obligations, taken together, would effectively mitigate many of the problems associated with sediment loss, land subsidence, land fertility, and salinity intrusion while protecting aquatic biodiversity. As they complied with these baseline ecological obligations the basin countries would also be called upon to articulate their own, higher and more specific environmental standards, taking into account these much-needed ecological functions and other particular features of the basin. Many rivers in the GBM basin, including the Ganges, are heavily polluted. Existing laws in the basin States (including Bangladesh) address pollution mostly from point sources, leaving out potentially more damaging diffuse sources. The reformulation proposed here would provide tools to limit and curtail such land-use activities, including irrigation practices, which might pollute the waters or otherwise interfere with river health (by, for instance, increasing salinity levels in the freshwater, a threat felt by Bangladesh in particular).

After these ecological concerns come the many use-conflicts between and among the basin States, clothed either in ecological claims or development claims. The basin is water abundant except during the dry season. It can easily accommodate different types of nonpolluting water uses. The most serious use-conflicts have to do with major diversions that reduce water flows substantially and from major construction projects. The case of Farakka, for example, pitted Bangladesh's claims of adverse impacts—on its irrigation and on the rivers ecological functioning—against India's demands to divert water southward down a Ganges tributary to facilitate navigational access to the Kolkata port. Similarly, the ongoing river interlinking project by India pitted India's desire to divert Ganges and Brahmaputra waters to arid areas for irrigation, improved navigation, and hydropower production against Bangladesh's many claims of resulting harm due to substantially reduced water flows (including reduced sedimentation, increased salinity, harm to aquatic species and agriculture, exacerbated dry-season scarcity. What

these disputes highlight is how water uses can be, and routinely are, in conflict with one another in the GBM basin. Some mechanism is needed to resolve the disputes. The reformulation supplies a means to do that.

The work of resolving such conflicts will be aided by putting aside the now-entrenched dichotomy between the principles of equitable and reasonable utilization and harm avoidance. Doing that simplifies the process of reconciling or choosing among competing water uses. On different occasions thus far, this clash between use and harm has paralyzed efforts to address basin water problems jointly, primarily between Bangladesh and India. It is worth noting that this alleged clash apparently, favoring one country over another, was the reason cited by India when it refused to endorse the UN Convention. Under the simplified new reformulation, all water uses in the GBM basin would be evaluated based on a single, multi-factor reasonable use standard. The test would weigh, as in the above-mentioned two scenarios, not only claims raised by Bangladesh and India (and their other needs) but also the interests, if any, of the three other basin States. The single test of reasonableness, taking into account all possible factors, would better serve the entire GBM basin, ecologically and socially. The law would protect those conflicting uses among basin States that are more reasonable; those that are more important and consistent with the maintenance of ecological standards and human well-being. In doing so it would prevent or at least reduce many of the ill effects that Bangladesh would otherwise suffer while allowing Bangladesh to engage in high-quality water uses. Further protection would come when and as the GBM basin formulates its own sets of additional, more objective standards for reasonableness and river health, tailored to context.

As seen, many of the looming water problems in the GBM basin arise from major projects planned by India and China to develop their rivers intensely. The reformulation proposed here

would bring these projects, and others like them—dams, reservoirs, barrages, diversions, levees—within the ambit of “uses” of waters, thereby subjecting them to the same standards set for regulating other water uses. This would mean that these projects would have to satisfy the initial ecological baseline standards, followed by an evaluation of their reasonableness in comparison with other competing water uses in the basin. The projects would also be subject to the various rules proposed here to govern decision-making processes. India, in the case of its planned diversions, and China, in the case of its conceived plans along the Yarlung Tsangpo (Brahmaputra) River, would be obligated to share detailed information on their projects, including the results of impact assessments, and to allow involvement by all stakeholders—within Bangladesh as well as other GBM basin States.

With regard to the India’s planned river interlinking diversions within the basin, the reformulation would limit India’s rights to do so except to the extent the diversions do not materially impact the ecological flows of the two rivers (Ganges and Brahmaputra) and otherwise comply with all other foregoing standards. Diversions out of the GBM basin on the other hand, which China is contemplating for the Yarlung Tsangpo (Brahmaputra) River, would be strictly limited given competing water uses. Such out-of-basin water transfers would not be allowed in the dry season, and would be permitted even during the wet season only when enough water is left to keep the GBM basin ecologically healthy and socially sound. Even then it would be problematic to take excess rain water out of the basin given the engineering challenges in the impassable area of India where rainfall is highest.

While the GBM basin has plentiful water overall the rivers flows feature high seasonal disparities. Many the prevailing tensions in the basin are due to this hydrological reality, especially between Bangladesh and India. These two lower riparian States are increasingly

dependent on steady water flows during the dry season for irrigation, to sustain underground drinking water supplies, and to satisfy other basic needs. As mentioned earlier, the Farakka barrage has already intensified dry-season water shortages for Bangladesh. Other proposed dams and diversions efforts will aggravate the situation. In much the same way, China's mega-projects will have similar or worse dry-season repercussions for both downstream riparians—India and Bangladesh. On top of these projects, climate change impacts in the region are likely to compound the dry season problems by causing more frequent droughts. Current international law remains largely silent on these issues. The reformulation proposed in this dissertation would help address them.

The reformulation, as applied to the GBM basin, recommends that in times of scarcity or sudden and unusual circumstances—when all water uses by the basin States cannot be accommodated—available water would go to the highest valued uses taking into account the basic needs of the people in the basin. This could favor water needed for agriculture yet curtail wasteful irrigation practices; it would maintain a minimum flow vital to recharge underground drinking-water aquifers and to keep inland waters immune to salinity intrusion; and it would limit upstream dam operations and diversions during the dry periods (October to March). The collaborative governing body in the GBM basin would be vested with the tasks of redistributing and reallocating the available waters to handle these seasonal water shortages in the basin. The body might additionally impose term limits on some water uses, and authorize water trading, as a way to promote the highest valued uses consistent with the overall health of the GBM basin.

As we have seen, the GBM basin has highly fragmented legal arrangements when it comes to transboundary water issues, evidenced by the existing bilateral agreements between Bangladesh and India, and between India and Nepal. There is at present no working water agreement with

China, except a few memorandums of understanding (those, too, bilateral ones with Bangladesh and India). Bhutan, despite being located well within the GBM basin, has never been a party to any arrangement. Good river health and basin-wide human flourishing can never be achieved in such a highly fragmented management system. It needs what this formulation proposes, basin-wide management that oversees the GBM basin as a single ecological unit. A basin-wide oversight body would represent all five States in the GBM catchment area—Bangladesh, India, Nepal, Bhutan and China—and would be responsible for comprehensively managing all rivers within the basin. This GBM oversight body would play the key role in implementing all of the foregoing formulations; i.e. setting the overall goals and criteria for a healthy GBM basin, monitoring compliance with binding international standards, prescribing standards applicable specifically to the GBM basin taking its individualistic traits and critical needs into account, regulating use-conflicts by diverting water to the highest-rated priorities, reallocating and readjusting dry season water uses, promoting cross-sectoral cooperation and basin-wide dialogue among States and/or non-State actors, and facilitating dispute resolution

The reformulation here would enjoin the GBM basin-body to undertake more of an integrated approach basin-wide, both in its policymaking and regulation of water uses. This would importantly require undertaking cross-sectoral analyses of plans or policies to make sure that an activity in a part of the basin would not negatively impact another part of the basin. The body would also be required to integrate management of both surface water and ground water, a pivotal aspect for a basin that makes enormous use of its groundwater sources. Moreover, the reformulation would involve all relevant stakeholders into the decision-making process including the basin States and the affected people, while also calling for streamlining all laws, policies and land-use practices in each State within the basin to align them with the long-term visions.



Importantly, the reformulation would not merely look at transboundary impacts. It would also call into question actions by individual States within their jurisdictional limits. For example, not all water related problems in Bangladesh are necessarily brought on by upstream uses. The country's own actions and unwise land use patterns may be responsible for some of the degraded riverine conditions. Many rivers in Bangladesh suffer from acute pollution from both point and non-point sources within the country. Urban sprawl and the illegal occupation and expansion of irrigable lands have degraded many streams, stream banks, and segments of major rivers. Beyond that rivers are degraded by ill-conceived flood—control measures, by weak and faulty management of coastal zones (including a decision to build a massive coal power plant near Sundarbans, the largest mangrove forest in world), and by the latest attempt to export critically important alluvial sands by dredging river beds. The mere fact that there is no other downstream riparian whose rights and interests Bangladesh may violate cannot justify such actions considering the overall ecological health of the river basin. As the reformulation urges, all people within the entire GBM basin have legitimate interests in the entire stretch of the rivers and the catchment area as a whole, which means residents in India have legitimate concerns about actions within Bangladesh. The country's own policymaking and actions would thus have to be compatible with the overall basin-management plan.

Then comes the aspect of social justice. Because justice includes considerations of how we share the earth and its resources with one another—in a territorial sense and in our relative rates of consumption<sup>524</sup>--ensuring social justice would require taking due account of unequal natural distributions of resources, peculiar regional features, and the state of economic and political advancement of groups, societies or even countries in an international setting. For Bangladesh

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<sup>524</sup> Eric T. Freyfogle, Chapter 6: Social Justice, 183.

therefore, an ideal basin-wide regime would take all these differences into account and, by counteracting them, place the country on par with others. Mandatory membership in a robustly framed GBM basin governance system would furnish the country a common platform for raising its legitimate concerns. Without needing tough diplomatic negotiations, the mandatory substantive and procedural obligations along with the multi-factor reasonable use test would further provide enough safeguards for Bangladesh to make sure that upstream water uses do not compromise the country's ecological and social needs. To ensure that the more influential States cannot unduly manipulate the process in their favor, the GBM basin can involve a third party as a watchdog in its governing framework to ensure its independence and to strengthen enforcement. As mentioned earlier, the joint body would also consider popular inputs, involve all relevant stakeholders in the process, and hear the voices of the affected and the marginalized sections of the society—all to make sure that decisions avoid undue hardship or injustice.

Concerns about justice are further implicated in the ultimate distribution of costs and benefits of water-related projects. If, for example, a water construction project in Nepal moves forward, diverting or consuming water in excess of the State's equitable amount, the reformulation would require Nepal to equitably share some of the project's benefits with downstream India and Bangladesh—in the form of hydropower or monetary compensation or through some other collaborative effort. In short, the inequities of the basin States would be fully considered and steps taken to equalize outcomes.

The GBM is one of the largest river basins in the world. The basin is also very dynamic in the way it incorporates diverse climate conditions, distinctive topography and different cultures. What unites all peoples and cultures is an inescapable reality: the high dependence on water of a very large population. The GBM basin should therefore be carefully managed, jointly by all

basin States concerned in a way that would meet the basic needs of this large population, promote long term ecological health, and stimulate overall human well-being in the basin. The basin-wide management body would thus have to assume long term planning, fostering good land uses across the basin and within individual basin States (as in Bangladesh), and reckoning the GBM basin as a complex, indivisible ecological whole.

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