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INTERNATIONAL WATER DISPUTES AND COOPERATION

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> "Precedents in this matter of water allocation are rare and practice varied; and the Commission is aware of no generally adopted code or standard practice upon which the settlement of a question of inter-communal water allocation might be based."
>
> —Nile Commission Report (1925)

> "A suit now pending in the United States Supreme Court between the states of Connecticut and Massachusetts involves important questions of International Law . . . . These cases involving the economic use of international rivers are rapidly increasing in number and importance, and in future they seem likely to arouse more discussion than the questions of navigation rights which have hitherto furnished the main juristic interest of these waterways. . . . [T]he group of problems connected with diversion is now introducing us to a chapter of International Law which is still in the making."
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> —Professor Herbert A. Smith, "Diversion of International Waters," 11 *Brit. Y.B. Int'l L.* 172, 195 (1930)

§ 7.01 Introduction[*] [**]

The United States, primarily through its Supreme Court's jurisprudence, has been an important contributor to the chapter of international law on the economic uses of transboundary rivers that Professor Herbert A. Smith anticipated nearly a century ago.[1] The international law of transboundary water allocation had only the faintest outlines before the U.S. Supreme Court began adjudicating interstate water allocation and pollution disputes at the beginning of the twentieth century. The dispute Professor Smith discusses in the quote above involved the Connecticut River, which flows through Vermont, Massachusetts, and Connecticut, and is typical of transboundary water disputes adjudicated by the U.S. Supreme Court. Massachusetts sought to divert water from tributaries of the Connecticut River to reservoirs to provide water to the Boston area. Connecticut sued for an injunction, claiming an absolute right to the normal flow of the river. The Supreme Court dismissed Connecticut's complaint in large part because it considered drinking and domestic uses to be the most important uses of water, and because Connecticut could not show that it would suffer

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[1] *See* Herbert A. Smith, "Diversion of International Waters," 11 *Brit. Y.B. Int'l L.* 172, 195 (1930).

real and substantial injury to its interests as a result of Massachusetts's diversions.[2]

The central role of the U.S. Supreme Court in balancing the rights, interests, and equities of riparian "quasi-sovereign" U.S. states is unique in the world, and therefore its jurisprudence serves as a significant source of international legal principles.[3] The world—including the United States—urgently needs to improve the management of its freshwater. This has proven difficult in many jurisdictions, and the effective management of transboundary freshwater has proven even more elusive. The United States has had long experience with managing transboundary waters, particularly in its water-stressed West. It has created interstate water commissions and developed and deployed increasingly sophisticated technology to assist in managing these waters. There is much to learn from the American experience. At the same time, internationally, there is no final adjudicator of transboundary water disputes in most contexts; therefore, international law has been forced to develop in ways U.S. law has not. International law, for example, places a duty on co-riparian States to cooperate.[4] This is a principle the United States has flirted with, but has never required. As its transboundary water management challenges expand, the United States would do well to examine international law for mechanisms—such as the duty to cooperate—to help it grapple with the water challenges of the twenty-first century.

§ 7.02 Managing Transboundary Watercourses

[1] Inadequacy of International Law

Transboundary waters are everywhere. By one count, there are 276 transboundary basins overlying 148 countries, which account for 60% of global freshwater flows.[5] As discussed in greater detail below,[6] in the

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[2] *See* Connecticut v. Massachusetts, 282 U.S. 660, 673–74 (1931).

[3] India too has a federal system with a Supreme Court capable of resolving interstate water disputes. However, the Indian Interstate Water Disputes Act of 1956 stripped the Indian Supreme Court of that power, and instead established a system for appointing ad hoc tribunals when a dispute arises and a tribunal is requested by a State. This system of adjudication is lengthy, often taking decades, and appeals and annulment proceedings subsequently brought to the Indian Supreme Court call into question the finality of the tribunal's decisions. As a result, Indian jurisprudence has been a less influential source of international law. *See* Daniel Seligman, Inst. of Water Pol'y, Lee Kuan Yew Sch. of Pub. Pol'y, Nat'l Univ. of Singapore, "Resolving Interstate Water Conflicts: A Comparison of the Way India and the United States Address Disputes on Interstate Rivers" (June 2011).

[4] *See* § 7.06[1], *infra*.

[5] Mark Giordano et al., "A Review of the Evolution and State of Transboundary Freshwater Treaties," 14 *Int'l Envtl. Agreements* 245, § 1 (2014).

[6] *See* § 7.04, *infra*.

century since the Nile Commission complained about the lack of established international freshwater law,[7] the principles applicable to allocating water across boundaries have become more established. However, there is no court of general jurisdiction (or other method of adjudication) that allocates international waters or applies existing principles of international law to the particular circumstances of the world's watercourses.[8] As a result, for enforceable allocations to be made in transboundary basins, the countries in those basins must agree by treaty how to allocate the waters, or establish an institution or mechanism for doing so. Unfortunately, less than half of the world's transboundary basins have any formal agreement in place for their management. Even where such agreements exist, many do not cover the entire basin, or provide enforceable mechanisms for allocating the waters.

One of the biggest impediments to properly managing international watercourses is the international system itself. International law, among other things, governs how States interact with each other. Modern international law was constructed largely on the basis of the idea of Westphalian Sovereignty, i.e., sovereignty of territory, non-intervention, and the legal equality of States. The basic territorial unit of the nation-state provides the basis for the development of world-state interaction. While this is a useful way of organizing world politics and law, it makes it difficult to address problems—such as pollution, climate change, and fisheries, to name a few—that cross borders or that otherwise require collective action.

Anywhere that a watercourse crosses from one jurisdiction to another, or adjoins more than one jurisdiction, there is a risk that it will not be fairly and efficiently regulated and managed. This problem exists with equal force within sovereign States that are organized in federal systems—such as Argentina, Canada, India, and the United States—where water use is regulated on a sub-national level. The problem is at least twofold. First, the simple fact that two or more governments are responsible for regulating a single resource means that, unless there is an effective mechanism for coordination, uses will not be optimized. Second, where two or more

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[7] *See* "Exchange of Notes Between His Majesty's Government in the United Kingdom and the Egyptian Government in Regard to the Use of the Waters of the River Nile for Irrigation Purposes," Nile Commission Report (1925), U.K.-Egypt, May 7, 1929, T.S. No. 17 (1929), cmd. 3348, ¶ 21.

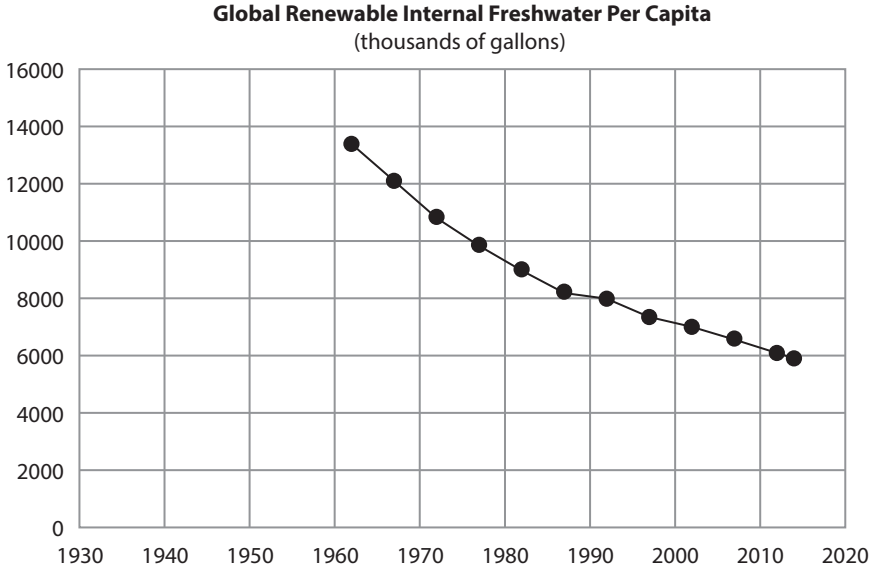
[8] "'Watercourse' means a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus." United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses art. 2, *opened for signature* May 21, 1997, 36 I.L.M. 700, 704 (entered into force Aug. 17, 2014) (U.N. Watercourses Convention).

riparians are competing over exploiting a shared resource, there is a risk of a "tragedy of the commons" if each acts in its narrow self-interest.

[2] Increased Demand and Changing Precipitation Patterns Increase the Stress on Transboundary Watercourses

In addition to the structural difficulties facing regulation of the use of transboundary freshwater, two additional developments are exacerbating the problem. First, worldwide water demand is increasing. "Global water [demand] has increased by a factor of six over the past 100 years . . . ."[9] Currently global water demand is estimated to grow at a rate of about 1% per year due to population growth, economic development, and other factors.[10] While reliable data only exists as far back as the 1960s, it is also clear that the amount of global renewable freshwater is declining (see Figure 1).

Figure 1[11]



[9] United Nations World Water Assessment Programme/UN-Water, "The United Nations World Water Development Report 2018: Nature-Based Solutions for Water," at 10 (2018).

[10] *Id.* In the United States, demand has declined in recent years even as the population and economy have grown. *See* John Fleck, "High-Tech Desert: The Great Decoupling of the West's Water," *Breakthrough J.* No. 6 (Summer 2016) ("Sometime between 2005 and 2010, the decline in per capita use became so rapid that total municipal water use in the United States began to decline . . . ."). The United States has accomplished this through greater efficiency and conservation measures. Nevertheless, worldwide the trend is toward increased demand.

[11] *See* U.N. Food & Agric. Org., AQUASTAT data, http://www.fao.org/nr/water/aquastat/main/index.stm. Internal freshwater is freshwater that does not cross national borders.

The second development is climate change. The Intergovernmental Panel on Climate Change (IPCC) predicts that in the future, freshwater will be redistributed from regions that are already relatively dry to wetter regions.[12] A new National Aeronautics and Space Administration (NASA) study has established that the IPCC's prediction is already manifesting itself.[13]

According to the authors of the NASA study, Earth is currently experiencing a "major hydrologic change."[14] The study employs data from Gravity Recovery and Climate Experiment (GRACE) satellites over a 14-year period, as well as other water and climate data. It confirms that the higher latitudes and tropics are getting wetter, while the middle latitudes are becoming dryer.[15] Data from the GRACE satellites from 2002 to 2016 allowed construction of monthly maps of Earth's average gravity field, offering details of how mass, primarily water, is moving around the planet. In this way, the authors of the study were able to distinguish annual variations in precipitation from changes in water due to climate change and groundwater pumping. Most groundwater depletion is occurring within Earth's mid-latitudes.[16] This "result[s] in a positive drying feedback that is accelerating water losses and the severity of related socioeconomic issues."[17] The NASA study identifies 30 areas in the middle latitudes where freshwater is in particular danger, including Northern India, the North China Plain, the Middle East, the area surrounding the Caspian Sea, and California.[18] The authors of the study conclude that greater water conservation efforts are needed within countries, and perhaps more importantly, "[t]he GRACE data provide[s] motivation for multilateral cooperation among nations, states and stakeholders, including development of transboundary water-sharing agreements, to balance competing demands and defuse potential

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[12] *See* IPCC, "Climate Change 2014: Synthesis Report," at 11 (2014) ("In many mid-latitude and subtropical dry regions, mean precipitation will *likely* decrease, while in many mid-latitude wet regions, mean precipitation will *likely* increase under the RCP8.5 scenario.").

[13] *See* Matthew Rodell et al., "Emerging Trends in Global Freshwater Availability," 577 *Nature* 651 (2018).

[14] Fiona Harvey, "Water Shortages to Be Key Environmental Challenge of the Century, NASA Warns," *The Guardian* (May 16, 2018) (quoting study author Jay Famiglietti).

[15] *See* Rodell et al., *supra* note 13, at 652 ("freshwater seems to be accumulating in far-northern North America (region 5) and Eurasia (region 6) and in the wet tropics, whereas the greatest non-frozen-freshwater losses have occurred at mid-latitudes").

[16] *Id.* at 657.

[17] *Id.*

[18] *Id.* at 656.

conflict."[19] The need for effective international management of transboundary waters has, therefore, never been more pressing, particularly since as these trends continue, international security and human welfare are increasingly threatened.

[3] Improved Data Availability

In the face of these challenges, there is some good news. The technology developed for understanding surface water and groundwater flows and consumption has become increasingly sophisticated. This includes hydrologic computer models, which the U.S. Supreme Court is now incorporating into its decrees.[20] It also includes remote sensing and satellite technology, such as the Landsat and GRACE satellite missions, as well as refined irrigation consumptive use physics and moisture sensor technology.[21] Making these technologies readily available and easy to use around the world will make better water management possible.

§ 7.03 Transboundary Water Risks

The World Economic Forum's annual "Global Risks Report" has listed "water crises" as one of the top five global risks in terms of impact every year since 2012.[22] In 2018, it is ranked fifth.[23] The report defines "water crises" as "[a] significant decline in the available quality and quantity of fresh water, resulting in harmful effects on human health and/or economic activity."[24] There is a general consensus among scholars and policy makers that in the past transboundary water disputes have almost never escalated

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[19] *Id.*

[20] *See, e.g.*, Kansas v. Colorado, 556 U.S. 98, 104 (2009) ("Compact compliance with respect to Groundwater Pumping shall be determined using the results of the H-I Model"); Kansas v. Nebraska & Colorado, 538 U.S. 720 (2003) (approving final settlement stipulation incorporating the Republican River Compact Administration Groundwater Model as part of the process for determining Compact compliance). Special Master Reports are available at https://www.supremecourt.gov/SpecMastRpt/SpecMastRpt.aspx.

[21] *See, e.g.*, Colin R. Leslie, Larisa O. Serbina & Holly M. Miller, U.S. Geological Survey, "Landsat and Agriculture—Case Studies on the Uses and Benefits of Landsat Imagery in Agricultural Monitoring and Production" (Open-File Report 2017-1034); Richard G. Allen et al., FAO Irrigation & Drainage Paper No. 56, "Crop Evapotranspiration" (2006); Task Committee on Revision of Manual 70, "Evaporation, Evapotranspiration, and Irrigation Requirements" (Marvin E. Jenson & Richard G. Allen eds., 2d ed. 2015).

[22] *See* World Economic Forum, "The Global Risks Report 2018" (13th ed. 2018). The report is the result of the Global Risks Perception Survey, in which nearly 1,000 experts and decision makers assess the likelihood and impact of 30 global risks over a 10-year horizon. *Id.* at 63–65.

[23] *Id.* at fig.IV.

[24] *Id.* at 61.

into international military conflicts.[25] While this is reassuring, the future could be different. Moreover, even if future disputes stop short of war, management of transboundary waters will remain a significant issue in international relations. In particular, the natural inclination of upstream streams States with economic and military superiority over downstream States is to take more than their equitable share of a river.

In 2012, the U.S. National Intelligence Council concluded that "during the next 10 years, water problems will contribute to instability in states important to US national security interests."[26] The report noted that "as water shortages become more acute beyond the next 10 years, water in shared basins will increasingly be used as leverage; the use of water as a weapon or to further terrorist objectives also will become more likely beyond 10 years."[27]

In December 2017, a group of ex-U.S. military officials and analysts revisited the conclusions of the 2012 National Intelligence Council report for the consultancy group CNA and concluded that global water stress has, if anything, exceeded the earlier estimate as an international security concern. The CNA report warned: "Water stress should be considered an intensifying factor in instability, conflict, and crises that will impact U.S. national interests abroad and likely lead to future U.S. military responses. Consequently, the international community should work to reduce water stress and its effects. This requires a whole-of-government approach."[28] This concern is shared outside the United States as well. The G7 (an informal grouping of the world's seven largest economies) recently commissioned a report focusing on how to improve the world's resilience in the face of climate change. The report concluded that competition over transboundary water driven by climate change and increased water demand could lead to international instability:

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[25] *See, e.g.*, Aaron T. Wolf, "Conflict and Cooperation Along International Waterways," 1 *Water Policy* 251–65 (1998); Nat'l Intelligence Council, "Global Water Security" (Feb. 2, 2012); CNA Analysis & Solutions, "The Role of Water Stress in Instability and Conflict" (Dec. 2017). *But see* Aaron T. Wolf, "Principles for Confidence-Building Measures in the Jordan River Watershed," *in Central Eurasian Water Crisis: Caspian, Aral, and Dead Seas* (Iwao Kobori & Michael H. Glantz eds., 1998) (Jordan and Syria's attempts to prevent Israel from diverting water from the Jordan River in the early 1960s "set off what has been called 'a prolonged chain reaction of border violence that linked directly to the events that led to the [June 1967] war.' Border incidents continued between Israel and Syria, triggering air battles in July 1966 and April 1967 and, finally, all-out war in June 1967." (alteration in original) (citation omitted)).

[26] Nat'l Intelligence Council, *supra* note 25, at 3.

[27] *Id.*

[28] CNA Analysis & Solutions, *supra* note 25, at 4.

> Competition over water use will likely increase as demand grows and climate impacts affect availability. Managing the effects of climate change on water resource use will be particularly complicated in transboundary basins affected by fragility or conflict, where water management is often eclipsed by political considerations or is affected by power asymmetries.[29]

The World Bank also worries that increased demand and climate change are sparking competition over water resources—particularly transboundary waters—that could lead to conflict:

> Countries are increasingly developing transboundary waters to meet escalating water demands and to more actively manage and develop these large shared river systems and aquifers to strengthen resilience to climate change. Growing demand for energy is also leading to increasing development of hydropower dams in transboundary basis. These trends suggest that competition will intensify and contention may grow over the use of transboundary resources, both in shared rivers and shared groundwater aquifers.[30]

In other words, the international community needs to quickly expand and improve its water basin management—particularly transboundary waters—if it is to avoid some of the worst effects of climate change and growing competition for water resources. There are many ways in which this can and must be done. The remainder of this chapter focuses on some relevant aspects of the U.S. experience with transboundary water governance, and corresponding experience and norms in the international arena. First, an overview of the current state of the law of international watercourses will be provided. This is followed by a discussion of the influence of the U.S. transboundary water jurisprudence on international law. Third, the international law of cooperation is considered. This chapter then concludes with recommendations for improving both international and U.S. transboundary water regulation.

§ 7.04 Overview of the Law of International Watercourses

[1] General Principles

The law of international watercourses consists of several general substantive obligations and several procedural obligations. These are codified in the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (U.N. Watercourses Convention).[31] The U.N. Watercourses Convention establishes the basic framework for negotiations and other agreements related to particular watercourses. Currently, 36 countries are parties to the Convention, which entered into force

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[29] Lukas Rüttinger et al., "A New Climate for Peace: Taking Action on Climate and Fragility Risks," at ix (2015) (independent report commissioned by the G7 members).

[30] Claudia W. Sadoff, Edoardo Borgomeo & Dominick de Waal, World Bank Grp., "Turbulent Waters: Pursuing Water Security in Fragile Contexts," at 28 (2017) (Turbulent Waters) (citation omitted).

[31] U.N. Watercourses Convention, *supra* note 8.

on August 17, 2014.[32] In addition, it has been recognized that a number of the principles contained in the U.N. Watercourses Convention reflect customary international law and, therefore, they bind all countries whether they are parties or not.[33]

[a] Substantive Obligations

The key substantive obligations under international law set out in the U.N. Watercourses Convention are (1) equitable and reasonable utilization, (2) the obligation to prevent harm to other riparian States, and (3) the emerging obligation to protect international watercourses and their ecosystems.

[i] Equitable and Reasonable Utilization

The cornerstone of international watercourse law is that States must "utilize an international watercourse in an equitable and reasonable manner" with the object of "attaining optimal and sustainable utilization."[34] When determining what is equitable and reasonable, "all relevant factors and circumstances" must be considered.[35] The nonexclusive list of such factors provides:

> (a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
>
> (b) The social and economic needs of the watercourse States concerned;
>
> (c) The population dependent on the watercourse in each watercourse State;
>
> (d) The effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
>
> (e) Existing and potential uses of the watercourse;
>
> (f) Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;

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[32] Parties to the U.N. Watercourses Convention are: Benin, Burkina Faso, Chad, Côte d'Ivoire, Denmark, Finland, France, Germany, Greece, Guinea-Bissau, Hungary, Iraq, Ireland, Italy, Jordan, Lebanon, Libya, Luxembourg, Montenegro, Morocco, Namibia, Netherlands, Niger, Nigeria, Norway, Portugal, Qatar, South Africa, Spain, State of Palestine, Sweden, Syrian Arab Republic, Tunisia, United Kingdom, Uzbekistan, and Vietnam. Paraguay, Venezuela, and Yemen are signatories, but have not yet become parties. United Nations Treaty Collection, "12. Convention on the Law of the Non-Navigational Uses of International Watercourses," https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&clang=_en.

[33] *See* Gabčíkovo-Nagymaros Project (Hungary/Slovakia), 1997 I.C.J. 7, ¶ 133 (Sept. 25). Customary international law is defined as "international custom, as evidence of a general practice accepted as law." Statute of the Int'l Court of Justice, art. 38(1)(b).

[34] U.N. Watercourses Convention, *supra* note 8, at art. 5(1).

[35] *Id.* at art. 6(1).

> (g) The availability of alternatives, of comparable value, to a particular planned or existing use.[36]

As discussed in § 7.05[1], below, the principle of equitable use is entirely consistent with, and, to a great extent, reflects the jurisprudence of the U.S. Supreme Court in interstate water disputes. The nonexclusive list of factors mirrors those cited by the Court in its various decisions.[37]

[ii] Obligation to Prevent Harm to Other Riparian States

The U.N. Watercourses Convention requires parties to "take all appropriate measures to prevent the causing of significant harm to other watercourse States."[38] When a State does cause harm to another, the State must "take all appropriate measures . . . to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation."[39] The best earliest articulation of the "no harm" principle in the context of international environmental disputes appears in the *Trail Smelter* arbitration between Canada and the United States, which held that

> 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.[40]

The *Trail Smelter* case is addressed in more detail in § 7.05, below.

[iii] Emerging Obligation to Protect International Watercourses and Their Ecosystems

The International Court of Justice has held that States must "reconcile economic development with protection of the environment."[41] The U.N. Watercourses Convention provides that "[w]atercourse States shall, individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses."[42] This includes an obligation to "prevent, reduce and control the pollution of an international watercourse that may cause significant harm to other watercourse States or to their

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[36] *Id.*

[37] *See, e.g.*, Colorado v. New Mexico, 459 U.S. 176 (1982); Kansas v. Colorado, 206 U.S. 46 (1907); New Jersey v. New York, 283 U.S. 336 (1931).

[38] U.N. Watercourses Convention, *supra* note 8, at art. 7(1).

[39] *Id.* at art. 7(2).

[40] Trail Smelter Case (U.S. v. Can.), Award of Mar. 11, 1941, 3 U.N. Rpts. Int'l Arb. Awards 1938, 1965 (1949).

[41] Gabčíkovo-Nagymaros Project (Hungary/Slovakia), 1997 I.C.J. 7, ¶ 140 (Sept. 25).

[42] U.N. Watercourses Convention, *supra* note 8, at art. 20.

environment . . . ."[43] Thus, while the Convention sets out the key principles, how watercourse States elaborate and apply those principles in particular contexts will determine how and to what extent watercourse ecosystems are protected.

[b] Procedural Obligations

The most important procedural obligations set forth in the U.N. Watercourses Convention are (1) to cooperate, (2) to give prior notification, (3) to consult with other riparian States, and (4) to exchange data and information on a regular basis.

Article 8 of the Convention provides for a general obligation to cooperate, which is discussed in greater detail in § 7.06, below. Subsequent sections of the Convention go on to elaborate different facets of cooperation. An entire section of the Convention is devoted entirely to detailed rules on notification, and related consultation and negotiation, in relation to "planned measures" that may affect other riparian States. Article 11 sets out the broad obligation that riparians "exchange information and consult each other and, if necessary, negotiate on the possible effects of planned measures on the condition of an international watercourse."[44] Articles 12 to 19 set forth detailed rules on how such notifications are made and responded to.

The U.N. Watercourses Convention requires riparians to consult on a variety of issues, including whether to conclude a watercourse agreement (Article 3(5)), how to implement the principle of equitable utilization (Article 6(2)), how to eliminate or mitigate significant harm caused by one riparian to another (Article 7(2)), and whether a joint management mechanism should be established (Article 24), among many others. Article 9 requires watercourse States to exchange data and information on the watercourse on a regular basis. It also requires States to use best efforts to provide other States with watercourse information they request.

[2] Development of Treaties Governing Particular International Watercourses

While the U.N. Watercourses Convention provides the legal framework, it is intended only to overlie a web of bilateral and multilateral treaties adapted to the specific circumstances of each international watercourse. By one count, between the years 1820 and 2007, States concluded 688 such international agreements, governing international freshwater in 113 basins,

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[43] *Id.* at art. 21(2).

[44] *Id.* at art. 11.

covering almost 70% of the world's transboundary basin area.[45] And there is evidence that transboundary water cooperation is increasing. Since World War II, an average of three transboundary water treaties have been signed each year, up from an average of less than one per year.[46] Nevertheless, many important international watercourses, such as the Salween River in Southeast Asia, have no treaty regulating their management. Others have agreements that cover only some of the watercourse States. The Mekong River, for example, has an agreement that does not include two key riparian States through which the river flows: China and Myanmar.[47]

These agreements also vary widely in scope and content. Many are not comprehensive, addressing only certain aspects of water management. For example, the agreement between Lebanon and Syria on the El Kebir River excludes water quality regulation.[48] Very few agreements regulate groundwater.[49]

One overall trend, however, is that the mechanisms for data and information exchange have increased. Before 1920, treaty provisions for information exchange were rare.[50] Since 1950, information exchange has become an increasingly common feature of treaties,[51] and today more than 40% of all agreements provide for information exchange.[52] Roughly half of all treaties provide for direct data exchange, and more than half include technical cooperation (e.g., joint research, investigation, and assessments).[53]

Other procedural mechanisms in treaties have become more complex over time, commonly incorporating joint management institutions and conflict resolution mechanisms.[54] Before 1950, 31% of agreements contained conflict resolution provisions, as compared with 44% after 1950.[55]

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[45] Giordano et al., *supra* note 5, at § 4.2.

[46] *Id.*

[47] *See* Mekong River Comm'n, "About MRC—Governance and Organizational Structure," http://www.mrcmekong.org/about-mrc/governance-and-organisational-structure/.

[48] Convention entre le Liban et la Syrie pour le partage des eaux du basin du Fleuve El-Kebir et law construction d'un barrage commun sur le cours principal du Fleuve (Beiruit, Apr. 20, 2002).

[49] Giordano et al., *supra* note 5, at § 4.4.4.

[50] *Id.* § 4.5.1.

[51] *Id.*

[52] *Id.*

[53] *Id.*

[54] *Id.* § 5.

[55] *Id.* § 4.5.2.

This trend also appears to be accelerating. Since 1990, 61% of all agreements have incorporated some means of conflict resolution.[56]

Generally, the trend has been toward creating structures for management of waters rather than imposing strict rules.[57] In short, while States are steadily building the legal structures necessary to implement the principles discussed here, much more progress must be made.

§ 7.05 U.S. Jurisprudence as a "Guide" for the Law of International Watercourses[58]

[1] Establishing the Obligation to Equitably Share International Watercourses

At the turn of the twentieth century, the United States was facing both international and internal transboundary water allocation disputes. The international dispute was with Mexico and concerned the Rio Grande River, while the internal dispute arose between Colorado and Kansas and concerned the Arkansas River.

In 1894, Mexico complained to the U.S. Secretary of State that increased diversions of water in Colorado and New Mexico had caused the Rio Grande to run dry in the critical spring and summer months, and that Ciudad Juarez and other Mexican communities on the Rio Grande "may be annihilated."[59] The two countries entered into negotiations. As part of that process, U.S. Attorney General Judson Harmon issued a legal opinion stating that the United States was under no obligation to allow any water to flow to Mexico because "[t]he fundamental principle of international law is the absolute sovereignty of every nation, as against all others, within its own territory."[60] This statement has since become known as the "Harmon

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[56] *Id.*

[57] *Id.* § 6.

[58] This chapter focuses primarily on the law of the allocation of transboundary freshwater for use by humans for such purposes as agriculture, industry, and municipal uses. As the discussion in § 7.04 demonstrates, international law is broader and also addresses, among other things, the protection of the ecosystems of international watercourses. This important subject is beyond the scope of this chapter. It is noteworthy, however, that the United States recognizes the importance of ecosystem protection of international rivers, and, with Canada, hopes to provide greater protection of the ecosystem of the Columbia River in the current effort to renegotiate the 1964 Columbia River Treaty. *See, e.g.*, Vaughn Palmer, "Salmon and Electricity at Centre of Columbia River Treaty Negotiations," *Vancouver Sun* (June 5, 2018).

[59] Stephen McCaffrey, *The Law of International Watercourses* 78 (2d ed. 2007) (quoting Note from Mexican Minister to U.S. Sec'y of State (Oct. 12, 1894)).

[60] *Id.* at 89 (quoting 21 Op. Att'y Gen. 274, 281 (1985) (relating to Treaty of Guadalupe Hidalgo)).

Doctrine." While now largely discredited, the Harmon Doctrine has frequently been invoked by upper riparian States.

As it turns out, the United States and Mexico did not follow Attorney General Harmon's advice, and eventually settled their differences in a 1906 convention between the United States and Mexico[61] "to provide for the equitable distribution of the waters of the Rio Grande for irrigation purposes, and to remove all causes of controversy between them in respect thereto, and [out of] considerations of international comity . . . ."[62] The convention provided that the United States would construct a reservoir near Engle, New Mexico, from which it would guarantee (with some exceptions) delivery of 60,000 acre-feet of water to Mexico annually.[63]

Nearly simultaneously, a dispute arose over the waters of the Arkansas River between Colorado and Kansas. In 1900, the Kansas Legislature authorized the Kansas Attorney General to file suit against Colorado over the Arkansas River. This was the first time that the U.S. Supreme Court had considered a complaint about the allocation of waters in a transboundary watercourse. Indeed, it may represent one of the first tribunals worldwide to do so.[64]

The Supreme Court's original jurisdiction is exclusive with regard to disputes between states.[65] The Court will exercise that jurisdiction where the case is of sufficient dignity and seriousness and there is no alternative forum.[66] The Court has said that "[t]he model case for invocation of this Court's original jurisdiction is a dispute between States of such seriousness that it would amount to a *casus belli* if the States were fully sovereign."[67]

Kansas filed its suit in 1901 seeking an injunction against further depletion of the river by Colorado after Colorado had constructed large diversion works and reservoirs in the 1890s.[68] Colorado demurred, arguing, inter alia, that Colorado should be treated as a sovereign because it

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[61] Convention Providing for the Equitable Distribution of the Waters of the Rio Grande for Irrigation Purposes, U.S.-Mex., May 21, 1906, 34 Stat. 2953.

[62] *Id.*

[63] *Id.* at art. I.

[64] The only other instances of which the author is aware are (1) *Aargau v. Zurich*, Entsch. Des Schweizerischen Bundesgerichts (1878), vol. IV, p. 34 (Swiss Federal Court); and (2) the *Helmand River Delta* arbitration, between Afghanistan and Persia, which resulted in an award on August 18, 1872, that, in part, addressed the allocation of the waters of the Helmand River. *See* McCaffrey, *supra* note 59, at 236.

[65] Judiciary Act of 1789 § 13, ch. 20, 1 Stat. 73 (codified as amended at 28 U.S.C. § 1251(a)).

[66] Mississippi v. Louisiana, 506 U.S. 73, 77 (1992).

[67] Texas v. New Mexico, 462 U.S. 554, 571 n.18 (1983).

[68] Kansas v. Colorado, 185 U.S. 125, 133–35 (1902).

> occupies toward the state of Kansas the same position that foreign states occupy toward each other, although she admits that the Constitution does not contemplate that controversies between members of the United States may be settled by reprisal or force of arms, and that to secure the orderly adjustment of such differences power was lodged in this court to hear and determine them.[69]

Colorado argued, therefore, that international law should decide the states' dispute, and that international law provides that Colorado may use all the water of the Arkansas River without regard to Kansas' needs:

> [Colorado] may absolutely and wholly deprive Kansas and her citizens of any use of or share in the waters of the river. . . . The rule of decision . . . is the rule which controls foreign and independent states in their relations to each other; that by the law of nations the primary and absolute right of a State is self-preservation; . . . that she has dominion over all things within her territory, including all bodies of water, standing or running, within her boundary lines; that the moral obligations of a state to observe the demands of comity cannot be made the subject of controversy between states; and that only those controversies are justiciable in this court which, prior to the Union, would have been just cause for reprisal by the complaining state; and that, according to international law, reprisal can only be made when a positive wrong has been inflicted or rights *stricti juris* withheld.[70]

In short, Colorado's defense was essentially the Harmon Doctrine. The Court stated it did not have sufficient information before it to decide the dispute, but it confirmed that it may apply international law. "Sitting, as it were, as an international, as well as a domestic tribunal, we apply Federal law, state law, and international law, as the exigencies of the particular case may demand . . . ."[71]

Rejecting the Harmon Doctrine, the Court concluded that facts might exist to justify its "interposition" in the dispute, and ordered that the parties submit further proofs.[72] Later, in a subsequent opinion in the same case, the Court took the opportunity to reiterate the role of international law in interstate water disputes:

> Nor is our jurisdiction ousted, even if, because Kansas and Colorado are states sovereign and independent in local matters, the relations between them depend in any respect upon principles of international law. International law is no alien in this tribunal. In The Paquete Habana, [175 U.S. 677, 700 (1900)], Mr. Justice Gray declared:
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> > "International law is part of our law, and must be ascertained and administered by the courts of justice of appropriate jurisdiction, as

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[69] *Id.* at 143.

[70] *Id.*

[71] *Id.* at 146–47.

[72] *Id.* at 144.

> often as questions of right depending upon it are duly presented for their determination."[73]

In this way, *Kansas v. Colorado* established the framework by which the Court would decide water disputes between states. The Court declared that it must "so adjust the dispute upon the basis of equality of rights as to secure as far as possible to Colorado the benefits of irrigation without depriving Kansas of the like beneficial effects of a flowing stream."[74] It thus established the principle that the U.S. Supreme Court may equitably apportion interstate waters in "case[s] of this magnitude, involving questions of so grave and far-reaching importance . . . ."[75]

A few years later, Colorado was sued by Wyoming over another interstate stream, the Laramie River. Colorado again invoked international law, and this time specifically cited the Harmon Doctrine as its defense:

> The fundamental rule that one Nation cannot exercise its sovereign power and jurisdiction over the waters or domain of another Nation without its consent and cannot expropriate the waters of an upper Nation for the use of the lower Nation by claim of prior appropriation, even on an international river, has been recognized and followed by the United States in its relations with Mexico.[76]

Colorado sought to explain away the inconvenient fact that the United States did not follow the Harmon Doctrine in the 1906 convention with Mexico by noting that the Convention itself contained language to the effect that the United States was not conceding any legal obligation to share the waters of the Rio Grande. The Court did not directly consider whether Colorado had accurately articulated international law. But it rejected Colorado's position as an articulation of U.S. federal common law:

> The contention of Colorado that she as a state rightfully may divert and use, as she may choose, the waters flowing within her boundaries in this interstate stream, regardless of any prejudice that this may work to others having rights in the stream below her boundary, cannot be maintained. The river throughout its course in both states is but a single stream wherein each state has an interest which should be respected by the other. A like contention was set up by Colorado in her answer in Kansas v. Colorado and was adjudged untenable. Further consideration satisfies us that the ruling was right.[77]

Thus, the U.S. Supreme Court refused a second time to apply the Harmon Doctrine in *Wyoming v. Colorado*. It went on to issue an injunction—the first in this context—restraining Colorado's use of water for the benefit of

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[73] Kansas v. Colorado, 206 U.S. 46, 97 (1907).

[74] *Id.* at 100.

[75] *Kansas v. Colorado*, 185 U.S. at 145.

[76] Wyoming v. Colorado, 259 U.S. 419, 1922 U.S. LEXIS 2492, at *31 (1922) (quoted language contained in case syllabus).

[77] *Id.* at 466.

a downstream state. Since these early cases, the U.S. Supreme Court has routinely exercised its original jurisdiction to resolve cases between states over interstate waters.[78]

Not long after the decision in *Wyoming v. Colorado*, an international tribunal addressed the same question of whether there is a limit to sovereignty under international law in relation to transboundary effects—in this case, from airborne pollution. The *Trail Smelter* arbitration between Canada and the United States involved transboundary air pollution from a smelter near the international border in British Columbia. Legal scholars consider the question presented in the *Trail Smelter* case to be analogous to transboundary water disputes, where actions taken entirely within the territory of one State have negative effects on another State.[79] An international arbitral tribunal was convened to determine whether the smelter was polluting the United States and, if so, what the remedy should be. The tribunal concluded that U.S. Supreme Court interstate pollution cases

> may legitimately be taken as a guide in this field of international law, for it is reasonable to follow by analogy, in international cases, precedents established by that court in dealing with controversies between States of the Union or with other controversies concerning the quasi-sovereign rights of such States, where no contrary rule prevails in international law and no reason for rejecting such precedents can be adduced from the limitations of sovereignty inherent in the Constitution of the United States.[80]

Comparing U.S. Supreme Court decisions with international law, the tribunal found that "the law followed in the United States in dealing with the quasi-sovereign rights of the States of the Union, in the matter of air pollution, whilst more definite, is in conformity with the general rules of international law."[81] The tribunal went on to examine a number of U.S. Supreme Court decisions relating to interstate pollution, including *Missouri v. Illinois*, 200 U.S. 496 (1906). It quoted from *Missouri* its citation of the proposition in the interstate water case of *Kansas v. Colorado*, 185 U.S. 125, 145 (1902), that the Court should only intervene when the case is of sufficiently "serious magnitude."[82]

The *Trail Smelter* tribunal concluded that the U.S. Supreme Court decisions it considered,

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[78]The Supreme Court's practice in this area is set forth in greater detail in John B. Draper & Jeffrey J. Wechsler, "Gunboats on the Colorado: Interstate Water Controversies, Past and Present," 55 *Rocky Mt. Min. L. Inst.* 18-1 (2009).

[79]*See* McCaffrey, *supra* note 59, at 227.

[80]Trail Smelter Case (U.S. v. Can.), Award of Mar. 11, 1941, 3 U.N. Rpts. Int'l Arb. Awards 1938, 1964 (1949).

[81]*Id.* at 1963.

[82]*Id.* at 1964 (quoting Missouri v. Illinois, 200 U.S. 496, 521 (1906)).

> taken as a whole, constitute an adequate basis for its conclusions, namely, that under the principles of international law, as well as of the law of the United States, no State has a 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.[83]

The *Trail Smelter* arbitration is notable for two reasons. First, because, when faced with the same arguments of absolute sovereignty that Colorado made to the U.S. Supreme Court in *Kansas v. Colorado* and *Wyoming v. Colorado*, it similarly found that such sovereignty is limited by the principle that one State may not unduly prejudice another through acts within its borders.

Second, it recognizes that U.S. Supreme Court interstate jurisprudence relating to water and environmental harm is addressing disputes in a sovereign-to-sovereign system that is directly analogous to the international system, and therefore may be looked to for principles of international law and the elaboration of those principles. This is equally if not more true in the area of the apportionment of transboundary watercourses. As one international legal scholar put it:

> The decisions of the United States Supreme Court in apportionment disputes between U.S. states comprise what is probably the richest body of practice in the field of equitable utilization that exists on either the national or the international level. Indeed, it seems likely that in large measure the doctrine of equitable utilization owes its very existence, as well as its fundamental meaning, to that body of decisional law.[84]

Other international adjudicators have also used U.S. jurisprudence as a guide. For example, in 1942 the *Report of the Indus Commission* effectively adopted the doctrine of equitable apportionment as elaborated by the U.S. Supreme Court for application to inter-provincial disputes in India.[85] It did so because the problems of how to ascertain the rights of States to transboundary waters where no agreements exist "appear to have arisen in recent years in the United States of America more than anywhere else

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[83] *Id.* at 1965.

[84] McCaffrey, *supra* note 59, at 244–45.

[85] *See Report of the Indus Commission* vol. I, at 12–13 (1942); *see also id.* at 10 (citing "American decisions" for "the rule of 'equitable apportionment', each unit getting a fair share of the water of the common river"). The Indus Commission described in great detail the leading U.S. Supreme Court decisions relating to interstate water and equitable apportionment. *See id.* at 32–47 (summarizing Kansas v. Colorado, 206 U.S. 46 (1907); Wyoming v. Colorado, 259 U.S. 419 (1922); Connecticut v. Massachusetts, 282 U.S. 660 (1931); New Jersey v. New York, 283 U.S. 336 (1931); Arizona v. California, 283 U.S. 423 (1931); Washington v. Oregon, 297 U.S. 517 (1936); Arizona v. California, 298 U.S. 558 (1936); Wyoming v. Colorado, 298 U.S. 573 (1936); Hinderlider v. La Plata River & Cherry Creek Ditch Co., 304 U.S. 92 (1938)).

and we may therefore turn to the decisions of the Supreme Court of that country for guidance."[86]

In 1987, the Supreme Court of Argentina decided the first dispute in that country between two provinces over a transboundary river. In *La Pampa v. Mendoza*, the Court allocated the waters of the Atuel River adopting the U.S. Supreme Court's elaboration of the principle of equitable apportionment. The court considered that it "was following precedents of international law and jurisprudence, particularly as established in the United States."[87] It found that the U.S. Supreme Court's 1984 decision in *Colorado v. New Mexico*[88] and the Supreme Court of Argentina's decision in *La Pampa* were "particularly relevant in clarifying what would be considered equitable."[89] It provided, according to those rulings, that "beneficial uses and established economies should be protected within a frame of flexible decision-making, where several factors such as climate, past uses, available volume etc. should be considered."[90]

While U.S. jurisprudence clearly influences international law in this regard, the dialogue is not entirely one-sided. For example, in *Texas v. New Mexico*,[91] the Court looked to international treaty practice relating to transboundary watercourses. The Court found that international treaty practice supported its conclusion that Texas would never have entered into an interstate compact (analogous to a treaty) with New Mexico that, as New Mexico had argued, would permit the upstream state to deny all water to the downstream state.[92] International practice showed that countries generally agree to share the waters of a transboundary watercourse.

[2] The Next Frontier—Transboundary Groundwater

Presently before the U.S. Supreme Court is an interstate dispute that may require it to undertake for the first time the allocation of groundwater in a transboundary aquifer and, as a consequence, may enunciate the principles by which such allocations are to be made.[93]

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[86] *Id.* at 32.

[87] U.N. Dep't of Technical Cooperation for Development, "Interstate Water Rights: A Case Adjudicated by the Supreme Court of Justice of Argentina," *in Int'l Rivers & Lakes Newsletter*, at 2 (May 1988) (Interstate Water Rights).

[88] 467 U.S. 310 (1984).

[89] Interstate Water Rights, *supra* note 87, at 4.

[90] *Id.*

[91] 462 U.S. 554 (1983).

[92] *Id.* at 568–69, 569 n.15 (citing the "practice in international law").

[93] *See* John B. Draper, Matthew E. Draper & Jeffrey J. Wechsler, "The Evolving Role of the Supreme Court in Interstate Water Disputes," 31-FALL *Nat. Resources & Env't* 3, 3–7 (Am. Bar Ass'n 2016).

In 2014, Mississippi filed a motion for leave to file a bill of complaint against Tennessee. The motion alleges wrongful conversion of Sparta-Sands Aquifer groundwater and trespass by Tennessee.[94] Mississippi alleges that the aquifer's water in Mississippi "[u]nder natural conditions, . . . would not leave Mississippi's groundwater storage."[95] It alleges, however, that Tennessee's pumping has caused a drawdown of groundwater in Mississippi and, as a result, some 252 billion gallons of water have been removed from Mississippi to Tennessee since 1985.[96]

Mississippi's claim is premised on the legal theory that when Mississippi became a state in 1817, it "became vested with ownership, control, and dominion over the land and waters within its territorial boundaries."[97] Mississippi contends that equitable apportionment is inappropriate because, although "[t]he geologic formation in which the groundwater is stored straddles two states," the water itself is "not a naturally shared interstate resource."[98] Tennessee argues that the applicable doctrine is that of equitable apportionment. Mississippi's claim therefore resembles the absolute ownership position that Colorado took in the early twentieth century in relation to its transboundary surface water disputes with Kansas and Wyoming. Colorado's primary argument was, like Mississippi's here, that the state is a sovereign with absolute ownership over the waters within its borders.[99]

The U.N. Watercourses Convention by its terms applies to international aquifers (unless they are "confined") as well as surface water, but this may not (or not yet) represent customary international law. The consensus among legal scholars appears to be, however, that the international law of groundwater is "at best, in the embryonic stages of development."[100] The first systematic attempt to address international groundwater was the Bellagio Draft Agreement on the Use of Transboundary Groundwaters (1989), which aimed to achieve joint, optimum utilization.[101] The International Law Commission issued Draft Articles on the Law of Transboundary

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[94] Complaint ¶ 52, Mississippi v. Tennessee, No. 143, Orig. (U.S. June 6, 2014), 2014 WL 5319728.

[95] *Id.* ¶ 14.

[96] *Id.* ¶ 26.

[97] *Id.* ¶ 8.

[98] *Id.* ¶ 41.

[99] *See, e.g.*, Kansas v. Colorado, 185 U.S. 125, 143 (1902); Wyoming v. Colorado, 259 U.S. 419, 457 (1922).

[100] McCaffrey, *supra* note 59, at 503.

[101] *See* Robert D. Hayton & Albert E. Utton, "Transboundary Groundwaters: The Bellagio Draft Treaty," 29 *Nat. Resources J.* 663 (1989).

Aquifers in 2008, which largely track the principles codified in the U.N. Watercourses Convention.[102] International tribunals have addressed groundwater as a secondary issue,[103] but have not been as squarely presented with the question of allocation as the U.S. Supreme Court is today. As a result, the U.S. Supreme Court's determination of Mississippi's claim could well influence international law relating to groundwater much as it has with its transboundary surface water allocation jurisprudence.

§ 7.06 International Law as a Source of U.S. Federal Common Law: The Duty to Cooperate with Co-Riparians

[1] Duty to Cooperate in International Law

Countries routinely cooperate to manage transboundary waters. Countries have committed themselves to almost 700 treaties dealing with transboundary waters in one way or another over the past 200 years.[104] The recent World Bank study explains why:

> Shared waters provide motivation for dialogue and cooperation between neighboring states, even in the presence of disputes over other issues. And while climate change is causing water flows to become less predictable and extreme events to be more frequent and severe, the need to manage these risks in transboundary basins can motivate high-level policy dialogue and actions both to strengthen existing agreements and to promote greater cooperation in shared basins.[105]

Cooperation is particularly required for transboundary resources. The International Court of Justice found, in relation to the Danube River, that cooperation is necessary on international waterways: "The Danube has always played a vital part in the commercial and economic development of its [nine] riparian States, and has underlined and reinforced their interdependence, making international cooperation essential. . . . Only by international co-operation could action be taken to alleviate . . . problems" relating to navigation, flood control, and environmental protection.[106] In addition, it is recognized that strong mechanisms for basin-wide cooperation can dampen the impact of future climatic or other shocks.[107]

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[102] *See* "The Law of Transboundary Aquifers," Int'l Law Comm'n, 60th Sess., U.N. Doc. A/CN.4/L.724 (May 29, 2008).

[103] *See, e.g.*, Gabčíkovo-Nagymaros Project (Hungary/Slovakia), 1997 I.C.J. 7, ¶ 40 (Sept. 25) (reduction in canal flow led to reduced groundwater levels).

[104] *See* Giordano et al., *supra* note 5, at § 4.2; § 7.04[2], *supra*.

[105] Turbulent Waters, *supra* note 30, at 30 (citations omitted).

[106] Gabčíkovo-Nagymaros Project (Hungary/Slovakia), 1997 I.C.J. 7, ¶ 17 (Sept. 25).

[107] *See* Turbulent Waters, *supra* note 30, at 30 ("In fragile contexts and those with legacies of significant tensions over transboundary waters, investment in cooperative transboundary water management could help to deescalate tensions, promote stability, and provide resilience to hydrological shocks or river developments that might otherwise act as a trigger for conflict. Cooperative efforts could include sharing information to strengthen

Sometimes cooperation is encouraged by the circumstances, so States engage each other willingly out of self-interest. For example, riparian States to a transboundary lake have a strong incentive to cooperate because any harm to them will adversely affect all riparian States including themselves. This perhaps explains why there are a great number of treaties and international commissions and other forms of cooperation in relation to international lakes. But international law recognizes that such circumstances do not always exist, which is why a general obligation to cooperate has developed under customary international law and is expressly included in treaties and reflected in State practice.

> [C]ooperation between states in relation to international watercourses is not only necessary, but is probably now required by general international law. The fact that it takes a variety of forms should not lead one to conclude that it is therefore not a genuine, independent obligation, binding on riparian states. This conclusion is reinforced by the very nature of the fundamental obligation of equitable utilization, the achievement and maintenance of which itself requires cooperation between the states concerned.[108]

The *Lake Lanoux* arbitration (France v. Spain), which involved a dispute over France's planned diversion of waters for hydroelectric power generation, recognized the existence of an obligation on upper riparian States to cooperate with other riparians when diverting from international watercourses. The tribunal found that international practice required "the States to seek, by preliminary negotiations, terms for an agreement . . . ."[109] This obligation "is incontestable and sanctions can be applied in the event . . . of an unjustified breaking off of the discussions, abnormal delay, disregard of the agreed procedures, systematic refusals to take into consideration adverse proposals or interests, and, more generally, in cases of violation of the rules of good faith."[110]

The tribunal concluded, among other things, that

> the upper riparian State, under the rules of good faith, has an obligation to take into consideration the various interests concerned, to seek to give them every satisfaction compatible with the pursuit of its own interests and to show that it

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disaster risk management and ensure environmental flow of or coordinate the operation of dam cascades; establishing institutions such are river basin organization or treaties to ensure transparency and equity in the management of shared basins; and promoting the joint planning, operation, and/or ownership of infrastructure to optimize the sustainability and productivity of the river system." (citation omitted)).

[108] McCaffrey, *supra* note 59, at 471 (footnote omitted).

[109] Lake Lanoux Arbitration (France v. Spain), Award of Nov. 16, 1957, 24 I.L.R. 101, 128, ¶ 11.

[110] *Id.* (citations omitted) (footnotes omitted).

> has, in this matter, a real desire to reconcile the interest of the other riparian with its own.[111]

Moreover, the tribunal stated that "note must be taken of the intimate connection between the obligation to take adverse interests into account in the course of negotiations and the obligation to give a reasonable place to such interests in the solution adopted."[112]

Treaty practice also reflects the duty to cooperate. The U.N. Watercourses Convention, for example, provides a "general obligation to cooperate."[113] Article 8(1) provides that "[w]atercourse States shall 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." Article 8(2) suggests, but does not require, the establishment of joint mechanisms or commissions.

Nevertheless, establishing joint mechanisms to facilitate management of international watercourses is considered best practice. A compelling example of this is the European Union's (EU) 2000 Water Framework Directive, which requires EU member States to work together to create (if they do not exist already) joint commissions on *every* international river basin in the EU.[114] The member States, in conjunction with these authorities, are to conduct joint environmental and economic analysis of the river basins and subsequently develop river basin management plans. Each plan must include a program of measures to meet the directive's environmental and other objectives.[115] These include "efficient and sustainable water use" and "controls over the abstraction of fresh surface water and groundwater, and the impoundment of fresh surface water . . . ."[116]

Requiring that all States in the EU formally cooperate, even on transboundary rivers over which there have never been any disputes, is a wise precautionary approach, particularly in an era of changing climate and increasing water demand. Indeed, this is the approach the United States takes internationally with its co-riparian neighbors, Canada and Mexico.[117]

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[111] *Id.* at 198, ¶ 1068.

[112] *Id.*

[113] U.N. Watercourses Convention, *supra* note 8, at art. 8.

[114] Directive 2000/60/EC, of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy, art. 3, 2000 O.J. (L 327) 1.

[115] *Id.* at art. 11.

[116] *Id.* at art. 11(3)(c), (e).

[117] The United States has established significant procedures for cooperation, data sharing, and joint management in its treaties concerning Canada and Mexico. *See* Treaty Between the United States and Great Britain Relating to Boundary Waters Between the United States

It is time that the United States consider doing so among its domestic interstate basins, as well.

[2] Co-Riparian Cooperation Under U.S. Federal Common Law

The recognition of an independent duty to cooperate among transboundary riparians is a relatively new development, dating from as recently as the *Lake Lanoux* arbitration in 1957.[118] In the United States, there appears to be no general legal obligation for states to cooperate. The federal government has conditioned its support of major water reclamation projects on states' entry into compacts allocating interstate rivers.[119] In addition, the U.S. Supreme Court has repeatedly exhorted states to negotiate their differences rather than resort to seeking equitable apportionments from the Court.

For example, in *New York v. New Jersey*, concerning a dispute over New Jersey's plan to discharge sewage into New York Bay, the Court stated:

> We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and growing populations living on the shores of New York Bay is one more likely to be wisely solved by co-operative study and by conference and mutual concession on the part of representatives of the states so vitally interested in it than by proceedings in any court however constituted.[120]

To encourage such cooperation, the Supreme Court, after pointedly rejecting the position of the New Jersey Attorney General that New York could have no valid legal objection to the planned discharge of sewage by New Jersey, denied New York's claims without prejudice, providing that New York could renew its suit for injunction before the Court

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and Canada, U.S.-Gr. Brit., Jan. 11, 1910, 36 Stat. 2448; Convention Providing for the Equitable Distribution of the Waters of the Rio Grande for Irrigation Purposes, U.S.-Mex., May 21, 1906, 34 Stat. 2953; Treaty Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., Feb. 3, 1944, 59 Stat. 1219.

[118] *See* § 7.06[1], *supra*. Scholars noted the need for cooperation on international waterways much earlier, of course. *See, e.g.*, Herbert A. Smith, *The Economic Uses of International Rivers* 150–51 (1931).

[119] For instance, on the Republican River, it was only once the Republican River Compact was negotiated and approved by Congress, that federal water projects in the compacting states of Colorado, Kansas, and Nebraska were approved. *See* Second Report of the Special Master (Subject: Final Settlement Stipulation) at 8, Kansas v. Nebraska, 540 U.S. 1043 (2003) (No. 126, Orig.), 2003 WL 25904173. On the Arkansas River, the storage benefits of the U.S. Army Corps of Engineers' John Martin Reservoir were threatened to be withdrawn if the states of Colorado and Kansas could not agree on allocations to each state that would later form the basis of the Arkansas River Compact. *See* Report of the Special Master Volume I at 87, Kansas v. Colorado, No. 105, Orig. (1994).

[120] 256 U.S. 296, 313 (1921).

if necessary.[121] Numerous other Supreme Court decisions have similarly urged cooperation and negotiation.[122] The complexity of water disputes and the likelihood of changed conditions in the future mean that "expert administration" is far preferable to adjudication:

> The reason for judicial caution in adjudicating the relative rights of states in such cases is that, while we have jurisdiction of such disputes, they involve the interests of quasi-sovereigns, present complicated and delicate questions, and, due to the possibility of future change of conditions, necessitate expert administration rather than judicial imposition of a hard and fast rule. Such controversies may appropriately be composed by negotiation and agreement, pursuant to the compact clause of the Federal constitution. We say of this case, as the court has said of interstate differences of like nature, that such mutual accommodation and agreement should, if possible, be the medium of settlement, instead of invocation of our adjudicatory power.[123]

The Supreme Court also expects and requires cooperation once the parties' rights are clear. For example, in *Wyoming v. Colorado*, the Court equitably apportioned the Laramie River, and addressed Wyoming's concerns that it would not have the information necessary to ensure that Colorado was abiding by the apportionment:

> The evidence bearing on this matter . . . tends to show a need for improving the means and methods of measuring the diversions, for keeping accurate and complete records thereof, and for according to the representatives of Wyoming full access to both the measuring devices and the records. Recognizing this need, Colorado in her brief assures us that through her officers she will accord to Wyoming's officers free access to the measuring devices and to the registering charts, records, and other available data, will co-operate freely with them in devising an appropriate plan for measuring the diversions, and will give full consideration to such suggestions as they may make respecting the improvement of the measuring equipment. . . . [W]e entertain the hope that the two states will by co-operative efforts accomplish a satisfactory solution of it. But we think Wyoming should have leave to apply to us for an appropriate order in the matter if the two states are unable to agree and it is found that there is real need for invoking action by us.[124]

As in *New York v. New Jersey*, the Court signaled its receptiveness to another application from Wyoming should Colorado fail to cooperate in administering the states' respective rights. Where transboundary waters have not yet been equitably apportioned there no requirement to cooperate, but the

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[121] *Id.* at 314.

[122] *See* Arizona v. California, 373 U.S. 546, 564 (1963) (encouraging settlement of interstate water dispute by "mutual accommodation and agreement" (quoting Colorado v. Kansas, 320 U.S. 383, 392 (1943); Nebraska v. Wyoming, 325 U.S. 589, 616 (1945))); Sporhase v. Nebraska, 458 U.S. 941, 960 n.20 (1982) (same); *see also* Kansas v. Colorado, 543 U.S. 86, 104 (2004) (leaving implementation of its decree to, in part, Colorado courts, "subject to the right of Kansas to seek relief under the Court's original jurisdiction").

[123] *Colorado v. Kansas*, 320 U.S. at 392 (footnotes omitted).

[124] 298 U.S. 573, 585–86 (1936).

threat of possible invocation of the U.S. Supreme Court's equitable apportionment powers has encouraged states to cooperate in the negotiation of interstate compacts.[125]

At least 19 interstate watersheds in the United States are subject to no equitable apportionment, including by interstate compact.[126] Given the risks to water resources from climate change, changing precipitation patterns, and demand, the United States would be well-advised to adopt a requirement of basin-wide cooperation similar to that of the 2000 EU Water Framework Directive. This requirement could be made through the adoption of a federal law. Alternatively, the Supreme Court could embrace it as a part of the federal common law. In any case, all U.S. states should affirmatively look to cooperate with their neighbors on transboundary waters through compacts that establish, at a minimum, procedures for exchanging information and addressing disputes.

§ 7.07 Conclusions and Recommendations

In the face of inexorably rising global water demand, diminishing supply, and the long-term disruptions due to climate change, the world is fortunate to have a more elaborate legal framework for transboundary water management and dispute resolution than it did in a century ago, when the Indus Commission complained that one hardly existed. Since then the U.N. Watercourses Convention has been drafted and entered into force, and numerous basin-specific treaties have been developed. To this day, the U.S. Supreme Court continues to develop and refine the law of transboundary water, including in unsettled areas like groundwater.

Yet much more must be done, both internationally and within states. The international community needs to quickly expand and improve its water basin management—particularly transboundary waters—if it is to avoid some of the worst effects of climate change and growing competition for water resources. In particular, it can continue to profit from considering the American experience with transboundary water management. International water management can and must benefit from advances in engineering and science that have been taking place in the United States and elsewhere. This includes hydrologic computer models, remote sensing, and satellite technology, as well as refined irrigation and moisture sensor technology. Making these technologies readily available and easy to deploy

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[125] *See, e.g.*, Kansas v. Nebraska & Colorado, 135 S. Ct. 1042, 1052 (2015) ("This Court's authority to apportion interstate streams encourages States to enter into compacts with each other.").

[126] *See* Draper & Draper LLC, "U.S. Transboundary Water Database," https://www.draperllc.com/water-disputes-map (collecting U.S. Supreme Court decisions and interstate compacts regarding the allocation of interstate waters).

and use around the world will make better water management possible. The U.S. experience with transboundary basin organizations, data sharing, and cooperation should also prove helpful.

At the same time, the United States would be wise to look to the best developments in international law and practice over the past 50 years because there is much that could help improve its transboundary water basin management. It has been 35 years since the Supreme Court last expressly did so in the context of an interstate water dispute. The international practice and law of cooperation and consultation with co-riparians has developed more in international law than it has in U.S. federal common law. Given the twin threats of increased water demand and climate change, arguably the "exigencies . . . demand,"[127] as the Supreme Court put it more than a hundred years ago, that the United States now expressly incorporate the obligation to cooperate into its law of interstate water allocation. The most practical way for this to happen is for the U.S. Congress to pass a statute requiring certain minimum levels of cooperation and information-sharing on all interstate rivers. Equally, the Supreme Court should, if faced with an appropriate circumstance, incorporate the international obligation to cooperate into the federal common law.

The protection of watercourse ecosystems is another area where the United States might benefit from looking to international principles developed over the past 50 years.[128] The U.S. Supreme Court recently took a significant step in this direction in the *Florida v. Georgia* litigation over the Apalachicola River.[129] The Court remanded the case to the Special Master to gather additional evidence to answer the question whether greater releases of water from upstream Georgia would "significantly redress the economic and *ecological harm* that Florida has suffered."[130] The Court noted there was some evidence in the record already that increased flows "could reduce harm to the [Apalachicola Region's] ecosystem and halt the cycle that is leading to irreversible harm."[131] Thus, the U.S. Supreme Court—perhaps unwittingly—may be bringing U.S. law in line with international standards relating to the protection of transboundary watercourse ecosystems.

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[127] Kansas v. Colorado, 185 U.S. 125, 147 (1902).

[128] *See* § 7.04[1][a], *supra*.

[129] 138 S. Ct. 2502 (2018).

[130] *Id.* at 2525 (emphasis added). Even the dissent agreed that "the Apalachicola River sustains a unique ecosystem" that is an "extraordinarily productive habitat for oysters and other sea life." *Id.* at 2529 (Thomas, J., dissenting).

[131] *Id.* at 2525 (majority op.) (alteration in original) (quoting Updated Pre-Filed Direct Testimony of J. David Allan).

Indeed, it may have the opportunity to elaborate them in greater detail than has occurred so far at the international level.

In short, increasing water scarcity and climate change will force the world to write the next chapter in the management of transboundary water resources. How happily that chapter ends will depend a great deal on the United States and the international community looking to each other's experiences for inspiration.