

# 1. Introduction

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## 1. INTERNATIONAL LAW AND FRESHWATER RESOURCES

Water is an omnipresent and finite resource; it cycles the planet changing between gaseous, liquid and solid state while its total quantity remains static throughout this journey. It is an essential resource for most organisms and life-forms, sustaining nature and proving vital to human life. Natural and human water demands are plentiful and any change in quantity, quality or temperature of water has an incidental effect on existing ecosystems. Humans have emerged as the species that most proactively interferes with the natural balance of aquatic ecosystems. Of the total amount of water available on Earth, the mere 1 percent that is usable by humans is amply used. Landscapes have been transformed, swamps drained and rivers regulated in order to fit the needs of human settlement. Canals and dykes have been created and reservoirs built in order to manage seasonal variations in water availability, to prevent floods and to adapt to droughts. Economic development and industrial production methods have transformed rivers temporarily into sewage channels before sewage treatment methods have been developed. Moreover, additional methods and techniques have been developed to use water ever more efficiently and to increase the amount of freshwater that is available for human use, such as through the desalination of ocean water.

The increase in demand caused by population growth and industrial development has rendered hydrologic challenges more complex. Not all water uses compete with each other and many can be satisfied simultaneously, such as the development of infrastructure that generates hydropower and that provides water for food production (irrigation) and flow regulation for navigation. Yet, consumptive water demands that utilize or transform water in a way so that it can no longer be applied to other uses stand in direct competition with each other, such as in cases where biodiversity and individuals have to make space for large infrastructure

projects. Such changes to the hydrologic balance that result from human use eventually require new methods and solutions to counter their negative medium- to long-term effects. These challenges are further compounded by the impacts of climate change on the global water cycle—precipitation patterns are changing and it is predicted that the occurrence and severity of extreme hydrologic events, such as flood and droughts, will increase significantly—requiring new adaptation strategies still. Decisions have to be made on a continuous basis about how to protect societies from negative impacts and about how to use water best: for the environment, for drinking water and food production, or for electricity production and the extraction of mineral resources and shale gas?<sup>1</sup>

Human interventions in the water flow frequently produce transboundary impacts. These international effects and the consumptive nature of certain water uses, such as water abstractions for agricultural purposes and industrial pollution, make agreements between States on the utilization of shared water resources necessary. Otherwise, multiple demands and uneven distribution of freshwater across regions may lead to tensions and disputes among States. In this context, international law helps shape the water use relations among States and between States and individuals and other non-State actors. It plays a significant role in the promotion of peaceful and orderly conduct among the various actors. International law provides a regulatory framework to address water challenges, such as the promotion of equitable access to drinking water, the mitigation and prevention of environmental degradation, consumptive economic uses and the prevention and settlement of water-related disputes. It provides principles and norms for the sustainable development and protection of this vital resource. The development of new agreements at the basin level, the codification efforts at the universal and regional level and the increasing case law of courts and tribunals dealing with water resources reveal a wind of change in the relationship between freshwater and international law.

In this water governance role, international law is subject to a number of restraints. Foremost among these are physical constraints; law acts within the limits that are set by the physical environment. In the context of international water law, hydrologic, climatic and geographic factors determine the realm within which law operates, setting the criteria to which the law and lawmakers react. Availability of accurate hydrologic and socioeconomic information and its regular exchange are vital conditions

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<sup>1</sup> Shale gas is a natural gas trapped in clastic sedimentary rock formations. Shale gas production has greatly increased as a way to diversify energy source dependency and, allegedly, as a means to reduce greenhouse gas emissions.

for this process; the more data that is available to all involved parties, the more effectively benefits and tradeoffs can be identified. Information-sharing and a common knowledge base can lead to cooperation and form a preliminary step in developing legal regimes on transboundary water resources. As a consequence, rules and international agreements are partly a result of the particular conditions and individual characteristics of the physical environment to which they apply. For instance, States that share contiguous water bodies realized early on their interdependence and thus established joint governance systems; as a consequence, the management and development of a large number of contiguous rivers and lakes are today governed by international treaties. Because water that is not available cannot be attributed, international water agreements frequently contain obligations concerning information exchange and the transmission of hydrologic data in order to avoid conflicts over use. Rules such as these, which promote effective water management, can help to overcome political constraints when States consider water a strategic resource that determines their relationship with neighboring States and also consider hydrologic information as a sensitive issue.<sup>2</sup>

The challenges of water management, hydrologic variability and increasing demand also constitute challenges for international law. International law has to react to and—in the ideal case—precipitate change; legal frameworks have to be developed that can anticipate and accommodate new demands. They need to provide mechanisms for cases of unpredicted water shocks and to anticipate situations in which water utilization rights of individual States can no longer be satisfied.

Up-to-date, international water law primarily regulates the use of transboundary water systems, meaning the use of hydrologic systems that are situated in different States and that constitute by virtue of their physical relationships a unitary whole. These include not only transboundary watercourses and connected aquifers that flow into a common terminus, but also transboundary aquifers that are not connected to surface water bodies.<sup>3</sup> Some very effective methods have been devised to promote

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<sup>2</sup> See D. Grey & D. Garrick, *Water security, perceptions and politics: the context for international watercourse negotiations*, *infra* Chapter 3.

<sup>3</sup> In this regard, the 1997 UN Watercourses Convention defines 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” and “international watercourse” as a “watercourse, parts of which are situated in different States.” Art. 2 (a), (b). The ILC Draft Articles on Transboundary Aquifers contains the following definitions: “(a) ‘aquifer’ means a permeable water-bearing geological formation underlain by a less permeable layer and the

peaceful cooperation and to prevent disputes over these transboundary waters through the establishment of joint management mechanisms that serve as platforms for dialogue among riparian States, as well as through various third-party dispute resolution mechanisms.

Yet, climate change accentuates that freshwater resources are not exclusively shared among riparian States within transboundary systems; the global water cycle connects all States and their territories, without exception. For instance, smoke and dust aerosols from the Sahara and West Africa impact cloud formation and rainfall over the Amazon basin.<sup>4</sup> International water law needs to start looking at freshwater resources as constituting a common reserve that is shared globally. Activities on one side of the planet can have significant impacts on water availability in another part of the planet. Given that differences of regional availability of water will significantly change with climate change, likely resulting in about 4 billion people living in more than 50 severely water stressed States by 2050,<sup>5</sup> international lawyers will have to direct their attention to the global character of the resource and its cycle in order to ensure satisfaction of vital water needs for all.<sup>6</sup> Legal development has to take into account the long-term uncertainty and short-term impact of climate change and hydrologic variability.

Within the limits that are set by physical, hydrologic and climatic conditions, law displays its particularity as a valuable tool that designs and structures peaceful relationships among States. Given the complex nature of water challenges and their cross-sectoral character, it is important to analyze the role of international law and its development together with

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water contained in the saturated zone of the formation; (b) 'aquifer system' means a series of two or more aquifers that are hydraulically connected; (c) 'transboundary aquifer' or 'transboundary aquifer system' means respectively, an aquifer or aquifer system, parts of which are situated in different States." Art. 2.

<sup>4</sup> H. Baars, A. Ansmann, D. Althausen, R. Engelmann, P. Artaxo, T. Pauliquevis & R. Souza, *Further evidence for significant smoke transport from Africa to Amazonia*, 38 GEOPHYSICAL RESEARCH LETTERS (2011) (cited in *Afrikas Rauch weht bis ins Amazonasbecken*, DER STANDARD, Jan. 29, 2012, available at <http://derstandard.at/1326503810859/Zehn-Tage-unterwegs-Afrikas-Rauch-weht-bis-ins-Amazonsbecken> (last visited Feb. 6, 2012)).

<sup>5</sup> UNEP/GRID-Arendal, *Increased global water stress*, UNEP/GRID-ARENDAL MAPS AND GRAPHICS LIBRARY (2009), available at <http://maps.grida.no/go/graphic/increased-global-water-stress> (last visited Feb. 6, 2012).

<sup>6</sup> See, e.g., A. Y. Hoekstra, *The Global Dimension of Water Governance: Why the River Basin Approach is no Longer Sufficient and Why Cooperative Action at Global Level is Needed*, 3 WATER 21–46 (doi: 10.3390/w30110021); C. LEB, COOPERATION IN THE LAW OF TRANSBOUNDARY WATER RESOURCES (doctoral thesis, University of Geneva, 2011), at 255-56.

insights from other water-related disciplines. The aim of the present book is to interweave legal research with contributions from other scientific fields. The opportunity for such a publication presented itself at a multidisciplinary conference organized by the Platform for International Water Law of the University of Geneva in July 2011.<sup>7</sup> This event brought together leading experts and practitioners working on a wide range of issues related to water resources management. The majority of the invited speakers at this conference and a number of other renowned water law experts agreed to contribute to the present book.

International law addresses in multiple ways the various challenges that emerge at different governance levels. Some of these challenges have been the focus of specific analysis. Firstly, water rights and access are a matter in which primarily human rights law but also other areas of international law intervene in order to address both community needs and local practices, seeking to assure access to adequate quantity and quality of water for individuals or groups of individuals and establishing specific rights in that respect (see Section 2). Secondly, the interactions of norms intervening at the local level with those adopted to govern relations at the regional and universal levels contribute to integrated solutions to transboundary water challenges (see Section 3). Thirdly, there are challenges that relate to water in its natural and economic environment. They occur where economic activity encounters limits set by the natural and hydrologic environment. Frameworks have been devised to protect the environment at the basin level, yet the legal response to challenges that emerge due to natural resource limitations at the universal level, including relative water scarcity, remains unclear and is only in the process of crystallizing (see Section 4). Finally, international law has an important role in the avoidance and settlement of water disputes that may emerge due to unilateral (rather than joint) management of transboundary water resources (see Section 5).

## 2. ACCESS TO WATER AND ITS VARIOUS FACETS

The issue of access to water and sanitation services is increasingly present on the international agenda. A significant international declaration is the UN Millennium Declaration committing States to “halve, by 2015, the proportion of the population without sustainable access to safe drinking

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<sup>7</sup> See website, available at [http://www.unige.ch/droit/eau/conferences/2011/defiEau\\_en.html](http://www.unige.ch/droit/eau/conferences/2011/defiEau_en.html) (last visited Feb. 29, 2012).

water and basic sanitation.”<sup>8</sup> While the target on access to safe drinking water is claimed to have been satisfied in advance of the 2015 deadline, the sanitation target still lags far behind and the number of people without access to basic sanitation has actually increased.<sup>9</sup> Private investments can be necessary to complement public investment in water infrastructure in order to achieve the Millennium Development Goals (MDGs).<sup>10</sup> Yet, the role of private actors in the water sector has triggered a (sometimes ideological) debate between critics and supporters of this participation.<sup>11</sup> According to critics, increasing private capital investments weaken State authority and put the target of universal access to water and sanitation at risk.<sup>12</sup> An increase in access to water requires investments in both infrastructure and institutions.<sup>13</sup> However, these aspects should not be isolated

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<sup>8</sup> See UN Millennium Declaration, A/RES/55/2 (2000).

<sup>9</sup> In 2000, the World Health Organization estimated 2.4 billion persons without access to sanitation. Currently 2.5 billion lack improved sanitation. WHO, *The Global Water Supply and Sanitation Assessment 2000*, Geneva, 2000, at 1; Joint press release, UNICEF/WHO, Millennium Development Goal drinking water target met, Geneva/New York (Mar. 6, 2012), available at [http://www.who.int/mediacentre/news/releases/2012/drinking\\_water\\_20120306/en/](http://www.who.int/mediacentre/news/releases/2012/drinking_water_20120306/en/) (last visited Mar. 13, 2012).

<sup>10</sup> UN Millennium Project, *Investing in Development. A Plan to Achieve the Millennium Development Goals* (2005), at 48–49.

<sup>11</sup> As noted in the report of the former independent expert (now special rapporteur): “Some highly visible instances of private sector participation have triggered a vigorous debate, criticism and high scrutiny over the formal private sector, focusing more on water than sanitation. On the one side, some argue that water is a public good and a unique resource essential for life and health and thus should remain in the public domain. Critics often point to instances where private sector participation is perceived to have failed, arguing that performance has been poor, agreed coverage targets have not been met, the quality of services has decreased, prices have increased substantially and that processes have not been transparent. Conversely, others argue that the private sector can contribute to the necessary investments in the sector, and thus extend coverage to currently unserved or underserved areas, as well as increase service quality and efficiency, contribute with technologies and skills and provide services at lower prices.” *Report of the independent expert on the issue of human rights obligations related to access to safe drinking water and sanitation*, UN Doc. A/HRC/15/31 (June 29, 2010) (prepared by Catarina de Albuquerque), at para. 7 (available at <http://daccess-ods.un.org/TMP/8507519.36435699.html>, last visited Feb. 27, 2012); see also Catarina de Albuquerque, *Water and sanitation are human rights: why does it matter?*, *infra* Chapter 4.

<sup>12</sup> R. Petrella, Keynote address on the occasion of the 20th Anniversary of the Flemish Environment Agency: The Future of Water, Sustainability and the Green Economy (Sept. 11, 2011).

<sup>13</sup> See D. Grey & D. Garrick, *Water security, perceptions and politics: the context for international watercourse negotiations*, *infra* Chapter 3.

from social and environmental considerations. Recent water agreements seek to balance these different elements through the prism of sustainable development.

In parallel with political commitments to improve access to water supplies and sanitation services, several international documents recognizing the right to water have been adopted.<sup>14</sup> These include the General Comment No.15 adopted by the UN Committee on Economic, Social and Cultural Rights in 2002,<sup>15</sup> the Draft Guidelines for the Realization of the Right to Water and Sanitation adopted by the Sub-Commission on the Promotion and Protection of Human Rights in 2005<sup>16</sup> and the resolutions recognizing the human rights to water and sanitation adopted by the UN General Assembly and the Human Rights Council in 2010.<sup>17</sup> Although each of these documents has a particular nature, has been adopted by distinct international bodies, and employs different language, all of them highlight States' acknowledgement that the issue of access to drinking water and basic sanitation services should be understood as a component of the legal framework of international human rights law. The emerging recognition of the right to water is not only reflected in instruments of human rights law; some treaties of the law on international watercourses also recognize this right, such as the London Protocol on Water and Health of 1999 to the 1992 Helsinki Convention,<sup>18</sup> the Charter of the Senegal Waters of 2002<sup>19</sup> and the Charter of the Niger Waters of 2008.<sup>20</sup>

The right to water is closely related to the principle of non-discrimination,<sup>21</sup> which is necessary to promote the physical and economic

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<sup>14</sup> See D. Shelton, *Water rights of indigenous peoples and local communities*, *infra* Chapter 5.

<sup>15</sup> UN Committee on Economic, Social and Cultural Rights, General Comment No. 15 on the Right to Water (Arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights), E/C.12/2002/11 (Nov. 2002).

<sup>16</sup> Sub-Commission on the Promotion and Protection of Human Rights, Draft Guidelines for the Realization of the Right to Water and Sanitation, E/CN.4/Sub.2/2005/25 (July 11, 2005).

<sup>17</sup> *The human right to water and sanitation*, UNGA A/RES/64/292 (July 28, 2010); *Human rights and access to safe drinking water and sanitation*, A/HRC/15/L.14. (September 30, 2010).

<sup>18</sup> Arts. 4, para. 2(a)-(b); Art. 6, para. 1(a)-(b).

<sup>19</sup> Arts. 4, Charte des Eaux du Fleuve Sénégal, May 2002, available at <http://bd.stp.gov.ml/padelia/pdf/CHARTEDESEAUXDUFLEUVESENEGAL.pdf> (last visited Feb. 27, 2012).

<sup>20</sup> Art. 4, Charte de l'Eau du Bassin du Niger, Apr. 30, 2008, available at [http://www.dialoguebarrages.org/dialoguebarrages/index.php?option=com\\_content&task=view&id=44&Itemid=44&lang=english](http://www.dialoguebarrages.org/dialoguebarrages/index.php?option=com_content&task=view&id=44&Itemid=44&lang=english) (last visited Feb. 6, 2012).

<sup>21</sup> See M. TIGNINO, *L'EAU ET LA GUERRE: ÉLÉMENTS POUR UN RÉGIME JURIDIQUE*

accessibility to water and sanitation for the most vulnerable or marginalized segments of the population. Vulnerable groups such as indigenous communities are more frequently at risk of discrimination with regard to access to safe drinking water and sanitation services. The experiences of the inter-American human rights system illustrate the impact of the lack of access to water and sanitation on these communities.<sup>22</sup>

The deprivation of ancestral land has a significant impact on access to water sources and other means of subsistence such as fishing and hunting. By virtue of the right to property enshrined in Article 21 of the Inter-American Convention on Human Rights, indigenous and tribal peoples have the right “to use and enjoy the natural resources that lie on and within their traditionally owned territory.”<sup>23</sup> The right to territorial property encompasses the use and enjoyment of natural resources, including water resources, and illustrates the linkages between territorial and human rights claims.

The protection of access to water is also related to the protection of health.<sup>24</sup> Yet, there are few instruments other than the 1999 Protocol on Water and Health to the 1992 Helsinki Water Convention that recognize this linkage. However, the right of individuals and peoples to safe drinking water is clearly dependent on the protection of the quality of water supplies. In this context, the World Health Assembly, the decision-making body of the World Health Organization (WHO), adopted a resolution requesting that national health strategies support the right to water and sanitation.<sup>25</sup>

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(Collection de l'Académie de droit international humanitaire et droits humains, Bruylant, Brussels, 2011).

<sup>22</sup> See D. Shelton, *Water rights of indigenous peoples and local communities*, *infra* Chapter 5.

<sup>23</sup> For the Inter-American Court, indigenous peoples' members' “right to use and enjoy their traditionally owned lands necessarily implies a similar right with regards to the natural resources that are necessary for their survival.” *Case of the Saramaka People v. Suriname*. Preliminary Objections, Merits, Reparations and Costs, Inter-Am. C.H.R., Series C No. 172, Judgment of Nov. 28, 2007, at subtitle D, para. 141.

<sup>24</sup> The World Health Organization (WHO) has adopted the Guidelines for drinking-water quality, which are “intended to be used as a basis for the development of national standards that, if properly implemented, will ensure the safety of drinking water supplies through the elimination of, or reduction to a minimum concentration, of constituents of water that are known to be hazardous to health.” *General Comment No. 15*, at n.15.

<sup>25</sup> The resolution urges States: “to ensure that national health strategies contribute to the realization of water- and sanitation-related Millennium Development Goals while coming in support to the progressive realization of the human right to

The issue of access to water and water rights moreover includes aspects related to public participation and access to information.<sup>26</sup> Regarding the right to water, for example, the concerned individuals and groups must be able to participate in decision-making processes and should be given access to information on water, water services and the environment held by public authorities or third parties.<sup>27</sup> Water rights include issues of not only access to water services, but also decision-making powers and access to justice and reparation.<sup>28</sup> This latter access is necessary in order to effectively implement the water rights of individuals and peoples. An example may be used to illustrate this. In the case of the Marlin Mining Project in Guatemala, residents of the local community of Sipacapa first filed a complaint concerning the mine with the International Finance Corporation's (IFC) Office of Compliance Advisor/Ombudsman (CAO), alleging that the Marlin gold mine was "developed without adequate consultation and in violation of the rights of indigenous people."<sup>29</sup> In 2010, local communities and non-governmental organizations followed this action by submitting petitions to both the International Labour Organization (ILO),<sup>30</sup> under Convention No. 169, and the Inter-American Commission on Human Rights, alleging water contamination from the mine. Both the ILO and the Commission called on the government to suspend the mining

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water and sanitation that entitles everyone, without discrimination, to water and sanitation that is sufficient, safe, acceptable, physically accessible and affordable for personal and domestic uses." Sixty-Fourth World Health Assembly, WHA 64.24, Item 13.15, May 24, 2011.

<sup>26</sup> See D. Shelton, *Water rights of indigenous peoples and local communities*, *infra* Chapter 5.

<sup>27</sup> General Comment No. 15, at para. 48. See Principle 10 of the 1992 Rio Declaration on Environment and Development, Report of the United Nations Conference on Environment and Development, Annex I, UN Doc. A/CONF.151/26 (Vol. I).

<sup>28</sup> See D. Shelton, *Water rights of indigenous peoples and local communities*, *infra* Chapter 5.

<sup>29</sup> See D. Shelton, *Water rights of indigenous peoples and local communities*, *infra* Chapter 5. Office of the Compliance Advisor/Ombudsman, International Finance Corporation/Multilateral Investment Guarantee Agency, Assessment of a complaint submitted to CAO in relation to the Marlin Mining Project in Guatemala (Sept. 7, 2005). The CAO found that Glamis had "interacted extensively" with local communities, but the information prepared by the company—including the environmental and social impact assessments—did not allow for an informed view of the likely adverse impacts of the project.

<sup>30</sup> See D. Shelton, *Water rights of indigenous peoples and local communities*, *infra* Chapter 5. Report of the Committee of Experts on the Application of Conventions and Recommendations (Arts. 19, 22 and 35 of the Constitution), International Labour Conference, 99th session (2010), at 769–71.

operation pending a full evaluation of the complaints.<sup>31</sup> This case illustrates that various international mechanisms may intervene in the protection of the right to water and that States have to ensure that activities of the private sector (e.g., mining operations or other industrial and agricultural activities) do not cause harm to human health or the environment of local communities.

The use of rivers and lakes as boundaries may equally raise issues related to water rights of individuals and peoples.<sup>32</sup> For example, in the delimitation of land boundaries, an international tribunal may have to face both territorial and human claims regarding access to water resources. Rivers and lakes have historically provided a clear and obvious geographic feature to mark the boundary between the territories of two or more States. The use of waterways as territorial boundaries raises complexities not attached to other land-based or even maritime boundaries. Human intervention and natural phenomena can both contribute to the ongoing transformation of the underlying hydro-morphology of international rivers and lakes; political boundaries may change as a consequence. Shared bodies of water, no less than domestic waters, often have a role in irrigation, transportation, communication, hydropower and fishing, not to mention numerous household and community uses. As a consequence, in the context of disputes surrounding boundaries along or near water sources, States have attached high priority to resource questions going well beyond strictly delimiting the geographical extent of sovereignty. In regions with scarce water resources, traditional arrangements for water allocation have been taken into account. Examples are found in the protection of customary rights of the local people to have access to the waters of the rivers,<sup>33</sup> as well as in the protection of grazing and agriculture rights.<sup>34</sup> Human rights, par-

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<sup>31</sup> See D. Shelton, *Water rights of indigenous peoples and local communities*, *infra* Chapter 5. *Communities of the Maya People (Sipakepense and Mam) of the Sipacapa and San Miguel Ixtahuacán Municipalities in the Department of San Marcos, Guatemala*, Inter-Am C.H.R., Annual Report 2010, 35, OEA/Ser.L/V/II, PM 260-07, Doc. 5, rev. 1 (Mar. 7, 2011), at Ch. III, para. 35.

<sup>32</sup> See M.G. Kohen & M. Tignino, *Do people have rights in boundaries' delimitations?*, *infra* Chapter 6.

<sup>33</sup> The Commission charged with delimiting the boundaries between Eritrea and Ethiopia, after having decided that river boundaries should be determined by reference to the location of the main channel during the dry season, held that: “[r]egard should be paid to the customary rights of the local people to have access to the river.” *Decision Regarding Delimitation of the Border between the State of Eritrea and the Federal Democratic Republic of Ethiopia*, Eritrea-Ethiopia Boundary Commission, 41 *ILM* 1057 (Apr. 13, 2002), at 1116, para. 7.3.

<sup>34</sup> Grazing and agriculture rights held by the inhabitants of one State on the

ticularly by way of the human right to water, provide an additional legal basis supporting the rights of individuals to use shared water resources in border areas.

### 3. INTEGRATED SOLUTIONS THROUGH MULTILEVEL APPROACHES

At the international level, bilateral, regional and universal frameworks interact and address transboundary water challenges in a comprehensive manner. The agreements, concluded at different levels, may nurture each other and provide mutual feedback with respect to the content of their norms.<sup>35</sup> For example, the principles and rules codified in the United Nations Convention on the Law of the Non-navigational Uses of International Watercourses (hereinafter “UN Watercourses Convention”)<sup>36</sup> and the 2008 Draft Articles on the Law of Transboundary Aquifers are based on not only State practice and earlier treaties, but also regional and local realities. At the same time, both instruments offer a frame of reference for the development of more specific instruments addressing the specificities of individual basins. Analyzing the current legal framework, it can be argued that transboundary water resources are subject to a multi-governance normative and institutional framework. These various levels of governance are often mutually compatible as well as complementary.

The codification of norms at the universal level that resulted in the adoption of the UN Watercourses Convention and the 2008 Draft Articles also underlined the importance of cooperation on transboundary waters in order to achieve equity. These two instruments not only recognize cooperation as one of the general principles of international water law, but they

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land of neighboring States have also been recognized in international practice, including in the *Kasikili/Sedudu Island* case concerning the rights of the Masubia tribe over the island of Kasikili-Sedudu in the Chobe River. The Court recognized that it was “not uncommon for the inhabitants of border regions in Africa to traverse such borders for purposes of agriculture and grazing, without raising concern on the part of the authorities on either side of the border.” *Kasikili/Sedudu Island (Botswana/Namibia)*, 1999 I.C.J. (Dec. 13), at para. 64.

<sup>35</sup> See L. Boisson de Chazournes, *Freshwater and International Law: The Interplay between Universal, Regional and Basin Perspectives*, UN WORLD WATER ASSESSMENT PROGRAMME INSIGHTS (2009).

<sup>36</sup> See L. Caflisch, *The law of international watercourses: achievements and challenges*, *infra* Chapter 2.

also inspire cooperation.<sup>37</sup> The Convention and previous drafts developed by the International Law Commission served as reference documents for a number of agreements adopted at the basin level, such as the 1995 Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin,<sup>38</sup> the 2000 Revised Protocol on Shared Watercourses of the Southern African Development Community<sup>39</sup> and, more recently, the 2008 Niger Basin Water Charter<sup>40</sup> and the 2010 Guaraní Aquifer Agreement.<sup>41</sup> At the same time, State cooperation in the negotiation of regional and basin instruments informed the codification of universal norms on their part. The 1992 UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (hereinafter “1992 UNECE Water Convention”)<sup>42</sup> and basin agreements such as the 1969 Treaty of the River Plate Basin,<sup>43</sup> 1972 Convention relating to the Statute of the Senegal River,<sup>44</sup> 1978 Treaty for Amazonian Cooperation<sup>45</sup> and the first Genevese Aquifer Agreement of the same year have all contributed to the identification of rules codified at the universal level.

Cooperation between the Canton of Geneva and French authorities to resolve a problem of a dropping groundwater level in the Genevese aquifer, brought about by over-pumping, demonstrated that where technical solutions are supported through cooperative legal frameworks, sustainable solutions can be achieved.<sup>46</sup> During the 1960s and 1970s, over-pumping

<sup>37</sup> See S. McCaffrey, *The codification of universal norms: a means to promote cooperation and equity?*, *infra* Chapter 7.

<sup>38</sup> Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, Apr. 5, 1995, 34 ILM 864 (1995).

<sup>39</sup> Community website, available at <http://www.sadc.int/index/browse/page/159>.

<sup>40</sup> La Charte de l'Eau du Bassin du Niger, Apr. 30, 2008, available at [http://www.dialoguebarrages.org/dialoguebarrages/index.php?option=com\\_content&task=view&id=44&Itemid=44&lang=english](http://www.dialoguebarrages.org/dialoguebarrages/index.php?option=com_content&task=view&id=44&Itemid=44&lang=english) (last visited Feb. 6, 2012).

<sup>41</sup> Acuerdo sobre el Acuífero Guaraní, Aug. 2, 2010, available at [http://internationalwaterlaw.org/documents/regionaldocs/Guarani\\_Aquifer\\_Agreement-Spanish.pdf](http://internationalwaterlaw.org/documents/regionaldocs/Guarani_Aquifer_Agreement-Spanish.pdf) (last visited Feb. 6, 2012); see also L. del Castillo-Laborde, *The Guaraní Aquifer Framework Agreement* (2010), *infra* Chapter 11.

<sup>42</sup> Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Mar. 17, 1992, 31 ILM 1312. See also A. Tanzi, *Regional contributions to international water cooperation: the UNECE contribution*, *infra* Chapter 9.

<sup>43</sup> Treaty of the River Plate Basin, Apr. 23, 1969, 875 UNTS 11.

<sup>44</sup> Convention relating to the Statute of the Senegal River, Mar. 11, 1972, in BASIC DOCUMENTS OF AFRICAN REGIONAL ORGANIZATIONS, VOL. III (Oceana, New York, 1973); LEX-FAOC016004, available at <http://faolex.fao.org>.

<sup>45</sup> Treaty for Amazonian Cooperation, July 3, 1978, 1202 UNTS 71.

<sup>46</sup> See G. de los Cobos, *Transboundary water resources and international law*:

lowered the groundwater level by more than 7 meters, thereby depleting about one-third of total groundwater storage over a period of 20 years. In parallel with technical and scientific studies that were being undertaken to study options for the artificial recharge of the aquifer, French and Swiss authorities negotiated a joint management agreement. The establishment of a cross-border committee allowed for the identification of the roles and responsibilities of each side and determined the financial modalities governing the use of the resource. The agreement that was signed in 1978 was revised and enhanced in 2007, attesting to the success of the joint management plan. The Franco-Swiss experience also highlights the importance of information exchange obligations and the establishment of joint mechanisms, and contributed to the elaboration of the 2008 Draft Articles on the Law of Transboundary Aquifers.<sup>47</sup>

In this dynamic process of interaction and cooperation, legal frameworks contribute to integrated approaches in addressing water management challenges. They work towards the equitable use of water and equitable sharing of the benefits that derive from it. Experience demonstrates that States cooperate where the benefits of cooperation are expected to be greater than the benefits of non-cooperation.<sup>48</sup> An important factor is that potential benefits are known to the actors involved. Hence, water management approaches that promote the concept of benefit-sharing focus on the identification of joint opportunities to increase benefits first, including the feasibility of the various implementation options and possible roadblocks.<sup>49</sup> In international river basins where greater benefits can be derived from joint development of water resources across the basin than from quantitative allocation of water to individual States for unilateral management, cooperative regimes emerged. More than 40 years of successful cooperation on the Senegal River basin attest to this; the basin is a unique case of basin-wide cooperation based on the concept of benefit-sharing.<sup>50</sup> A joint formula of sharing has been developed so that all four riparian States

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*the example of the aquifer management of the Geneva region (Switzerland and France), infra Chapter 10.*

<sup>47</sup> *Second Report on Shared Natural Resources: Transboundary Groundwaters*, A/CN. 4/539/Add.1 (Apr. 12, 2004) (prepared by Chusei Yamada, Special Rapporteur), at paras. 12–16.

<sup>48</sup> See J. Granit & M. Claassen, *A scalable approach towards realizing tangible benefits in transboundary river basins and regions*, *infra Chapter 8*.

<sup>49</sup> *Id.*

<sup>50</sup> See M.M. Mbengue, *The Senegal River legal regime and its contribution to the development of the law of international watercourses in Africa*, *infra Chapter 12*; see also W.H. Yu, *Benefit Sharing in International Rivers: Findings from the Senegal River Basin, the Columbia River Basin, and the Lesotho Highlands Water*

benefit from hydropower production, irrigation benefits and upstream watershed management, irrespective of whether those benefits are generated in their own territory. An integrated basin approach was adopted: the formula distributes the benefits that are generated from the basin equitably among all four basin States. A series of agreements provide the enabling legal framework for this cooperative arrangement, having established principles of water management such as priority satisfaction of vital human water needs across the basin, joint management mechanisms and joint ownership of key infrastructure assets.

The adoption of a series of complementing legal instruments also accounts for the strength and integrated approach of the UNECE legal framework on water. This framework is characterized by a series of regional conventions that are directly or indirectly related to water management, on the one hand, and by a dynamic system of instruments adopted under the “umbrella” of the 1992 UNECE Water Convention, on the other hand.<sup>51</sup> This latter Convention interacts with other UNECE Conventions that were adopted at the regional level to, *inter alia*, prevent transboundary pollution,<sup>52</sup> ensure the implementation of environmental impact assessments<sup>53</sup> and accord to individuals and civil society certain rights and possibilities for public participation and access to justice.<sup>54</sup> These other Conventions are important for (but not limited to) equitable and sustainable water management. At the same time, the 1992 UNECE Water Convention itself is a dynamic regime: the Convention bodies, the Meeting of the Parties and the Secretariat contribute to its evolution through the adoption of implementation guidelines and other instruments. These documents advise States on the detailed process to achieve the Convention’s objectives. Pursuant to this, an Implementation Committee<sup>55</sup>

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*Project* (Africa Region Water Resources Unit Working Paper 1, World Bank, Washington, 2008).

<sup>51</sup> See A. Tanzi, *Regional contributions to international water cooperation: the UNECE contribution*, *infra* Chapter 9.

<sup>52</sup> UNECE Convention on the Transboundary Effects of Industrial Accidents, Mar. 18, 1992, 2105 UNTS 457.

<sup>53</sup> UNECE Convention on Environmental Impact Assessment in a Transboundary Context, Feb. 26, 1991, Espoo (Finland), 1989 UNTS 309.

<sup>54</sup> UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, adopted June 25, 1998, 2161 UNTS 447.

<sup>55</sup> The decision on the establishment of this unique mechanism will be taken by the sixth session of the Meeting of the Parties to the Water Convention, to be held in Rome, Italy, from Nov. 28–30, 2012. UNECE Press Release (Feb. 3, 2012), available at <http://www.unece.org/index.php?id=28823> (last visited Feb. 10, 2012).

will be established to facilitate external assistance, technology transfer and capacity-building for those State Parties that require assistance. Protocols to the 1992 UNECE Water Convention additionally enhance the framework's scope: the 1999 Protocol on Water and Health established a bridge between national and transboundary water management and to the Member States' human rights obligations with respect to water and health; the Protocol on Civil Liability,<sup>56</sup> once ratified, will establish a comprehensive regime on civil liability for transboundary effects of industrial accidents; and a 2003 amendment<sup>57</sup> aimed to give the Convention a wider geographic scope, opening it up to accession by non-UNECE Member States.<sup>58</sup>

The UNECE legal framework for water management is a valuable case study for analysis because it addresses water management and its inter-linkages with other areas in an integrated manner. Comprehensive frameworks such as this, where the interdependence of the various water-related sectors is recognized, are necessary to capture and equitably share the large variety of benefits that can be derived from adequate resource management, as well as to reduce the costs that occur due to natural and human-induced water emergencies.

#### 4. WATER IN ITS NATURAL AND ECONOMIC ENVIRONMENT

As outlined earlier, water is a resource that transcends all aspects of human livelihoods and the natural environment. Water is the lifeblood of the human environment; the healthier our environment, the cleaner the water that can be drawn directly from it. Hence, environmental protection is of vital importance to guarantee access to clean water in the long term. Over the course of time, and in particular over the last four decades, international instruments have increasingly been employed as tools to establish a balance between human needs for economic development

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<sup>56</sup> Protocol on Civil Liability, adopted May 12, 2003, *available at* <http://www.unece.org/env/civil-liability/welcome.html> (last visited Feb. 10, 2012).

<sup>57</sup> The amendment has not yet entered into force (as of Feb. 2012). Its text is *available at* <http://www.unece.org/env/water/text/text.html> (last visited Feb. 10, 2012).

<sup>58</sup> L. Boisson de Chazournes, *Sur les rives du droit international de l'eau: entre universalité et particularismes*, in LA PROMOTION DE LA JUSTICE, DES DROITS DE L'HOMME ET DU RÈGLEMENT DES CONFLITS PAR LE DROIT INTERNATIONAL, LIBER AMICORUM LUCIUS CAFLISCH 685–700 (M. Kohen ed., Koninklijke Brill NV, Leiden, 2007).

and environmental needs. At the universal level, the Declaration on the Human Environment<sup>59</sup> adopted in Stockholm in 1972 marks a starting point for this trend. Subsequent Declarations, including the 1992 Rio Declaration on Environment and Development<sup>60</sup> and the 2002 Johannesburg Declaration on Sustainable Development,<sup>61</sup> reassert this need for balance. In international water law this trend was also picked up; since the late 1980s, a proliferation of treaties and rules protecting hydrologic ecosystems and the riverine environments can be observed. These agreements complement earlier treaties concerning economic uses of water, such as navigation and hydroelectricity production, by establishing restrictions on these uses for the benefit of the natural environment. The water treaties concluded between the riparian States of the Danube River equally reflect this trend: the overwhelming majority of agreements concluded between 1920 and 1990 concern infrastructure development for navigation and hydroelectricity production, as well as for flood and ice damage control. In contrast, the large majority of treaties concluded since 1990 focus on the protection of the shared waters and the ecosystem, and seek to achieve sustainable use thereof. Most notable among these are the 1994 Danube Protection Convention and the 2002 Framework Agreement on the Sava River Basin.<sup>62</sup>

Multilateral environmental agreements (MEAs) such as the 1971 Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) and the 1992 Convention on Biological Diversity also contribute to the protection of water ecosystems. By focusing on the maintenance of water quality for wetlands and the protection of biodiversity resources, these instruments are essential tools to ensure that hydrologic ecosystems continue to perform their water purification functions, groundwater recharge and flood control.<sup>63</sup>

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<sup>59</sup> Report of the United Nations Conference on the Human Environment, United Nations publication, Sales No. E.73.II.A.14 and corrigendum, Stockholm (June 5–16, 1972), at chap. 1.

<sup>60</sup> Report of the United Nations Conference on Environment and Development, Annex I, Vol. I, UN Doc. A/CONF.151/26.

<sup>61</sup> Report of the World Summit on Sustainable Development, Annex, UN Doc. A/CONF.199/20.

<sup>62</sup> Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention), adopted June 29, 1994 ('Danube Treaty'), available at <http://www.icpdr.org/icpdr-pages/drpc.htm>; Framework Agreement on the Sava River Basin, adopted Dec. 3, 2002, available at <http://www.savacommission.org>.

<sup>63</sup> L. Boisson de Chazournes, C. Leb & M. Tignino, *Environmental and Access to Water: the Challenges Ahead*, in *THE RIGHT TO WATER AND WATER RIGHTS IN A*

In addition to these environmental aspects, the rules of international water law have also been enhanced with regard to procedure.<sup>64</sup> Rules such as the obligations to exchange information and to notify concerned States of planned measures ensure that those States are informed about potentially harmful impacts to their interests and negative effects on the hydrologic ecosystem. In particular, the obligation to notify planned measures experienced significant enhancement when the International Court of Justice (ICJ) recognized in its decision on the *Pulp Mills Case* that the execution of an environmental impact assessment (EIA) is a requirement under “general international law,” and that potentially affected parties must be notified of an EIA prior to the implementation of planned measures.<sup>65</sup> This clarification of rules manifests that, in international water law, environmental protection and the water needs of nature are considered tantamount to human water needs for domestic and economic uses. Moreover, in this decision the ICJ underlined the importance of “vigilance” and “prevention” in order to ensure the “preservation of the ecological balance, since the negative impact of human activities on the waters of the river may affect other components of the ecosystem of the watercourse such as its flora, fauna, and soil.”<sup>66</sup> The Court hence reasserts its earlier dictum that

the environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn. The existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment.<sup>67</sup>

Water as a natural resource is also at issue in the interaction of different areas of international law, more specifically at the crossroads of international water law with trade law.<sup>68</sup> Trade agreements do not usually contain

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CHANGING WORLD 9–24 (M.R. Van der Valk & P. Keenan eds., UNESCO-IHE, Delft, 2011).

<sup>64</sup> See O. McIntyre, *The contribution of procedural rules to the environmental protection of transboundary rivers in light of recent ICJ case law*, *infra* Chapter 13.

<sup>65</sup> *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, 2010 I.C.J. (Apr. 20), at paras. 119, 204, available at <http://www.icj-cij.org/docket/files/135/15877.pdf>.

<sup>66</sup> *Id.* at para. 188.

<sup>67</sup> *Gabčíkovo-Nagyymaros Project (Hungary/Slovakia)*, 1997 I.C.J. (Sept. 25), at para. 53; *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 I. C. J. (Advisory Opinion of July 8), at para. 29.

<sup>68</sup> V. Hughes & G. Marceau, *WTO and trade in natural resources*, *infra* Chapter 14.

regulations specifically on water; however, they do provide some exceptions for natural resources use and essential products, such as Articles XI and XX of the 1994 General Agreement on Tariffs and Trade (GATT), which may find application with respect to water. The first (Article XI) allows temporary export restrictions in case of critical shortage of essential goods, while the second (Article XX) permits certain measures to protect exhaustible natural resources. Within regional trade agreements such as the 1992 North American Free Trade Agreement (NAFTA), Canada, Mexico and the United States have adopted a joint statement providing that: “The NAFTA creates no rights to the natural water resources of any Party to the Agreement [ . . . ] And nothing in the NAFTA would oblige any NAFTA Party to either exploit its water for commercial use, or to begin exporting water in any form.”<sup>69</sup> The objective of this statement was to dispel any doubt about whether trade rules—either universal or national—could accord rights with regard to natural water resources.

The concept of “virtual water” also illustrates the intersection with trade law. Through trade in finalized products and agricultural produce, water can be transferred from water-rich to water-poor regions.<sup>70</sup> Water-poor States can “acquire water resources” by leasing or buying farmland elsewhere. These investments, which are also referred to as land-grabs, often follow commercial objectives involving private investors that seek to increase agricultural production for trade on the world market. When they are made in developing countries, they may lead to additional beneficial effects such as knowledge and technology transfer. However, experience shows that these investments do not always have such beneficial outcomes—for instance, they have not always led to an improvement in the livelihoods of the local population—and can therefore be problematic.<sup>71</sup> Virtual water and land transfers are legally complex affairs because they touch on different areas of law: property law, investment law, trade law and human rights. For the time being, foreign investment in agricultural lands and the abstraction of water through agricultural production and subsequent export of “virtual water” (contained in agricultural produce) has not yet been challenged in international dispute settlement procedures. At the current stage of legal

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<sup>69</sup> Joint Statement by the Governments of Canada, Mexico and the United States (1993), *reprinted in* E. BROWN WEISS, L. BOISSON DE CHAZOURNES, N. BERNASCONI-OSTERWALDER, *FRESH WATER AND INTERNATIONAL ECONOMIC LAW* 443 (Oxford University Press, Oxford, 2005).

<sup>70</sup> See E. Hey, *Virtual water, “land grab” and international law*, *infra* Chapter 15.

<sup>71</sup> See B. Yimer, *Competing water use in large-scale commercial farms: Ethiopia*, *infra* Chapter 16.

development, it is difficult to predict on which legal basis, in which forum, and how such a dispute would be decided. One of the possible *fora* to bring a dispute could be the “problem-solving” and investigation mechanisms of international financial institutions (IFIs).<sup>72</sup> Mechanisms such as the CAO of the IFC, the Independent and Consultation Investigation Mechanism (ICIM) of the Inter-American Development Bank and the Independent Review Mechanism (IRM) of the African Development Bank can provide a direct channel of communication between local populations and the IFIs’ highest levels of decision-making.

## 5. AVOIDING AND SETTLING WATER DISPUTES

Investigation mechanisms may also be of help in the prevention and settlement of water-related disputes. In this regard, mention should be made of the World Bank Inspection Panel. This mechanism operates as a fact-finding body that addresses the concerns of people affected by projects funded by the World Bank when the latter does not comply with its own policies for project planning and implementation. The Yacyretà hydroelectric project provides a useful example that illustrates the approach taken by the Inspection Panel to deal with consultation with affected communities, access to information and plans for the resettlement and compensation of all those affected.<sup>73</sup>

States resort to a variety of dispute settlement mechanisms to solve water disputes; they include diplomatic and judicial mechanisms. Both methods have proven effective in settling water disputes and in assisting in re-establishing cooperation on transboundary water resources among the concerned parties. Among judicial dispute settlement procedures, the ICJ and its predecessor, the Permanent Court of International Justice (PCIJ), have played a significant role in promoting equitable and sustainable use of transboundary water resources.<sup>74</sup>

The judicial settlement of water disputes emphasizes the challenge of finding ways to strengthen the integration of scientific experts in water dispute resolution procedures. As the number of water-related cases of

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<sup>72</sup> See E. Hey, *Virtual water, “land grab” and international law*, *infra* Chapter 15.

<sup>73</sup> See E. Brown Weiss, Manley O. Hudson Medal Lecture for ASIL Proceedings of the 104th Annual Meeting: On Being Accountable in a Kaleidoscopic World (2010), at 487.

<sup>74</sup> See A.S. Al-Khasawneh, *Do judicial decisions settle water-related disputes?*, *infra* Chapter 17.

international litigation is growing, it is important to devise procedures that address technical aspects more effectively and make more efficient use of scientific expertise. The fact-finding capacities of international tribunals and courts should be enhanced through more frequent involvement of scientific experts, in particular where technical and scientific questions concerning natural resources management are at issue. In fact, when a dispute concerns preventative measures, alleging the conjectural risk of a future injury may lead to evidentiary problems in demonstrating the likelihood of potential damages. The *Gabčíkovo-Nagymaros* and the *Pulp Mills* cases highlighted the important role of scientific expertise and evidence in settling water disputes.<sup>75</sup> States Parties to these disputes have supported their claims with a variety of scientific studies to assess the ecological impacts of planned uses of water resources.<sup>76</sup>

Beyond judicial methods, diplomatic dispute resolution mechanisms have helped to prevent and solve water disputes. Mediation is among these mechanisms. In contrast to adversary proceedings, mediation is a process controlled by the parties and aims to create mutually acceptable solutions. This method can start with good offices providing parties with a channel of communication and then can involve a more proactive approach that includes a proposal to resolve the dispute made by the mediator.<sup>77</sup> In many cases the third party mediator can bring additional technical and scientific expertise. For instance, mediation efforts of the World Bank succeeded in the resolution of the Indus waters dispute and resulted in the signature of the Indus Water Treaty by India and Pakistan in 1960. On the other hand,

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<sup>75</sup> In the *Gabčíkovo-Nagymaros* case, the Hungarian Academy of Sciences studied the hydrological and seismological impacts of abandoning or implementing the Nagymaros project of the Gabčíkovo-Nagymaros Barrage System. *Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, 1997 I.C.J. (Sept. 25), at para. 35. In the *Pulp Mills* case, the Court noted that: “Both Argentina and Uruguay have placed before the Court a vast amount of factual and scientific material in support of their respective claims. They have also submitted reports and studies prepared by the experts and consultants commissioned by each of them, as well as others commissioned by the International Finance Corporation in its quality as lender to the project. Some of these experts have also appeared before the Court as counsel for one or the other of the Parties to provide evidence.” *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, 2010 I.C.J. (Apr. 20), at para. 165; see also, *id.* (Separate Opinion of Judges Al-Khasawneh and Simma), at para. 8.

<sup>76</sup> See P. Sands, *Water and International Law: Science and Evidence in International Litigation*, 22 ELM 151 (2010), available at <http://www.lawtext.com/pdfs/sampleArticles/ELM-22-4text-SANDS151-161FINAL18102010.pdf> (last visited Feb. 28, 2012).

<sup>77</sup> See S.M.A. Salman, *Mediation of international water disputes—the Indus, the Jordan and the Nile Basin interventions*, *infra* Chapter 18.

the mediation of the personal representative of US President Eisenhower, Mr. Eric Johnston, did not succeed in the case of the Jordan River dispute in 1953–55. The main reason for the failure of Johnston's mediation efforts was that the Jordan River dispute was interwoven in the larger Arab-Israeli conflict and Palestinian rights issues.<sup>78</sup> This contrasts with the Indus waters dispute, wherein both India and Pakistan agreed that the Indus waters dispute had to be considered separately from other disputes between them, such as the territorial claims over the Kashmir region.<sup>79</sup>

The role and the strengthening of powers of joint institutional mechanisms also need to be given significant attention when analyzing dispute avoidance and settlement mechanisms.<sup>80</sup> In fact, relevant ICJ decisions have emphasized the role of joint commissions in the re-establishment of cooperation when they are in place. This is illustrated by the *Land and maritime boundary dispute between Cameroon and Nigeria* and the *Pulp Mills* cases.<sup>81</sup>

A further challenge is related to the role of dispute avoidance and settlement mechanisms and the maintenance of international peace and security.<sup>82</sup> In the boundary dispute between Cameroon and Nigeria, the ICJ dealt with the role of the Lake Chad Commission put into place by the Convention and Statutes relating to the Development of the Chad Basin, adopted in 1964. It is interesting to note that the Court rejected the Nigerian argument that “the role and Statute of the Commission” must be understood “in the framework of regional agencies” referenced in Article 52 of the UN Charter.<sup>83</sup> The Court noted that: “[w]hatever their nature, the existence of procedures for regional negotiation cannot prevent the

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<sup>78</sup> See C. Bourne, *Mediation, Conciliation and Adjudication of International Drainage Basins Disputes*, 9 CANADIAN YEARBOOK OF INTERNATIONAL WATER LAW 203 (1971).

<sup>79</sup> See A.A. MICHEL, *THE INDUS RIVER—A STUDY OF THE EFFECTS OF PARTITION* (Yale University Press, 1967), at 225.

<sup>80</sup> See C. Leb & M. Tignino, *State succession to water treaties: uncertain streams*, *infra* Chapter 20.

<sup>81</sup> *Case concerning the land and maritime boundary between Cameroon and Nigeria (Cameroon v. Nigeria)*, Preliminary Objections, 1998 I.C.J. (Judgment of June 11), at paras. 64–65; *Case concerning the land and maritime boundary between Cameroon and Nigeria (Cameroon v. Nigeria: Equatorial Guinea intervening)*, 2002 I.C.J. (Judgment of Oct. 10, 2002), at paras. 36, 53; *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, 2006 I.C.J. (Order on the Request for the indication of provisional measures of July 13, 2006), at paras. 80–82; *id.*, 2010 I.C.J. (Judgment of Apr. 20), at paras. 86–93.

<sup>82</sup> See M. Tignino, *Water, International Peace and Security*, 879 INTERNATIONAL REVIEW OF THE RED CROSS 647–74 (2010).

<sup>83</sup> *Cameroon v. Nigeria*, Preliminary Objections (1998), at para. 66.

Court from exercising the functions conferred upon it by the Charter and the Statute.”<sup>84</sup> This being said, riparian commissions could play a role as “regional agencies” for peace between riparian States. Some joint commissions are endowed with means for resolving disputes between riparian States. In the *Pulp Mills* case, the Court observed that the joint commission between Argentina and Uruguay is vested “with regulatory, executive, administrative, technical and conciliatory functions” and that “the Parties intended to make that international organization a central component in the fulfillment of their obligations to co-operate as laid down by the 1975 Statute.”<sup>85</sup>

Joint commissions are central elements in the obligation to cooperate that water agreements impose.<sup>86</sup> For example, the Indus Water Commission established by the 1960 Indus Water Treaty was resilient to three armed conflicts, the nuclear arms race and terrorist attacks.<sup>87</sup> Other riparian commissions, such as the joint mechanisms on the Senegal and Mekong rivers, have also been resilient to armed conflict. Joint commissions—as “technical *fora*”—are means for strengthening and (re-)establishing cooperation between riparian States. Riparians can meet, exchange viewpoints and agree on the implementation of principles in relation to water management for the benefit of their people, economic development and the environment.

## CONCLUSION

Water intervenes in all aspects of life. This is reflected in the legal sphere by the interaction of different areas of law that regulate water issues directly and indirectly, and becomes particularly visible when differences occur. Frontier disputes can affect the local customs and human rights of riparian communities, international trade disputes can involve questions concerning concepts of international environmental law and cases brought before dispute settlement mechanisms, compliance mechanisms or claims commissions highlight that water questions frequently touch on different areas of international law. At times, such cases simultaneously touch on

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<sup>84</sup> *Id.* at para. 68.

<sup>85</sup> *Pulp Mills*, Provisional measures (2006), at paras. 80–82; *id.*, Judgment (2010), at para. 93.

<sup>86</sup> C. LEB, *supra* note 6.

<sup>87</sup> U. Alam, *India and Pakistan's truculent cooperation: can it continue?*, *infra* Chapter 19.

not only the human and environmental rights of affected communities, but also investment law and property rights.

A multidisciplinary approach and the inclusion of scientific experts throughout the process of lawmaking and implementation are essential in order to address the hydrologic, socioeconomic and environmental challenges of water resources management in an integrated manner. The large variety of instruments that have been elaborated for water governance demonstrate that technical expertise is widely employed, in particular in lawmaking and within joint management mechanisms. Yet, there are certain issues that—though raised by science—have been only partially addressed by law. This concerns the governance of both virtual water streams (and thus the global trade in “virtual water”) and real water streams that transcend the limits of transboundary basins. Rainwater and cloud formations are not yet subject to international regulation.

With increasing water demand, these real and virtual water streams are likely to become new indicators of equitable and reasonable resource management. They will be essential resources to ensure that vital human water needs are satisfied and that the human right to water can be achieved for all. Multiplicity and diversity of international agreements and the intersection of various areas of law contribute to the improved protection of freshwater. They also create consequences that should be addressed (such as the risk of conflicting interpretations) through parties’ specific commitments and the proactive attitudes of courts and tribunals. The variety and number of such norms and mechanisms suggest States’ trust in the rule of law and institutional mechanisms. They also suggest the belief that international law is a means toward cooperation on transboundary water resources. As highlighted in the various contributions in the present volume, international law already responds to multiple issues that require attention, while the legal system concurrently finds itself in constant need of improvement. The interactions between international law and freshwater must continuously take changing circumstances into account. International law has responded to challenges in the past and is suitably dynamic to prepare for the challenges of the future.