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REIMAGINING INTERNATIONAL WATER LAW

TIM STEPHENS*

I. INTRODUCTION

Scientists increasingly refer to the current epoch as the “anthropocene” because of the many ways human hands have transformed the natural world.¹ Human activities have touched virtually all landscapes on earth, driven many organisms to extinction, and changed the composition of the atmosphere and the chemistry of the oceans.² They have also had a major impact on water basins,³ “re-plumbing” natural waterways to satisfy uses, including agriculture, industry, consumption, transportation, and the reduction of flood risks. In so doing, human activities have fundamentally altered the flow of freshwater and changed the flux of sediments between the land and the oceans.⁴ Human-induced climate change looms as the most powerful influence on the hydrosphere as a whole and on the small fraction (three percent) of the planet’s water that is freshwater.⁵ Climate change is intensifying the hydrological cycle, shifting precipitation patterns worldwide, increasing rates of evaporation, the intensity of cyclones, and melting glaciers and icecaps.⁶

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1. Jan Zalasiewicz et al., *The Anthropocene: A New Epoch of Geological Time?*, 369 PHIL. TRANSACTIONS OF THE ROYAL SOC’Y A 835, 835 (2011); James P.M. Syvitski & Albert Kettner, *Sediment Flux and the Anthropocene*, 369 PHIL. TRANSACTIONS OF THE ROYAL SOC’Y A 957, 957 (2011).

2. Syvitski & Kettner, *supra* note 1, at 958–59; Rachel Baird, Meredith Simons & Tim Stephens, *Ocean Acidification: A Litmus Test for International Law*, 4 CARBON AND CLIMATE L. REV. 459, 459–61 (2009).

3. Syvitski & Kettner, *supra* note 1, at 958.

4. *Id.* at 958–59, 964–70.

5. *Earth’s Water Distribution*, USGS, <http://ga.water.usgs.gov/edu/waterdistribution.html> (last visited Nov. 11, 2011).

6. Syvitski & Kettner, *supra* note 1, at 958–59; M. G. Sanderson et al., *Regional Temperature and Precipitation Changes Under High-End ($\geq 4^{\circ}\text{C}$) Global Warming*, 369 PHIL. TRANSACTIONS OF THE ROYAL SOC’Y A 85, 94 (2011).

If the extent of these changes seems almost too great to fathom, then the idea that international water law could ever be up to the task of moderating human influence on the hydrological cycle and satisfying global water needs in an equitable fashion also appears beyond our imagination. Nonetheless, such a reimagining is not only necessary, but possible.⁷ International water law has seen significant change over the last century, with the law expanding to recognize the functions that water plays not only in meeting human needs, but also in servicing critical ecosystem functions.⁸ Yet there is a dimension of international water law that remains only partially explored and significantly underdeveloped, namely its capacity to realize a fair distribution of freshwater resources on a global scale.⁹ Considerable progress has been made in examining water issues through the lens of human rights—an imperative urged upon us by the Millennium Development Goal that we halve the proportion of the world’s population without sustainable access to safe drinking water.¹⁰ But there is a need to look further and address even more fundamental questions surrounding hydrological disadvantage worldwide.¹¹

The seeds of this approach can be found in the “community of interest” theory of water management endorsed by the International Court of Justice (“ICJ”) in the *Gabčíkovo-Nagymaros* case.¹² Professor Stephen C. McCaffrey, one of the International Law Commission’s (“ILC”) special rapporteurs on the Law of the Non-Navigational Use of International Watercourses, has since extrapolated it.¹³ McCaffrey suggests a radical change for international law: a mechanism to address the world’s severe hydrological disadvantages.¹⁴ McCaffrey argues that freshwater resources should be considered the common heritage of humankind, given that they are as vital to human existence as other natural resources that have been classified as global commons and subject to international legal regulation (however im-

7. See *infra* Part II.

8. Malin Falkenmark & Jan Lundqvist, *Looming Water Crisis: New Approaches are Inevitable*, in *HYDROPOLITICS: CONFLICTS OVER WATER AS A DEVELOPMENT CONSTRAINT* 178, 179–80, 185 (Leif Ohlsson ed., 1995).

9. *Id.* at 179.

10. Rep. of the World Summit on Sustainable Development, 9, U.N. Doc. A/Conf. 199/20 (Aug. 26–Sept. 4, 2002).

11. Falkenmark & Lundqvist, *supra* note 8, at 179–83.

12. *Gabčíkovo-Nagymaros Project* (Hung. v. Slov.), Judgment, 1997 I.C.J. 7, ¶ 85 (Sept. 25) (finding that countries sharing a river have a right to equal water access, and that no country can unilaterally assume control of a shared water source).

13. See STEPHEN C. McCAFFREY, *THE LAW OF INTERNATIONAL WATERCOURSES* 168 (2d ed. 2007) (describing the “community of interest” theory as a good theoretical context even though it is not a source of concrete legal rights or obligations).

14. *Id.* at 169.

perfect that regulation may be).¹⁵ He contends further that if there is agreement on this, there should be a mechanism for addressing severe hydrological disadvantages. This would be a radical change for international water law. Historically, freshwater resources have been treated as fixtures in landscapes, belonging exclusively to the individual states, or groups of states, in which they are found.¹⁶ Against the backdrop of climatic change that is altering the hydrosphere and exacerbating hydrological inequalities, this Article reprises McCaffrey's argument, assessing the prospects for a reimagined international water law, which is based on a new global "water ethic"¹⁷ and which addresses the freshwater needs of all states.

II. THE U.N. WATERCOURSES CONVENTION

The United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses¹⁸ ("U.N. Watercourses Convention") provides the global architecture for international water law. Based on articles drafted by the ILC, the United Nations General Assembly (the "General Assembly") adopted the U.N. Watercourses Convention in May 1997 by a vote of 106 states in favor to just three against.¹⁹

Fourteen years have now passed and yet the Convention has still not taken effect.²⁰ The Convention has only twenty-four parties, nine fewer than the thirty-five required for the Convention to enter into force.²¹ Ratification of the Convention has not only been slow, but it has been geographically uneven. While it has few signatories from the Americas, Asia, or Europe, it has attracted a respectable number of accessions in Africa and the Middle East, reflecting the priority that nations in these regions place on water issues.²² Among African states, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Libya, Morocco, Namibia, Nigeria, South Africa, and Tunisia have all joined the U.N. Water-

15. *Id.* at 168–70.

16. *Id.* at 69–70.

17. For an explanation of the need for a new global "water ethic," see Falkenmark & Lundqvist, *supra* note 8, at 179.

18. United Nations: Convention on the Law of the Non-Navigational Uses of International Watercourses, May 21, 1997, 36 I.L.M. 700 (1997).

19. *Id.* at 700. Burundi, China, and Turkey voted against the U.N. Watercourses Convention; twenty-seven states abstained. *Id.*

20. *Convention on the Law of the Non-Navigational Uses of International Watercourses*, UNITED NATIONS TREATY COLLECTION, <http://treaties.un.org/doc/Publication/MTDSG/Volume%20II/Chapter%20XXVII/XXVII-12.en.pdf> (last visited Sept. 13, 2011).

21. *Id.*

22. *Id.*

courses Convention, as have a number of Middle Eastern states: Iraq, Jordan, Lebanon, Qatar, and Syria.²³

The U.N. Watercourses Convention was the culmination of over twenty years of work by the ILC and the Sixth (Legal) Committee of the General Assembly, and is the world's first universal water agreement.²⁴ It contains thirty-seven provisions divided across seven parts and applies only to shared watercourses on the earth's surface, such as rivers or lakes, and not to groundwater resources (unless these are connected with a surface water system).²⁵ The most fundamental obligations under the U.N. Watercourses Convention are found in Part II. Article 5, the opening provision of Part II, requires states sharing a watercourse to utilize it equitably and reasonably, taking into account relevant factors and circumstances.²⁶ These circumstances include geographic considerations, social and economic needs, populations dependent on the watercourse, effects on other watercourse states, existing and potential uses, and the availability of alternatives.²⁷ The U.N. Watercourses Convention further requires that states "take all appropriate measures to prevent the causing of significant harm to other watercourse States."²⁸ Part III of the U.N. Watercourses Convention contains important obligations relating to prior notification of planned measures, such as the construction of a dam that may have a significant adverse impact upon other watercourse states.²⁹

Part IV goes beyond the traditional focus of international water law; it encourages states' cooperation in the optimum use of water resources for human needs and imposes obligations on states to protect and preserve the ecosystems of international watercourses.³⁰ The U.N. Watercourses Convention therefore represents an important development in international water law in several respects, particularly

23. *Id.*

24. MCCAFFREY, *supra* note 13, at 359; Salman M. A. Salman, *The U.N. Watercourses Convention Ten Years Later: Why Has Its Entry into Force Proven Difficult?*, 32 WATER INT'L 1, 13 (2007), available at <http://www.internationalwaterlaw.org/bibliography/articles/general/Salman-UNWatercoursesConventionTenYears.pdf>.

25. United Nations: Convention on the Law of the Non-Navigational Uses of International Watercourses, *supra* note 18, art. 1, 2 (explaining that the U.N. Watercourses Convention applies only to international watercourses); see also G.A. Res. 63/124, U.N. Doc A/RES/63/124 (Jan. 15, 2009) (addressing transboundary aquifers).

26. United Nations: Convention on the Law of the Non-Navigational Uses of International Watercourses, *supra* note 18, art. 6.

27. *Id.* The factors and circumstances listed in Article 6 are indicative rather than exhaustive. *Id.*

28. *Id.*

29. *Id.* art. 12.

30. *Id.* art. 20.

in giving this historically utilitarian area of international law a non-anthropocentric environmental dimension.

Various reasons have been posited to explain the poor level of ratification of the U.N. Watercourses Convention, including treaty congestion, lack of awareness and capacity, and lack of a “champion.”³¹ The most probable explanation for the slow ratification, however, is that because the Convention’s core elements reflect customary international law, states see little benefit in joining the regime.³² As much as states have extensively applied the ILC’s Articles on State Responsibility³³ in addressing internationally wrongful acts even though they are unlikely ever to be transformed into a treaty, the U.N. Watercourses Convention can be said to have value for its substantive content rather than its formal legal status.³⁴ This interpretation is supported by the decision of the ICJ in the *Gabčíkovo-Nagymaros* case that referred approvingly to the U.N. Watercourses Convention just a few months after it had been concluded.³⁵

A less charitable view is that the U.N. Watercourses Convention offers little to prospective members, as it imposes few concrete obligations and leaves existing arrangements essentially undisturbed.³⁶ This appraisal draws support from a recent ICJ decision, the *Pulp Mills* case, in which the court made no reference to the U.N. Watercourses Convention and instead decided the dispute solely by reference to a bilateral treaty between the parties.³⁷ The relationship between the U.N. Watercourses Convention and other water agreements on foot or to be agreed in the future was a vexed one during the drafting and

31. Alistair Rieu-Clarke & Flavia Rocha Loures, *Still Not in Force: Should States Support the 1997 UN Watercourses Convention?*, 18 REV. EUR. COMMUNITY AND INT’L ENVTL. L. 185, 192–93 (2009).

32. *Id.* at 193–94.

33. Rep. of the Int’l Law Comm’n, 53rd sess., Apr. 23–Jun. 1, Jul. 2, 2001–Aug. 10, 2001, U.N. Doc. A/56/10; GAOR, 56th sess., Supp. No. 10 (2001).

34. Rep. of the Int’l Law Comm’n, 49th sess., Apr. 23–Jun. 1, Jul. 2, 2001–Aug. 10, 2001, U.N. Doc. A/49/10; GAOR, 49th sess., Supp. No. 10 (1994).

35. *Gabčíkovo-Nagymaros Project (Hung. v. Slov.)*, Judgment, 1997 I.C.J. 7, ¶ 85 (Sept. 25).

36. See United Nations: Convention on the Law of the Non-Navigational Uses of International Watercourses, *supra* note 18, art. 3(1) (providing that nothing in the U.N. Watercourses Convention “shall affect the rights or obligations of a watercourse State arising from agreements in force for it on the date on which it became a party to the present Convention”).

37. *Pulp Mills on the River Uruguay (Arg. v. Uru.)*, Judgment, 2010 I.C.J. 1, ¶¶ 1, 47 (Apr. 20). Neither Argentina nor Uruguay have signed or ratified the U.N. Watercourses Convention, but the parties referred to it in the written pleadings and in oral argument, and Judge Cançado Trindade referred to it in his opinion. See *id.* at ¶ 60 (separate opinion of Judge Trindade) (discussing the U.N. Watercourses Convention and its impact on international environmental protection law).

negotiation of the Convention.³⁸ There are more than 260 watersheds shared by two or more countries, and there are over 3,000 watercourse treaties in existence.³⁹ This latter fact was one reason cited by Egypt and other states as to why the Convention must apply subject to the existing *leges speciales* rather than override them.⁴⁰ Indeed, the diversity in the governance of river basins worldwide is very significant, with some relying on more formal and “harder” legal regimes, while others depend on “softer” forms of regulation.⁴¹

Nonetheless, there are some regions where considerable work remains to be done in reaching an agreement on sharing freshwater resources, particularly in Africa.⁴² In such situations, the U.N. Watercourses Convention may have a positive normative influence as seen in the Southern Africa Development Community Revised Protocol on Shared Watercourse Systems (“SADC Protocol”)⁴³ that significantly revised the original 1995 protocol in order to harmonize the agreement with the U.N. Watercourses Convention.⁴⁴

There are at least fifteen international rivers in the SADC region, which is among the world’s most water-scarce regions.⁴⁵ The SADC Protocol is an example of a significant water agreement that seeks to safeguard water supplies in a region where two-thirds of the surface water is shared by two or more states, and where population growth and climate change are putting significant pressures on water availability.⁴⁶ Given this and other similar practices, Rieu-Clarke and Loures have commented that “even though not yet in force, the [U.N.] Watercourses Convention has been, at least to some degree, performing one of its key functions as a framework instrument—that of informing inter-State negotiations on watercourse agreements.”⁴⁷

38. Rieu-Clarke & Loures, *supra* note 31, at 189.

39. Aaron T. Wolf et al., *International River Basins of the World*, 15 INT’L J. WATER RESOURCES DEV. 387, 391 (1999); Rieu-Clarke & Loures, *supra* note 31, at 189.

40. Rieu-Clarke & Loures, *supra* note 31, at 189 & n.52.

41. Fleur Johns et al., *Law and the Mekong River Basin: A Socio-Legal Research Agenda on the Role of Hard and Soft Law in Regulating Transboundary Water Resources*, 11 MELB. J. INT’L L. 1, 2 (2010).

42. *See* Rieu-Clarke & Loures, *supra* note 31, at 187 (noting that most African basins are without equitable use or environmental protection agreements).

43. Revised Protocol on Shared Watercourses in the Southern African Development Community (“SADC”), Aug. 7, 2000, 40 I.L.M. 321.

44. Salman M. A. Salman, *Legal Regime for Use and Protection of International Watercourses in the Southern African Region: Evolution and Context*, 41 NAT. RESOURCES J. 981, 1004–05 (2001).

45. ASHOK SWAIN, *MANAGING WATER CONFLICT: ASIA, AFRICA AND THE MIDDLE EAST* 140–42 (2004).

46. *Id.* at 153–54.

47. Rieu-Clarke & Loures, *supra* note 31, at 192.

There is incredulity in some quarters that the U.N. Watercourses Convention languishes while other multilateral environmental treaties attract widespread support (consider here the extensive adoption of instruments addressing marine pollution).⁴⁸ Rieu-Clarke and Loures ask, for instance, why should “other global environmental issues . . . be afforded any greater priority than the current water crisis[?]”⁴⁹ It is certainly true that water issues have not attracted the same level of international attention as other environmental challenges. Although there have been some important developments, including the focus on water in the Millennium Development Goals, it remains the case, as recently pointed out by the InterAction Council in its May 2011 Communiqué, that “[i]nternational water leadership is virtually non-existent.”⁵⁰

Despite this, it is not at all clear that the U.N. Watercourses Convention in its current form can be the primary vehicle for addressing the world’s water crisis. The U.N. Watercourses Convention is by no means a comprehensive regime for freshwater in the same way as the U.N. Convention on the Law of the Sea⁵¹ may be described as a “constitution” of the seas, seeking to protect the oceanic commons for the benefit of humanity as a whole.⁵² The U.N. Watercourses Convention is not a constitution in form; it is flexible and able to be modified by states.⁵³ Nor is it a constitution in substantive content; its scope is li-

48. For discussion of the many widely supported pollution-control agreements adopted under the auspices of the International Maritime Organization, see DONALD R. ROTHWELL & TIM STEPHENS, *THE INTERNATIONAL LAW OF THE SEA* ch. 15 (2010).

49. Rieu-Clarke & Loures, *supra* note 31, at 193.

50. Final Communiqué, InterAction Council, 7, 29th annual plen. sess. (May 29–31, 2011), available at <http://interactioncouncil.org/final-communiqu-42>. The InterAction Council was established in 1983 and brings together former heads of government and heads of state to promote international cooperation in achieving peace and security, world economic revitalization, and universal ethical standards. INTERACTION COUNCIL, www.interactioncouncil.org/about-us (last visited Oct. 17, 2011).

51. United Nations Convention on the Law of the Sea, opened for signature Dec. 10, 1982, 1833 U.N.T.S. 397 (entered into force Nov. 16, 1994).

52. *Id.* at 397 (stating that the “ocean floor and the subsoil thereof . . . are the common heritage of mankind, the exploration and exploitation of which shall be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States”).

53. Unlike the U.N. Convention on the Law of the Sea, it does not prevail over other agreements with which it is incompatible. Compare Agreement for the Implementation of the Provisions of the United Nations Convention of the Law of the Sea of 10 December 1982, Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks art. 3(1), Dec. 4, 1995, 34 I.L.M. 1542 (providing that the Law of the Sea applies to areas beyond national jurisdiction) with United Nations: Convention on the Law of the Non-Navigational Uses of International Watercourses art. 3, *supra* note 18 (providing that nothing in the U.N. Watercourses Convention “shall affect the rights or obligations of a watercourse State arising from agreements in force for it on the date on which it became a party to the present Convention”).

mitted to fairly general and imprecise duties of cooperation. It is concerned with the equitable sharing of freshwater resources among states that *already share* those resources, and does not deal with meta-questions of distributive justice. As such, it differs significantly from the regimes applicable to global commons, such as the climate change regime⁵⁴ and ozone depletion regime,⁵⁵ or even the biodiversity regime.⁵⁶ All of these are attempts to address structural issues of intra- and inter-generational justice.⁵⁷

In light of the attention given to other core elements of the global environment, it is remarkable that we lack a global regime for the fair allocation of freshwater resources. As water will always find the lowest level, can we say the same of international water law? Is it destined to reflect the lowest common denominator, establishing few constraints on the agreements that states have already concluded or may in the future reach over shared watercourses? Can it exercise any moderating influence upon power imbalances between riparian states, challenging agreements and practices that are unjust and do not address fundamental inequalities? Above all, can we be bold enough to think that a truly international and universal water law can be reimagined to match the needs of the international community in the twenty-first century?

III. A GLOBAL “COMMUNITY OF INTEREST” IN FRESHWATER RESOURCES?

In the *Gabčíkovo-Nagymaros* case, the ICJ affirmed the “community of interest” concept,⁵⁸ which is the idea that all riparians have common legal rights in a shared watercourse.⁵⁹ This marked a departure from the previously ascendant notion of “limited territorial sovereignty” that had been supported in much state practice and by key arbitral decisions.⁶⁰

54. United Nations Conference on Environment and Development: Framework Convention on Climate Change, May 9, 1992, 31 I.L.M. 849; Conference of the Parties to the Framework Convention on Climate Change: Kyoto Protocol, Dec. 10, 1997, 37 I.L.M. 22.

55. United Nations: Vienna Convention for the Protection of the Ozone Layer, Mar. 22, 1985, 26 I.L.M. 1516; United Nations: Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987, 26 I.L.M. 1541.

56. United Nations Conference on Environment and Development, Jun. 3–14, 1992, 31 I.L.M. 814.

57. Tim Stephens, *Sustainability Discourses in International Courts: What Place for Global Justice?*, in *GLOBAL JUSTICE AND SUSTAINABLE DEVELOPMENT* 39, 42–44 (Duncan French ed., 2010).

58. *Gabčíkovo-Nagymaros Project* (Hung. v. Slov.), Judgment, 1997 I.C.J. 7, ¶ 85 (Sept. 25).

59. SWAIN, *supra* note 45, at 163.

60. *See* Lake Lanoux Arbitration (Fr. v. Spain) 12 RIAA 285 (1957).

The limited territorial sovereignty doctrine holds that upstream users must have some regard for downstream riparians, but otherwise pays legal deference to their position of physical control of a shared water resource.⁶¹ It moderates the right of capture, so that it is not simply the case that any state with access to a surface or subsurface water resource may exploit it without regard for other users.⁶² The “community of interest” approach goes further, not only connoting “unilateral restraint,” but evoking “shared governance, joint action.”⁶³

McCaffrey has endeavored to take the “community of interest” idea even further than its application to a particular basin and has called for freshwater resources to be shared equitably among all nations, having special regard for those that are hydrologically disadvantaged.⁶⁴ Implicit in McCaffrey’s argument is that a system for the global allocation of water should be based on meeting minimum requirements of distributive justice.⁶⁵ It is not necessary for all individuals to have access to an equal share of water—there is no aim for absolute perfection in distribution.⁶⁶ There should, however, be some leveling out of the most egregious inequalities, so that hydrologically disadvantaged states are given a legal interest in the global hydrologic cycle and made the beneficiaries of an international mechanism to provide water to meet fundamental human needs.⁶⁷

The obvious obstacle to achieving a fair global sharing of freshwater is a physical one. Equitable management of the public goods provided by some commons can be addressed through obligations of restraint—for instance, a stable climate depends upon states refraining from polluting the atmosphere with greenhouse gases, and similarly, yields of fish stocks upon which fishing states depend may be preserved by setting appropriate catch limits. By contrast, a truly global common heritage regime for distributing freshwater would involve moving water across significant distances and not simply addressing shortages within particular transboundary basins, an objec-

61. MCCAFFREY, *supra* note 15, at 135–36.

62. *Id.*

63. *Id.* at 165.

64. *Id.* at 168–69.

65. For a justification of the turn to distributive justice in relation to global environmental goods, see RICHARD P. HISKES, *THE HUMAN RIGHT TO A GREEN FUTURE: ENVIRONMENTAL RIGHTS AND INTERGENERATIONAL JUSTICE* 1–2 (2009) (arguing that all people should have equal access to air, water, and soil, implicit in their rights as citizens); see also THOMAS M. FRANCK, *FAIRNESS IN INTERNATIONAL LAW AND INSTITUTIONS* 18–19 (1995) (discussing and providing a critical analysis of the distributive justice theory).

66. MCCAFFREY, *supra* note 15, at 412 (noting that “[e]quity does not mean equality” when considering water access).

67. *Id.* at 169.

tive that can often be achieved by limiting upstream use in order to satisfy downstream needs.⁶⁸ The fluidity of water belies the fact that it is a heavy and bulky commodity.⁶⁹ The history of constructing canals and other structures to move water stretches back as far as ancient Mesopotamia.⁷⁰ Recent technological advances have made seemingly unimaginable engineering feats possible, as illustrated by the momentous Lesotho Highlands Water Project, one of the largest infrastructure projects in Africa.⁷¹ Many potential water projects, such as the populist calls in Australia to turn rivers inland, however,⁷² are literally pipe dreams because they are costly, energy intensive, and have a range of environmental, social, and cultural impacts. Hence, while it is true that some valuable liquids (such as oil and liquid natural gas) are transported vast distances, it is in most cases uneconomical to do so for water, given the volumes involved.⁷³

For this reason, there is a need to think laterally about the ways in which water scarcity can be addressed other than by moving water itself. McCaffrey has contended that assistance to hydrologically disadvantaged states could take various forms, and “would not necessarily entail provision of water, per se.”⁷⁴ Although McCaffrey does not specify what this “assistance” would be, there are conceivable possibilities: transferring technology and expertise to manage existing water resources more sustainably; financing construction of water-saving infrastructure, such as replacing open channels with piped systems; or even funding and providing experts to construct desalination plants for parched coastal states. If water law were to recognize these forms of assistance, then it would not be breaking new ground in international environmental law given the plethora of environmental regimes addressing financing and technology transfer in aid of sustainable development.⁷⁵

There are two interrelated developments that underscore the need for the common heritage water ethic that McCaffrey advocates,

68. *Id.* at 410–11.

69. Falkenmark & Lundqvist, *supra* note 8, at 204.

70. WATER ENCYCLOPEDIA, IRRIGATION SYSTEMS, ANCIENT, www.waterencyclopedia.com/HY-La/Irrigation-Systems-Ancient.html (last visited Oct. 18, 2011).

71. LESOTHO HIGHLANDS WATER PROJECT, <http://www.lhwp.org.ls/overview/default.htm> (last visited Oct. 14, 2011).

72. Austl. Dept. of Sustainability, Env., Water, Population and Communities, *Water for the Future: Moving Water Long Distances: Grand Schemes or Pipe Dreams?* (2010).

73. It has occurred from time to time to satisfy human needs, as was the case in 2008 when a tanker delivered freshwater to Barcelona, *see* Graham Keeley, *Barcelona Forced to Import Emergency Water*, *GUARDIAN*, May 14, 2008, at 16.

74. MCCAFFREY, *supra* note 15, at 169.

75. *See, e.g.*, United Nations Conference on Environment and Development: Framework Convention on Climate Change art. 4(3), May 9, 1992, 31 I.L.M. 849.

in which water itself may be moved from areas of greatest supply to areas of greatest need. The first and most significant of these is human-induced climate change that requires legal changes to keep pace with changes to the hydrosphere.⁷⁶ The second development is the phenomenon of “virtual water,” that is, the international trade in water-intensive products, the effect of which is to transfer water resources between states in a way that limits the capacity of exporting states to sustainably manage their water resources and be in a position to adapt to changing hydrological conditions.⁷⁷

IV. GLOBAL WARMING AND CHANGES TO THE HYDROLOGICAL CYCLE

There is improved understanding of the likely impacts of climate change on water availability worldwide, although much remains unknown about specific impacts on particular regions and basins. In relation to water, the central messages of the Fourth Assessment Report (“AR4”) of the Intergovernmental Panel on Climate Change (“IPCC”) are that as temperatures increase there will be increased water availability in the moist tropics and high latitudes; however, there will also be decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes (*see* Figures 1 and 2 below).⁷⁸

76. *See infra* Part IV.

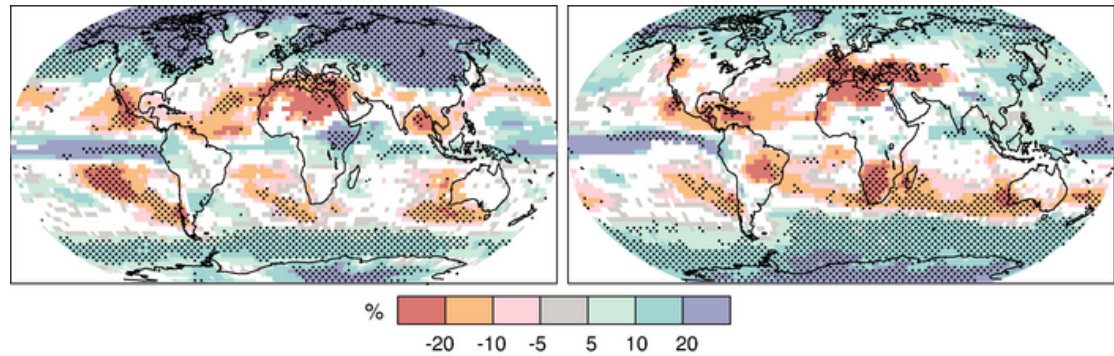
77. *See infra* Part V; *see also* A. K. Chapagain & A. Y. Hoekstra, UNESCO-IHE, *Water Footprints of Nations*, in VALUE OF WATER RESEARCH REPORT SERIES NO. 16, 9 (2004) (“Virtual water is defined as the volume of water required to produce a commodity or service.”); Anil Ananthaswamy, *Land-Grab Strategy Doesn’t Hold Water*, NEW SCIENTIST, May 28, 2011, at 10 (noting that importing food is “equivalent to importing ‘virtual water’”).

78. *See* Sanderson *supra* note 6, at 94.

The increases in precipitation seen at higher latitudes are a result of increasing amounts of water vapour in the atmosphere. Warmer temperatures result in higher evaporation rates, and warmer air can hold more water vapour. There is also an increasing poleward transport of water vapour from lower latitudes. The subtropical regions . . . experience a drying . . .

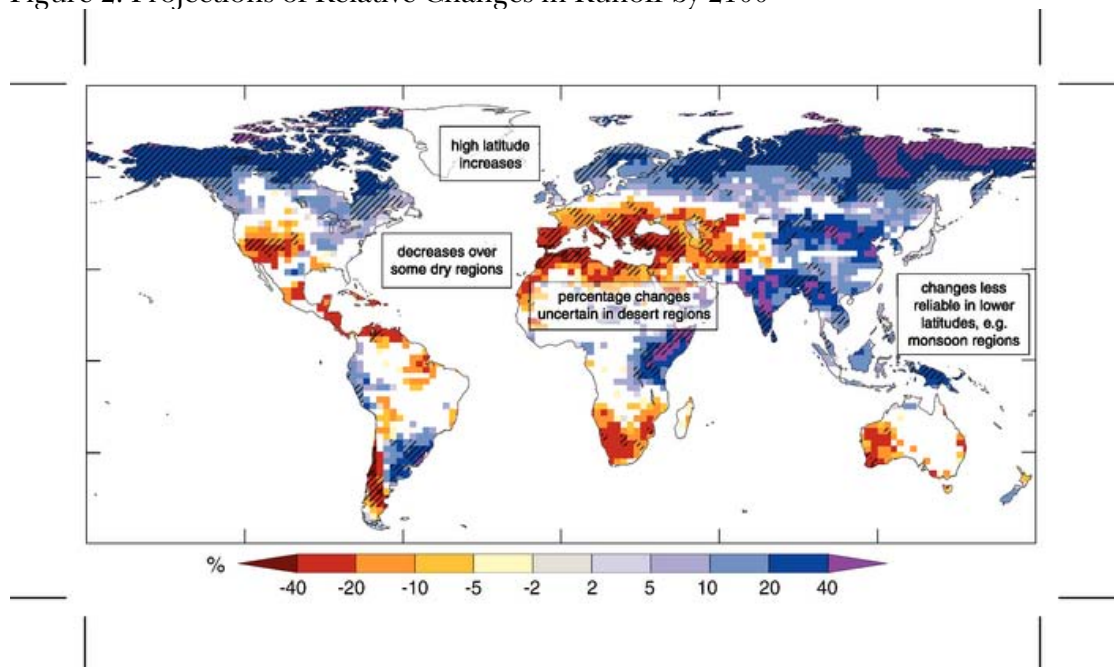
Id.

Figure 1. Relative Changes in Precipitation in 2090–99 Compared to 1980–99



Source: IPCC Fourth Assessment Report, *Climate Change 2007: Synthesis Report*, Figure 3.3. Relative changes in precipitation (in percent) for the period 2090–2099, relative to 1980–1999. Values are multi-model averages based on the SRES A1B scenario for December to February (left) and June to August (right). White areas are where less than 66% of the models agree in the sign of the change and stippled areas are where more than 90% of the models agree in the sign of the change.

Figure 2. Projections of Relative Changes in Runoff by 2100



Source: IPCC Fourth Assessment Report, Climate Change 2007: Synthesis Report, Figure 3.5, Large-scale relative changes in annual runoff (water availability, in percent) for the period 2090-2099, relative to 1980-1999. Values represent the median of twelve climate models using the SRES A1B scenario. White areas are where less than 66% of the twelve models agree on the sign of change and hatched areas are where more than 90% of models agree on the sign of change. The quality of the simulation of the observed large-scale twentieth century runoff is used as a basis for selecting the twelve models from the multi-model ensemble.

The decrease in river runoff and water availability will worsen the trend of declining water availability already being experienced in places such as the Mediterranean Basin, western United States, northern Africa, southern Africa, northeastern Brazil, and southern Australia.⁷⁹ Northern Africa appears likely to be hardest hit.⁸⁰ This is of utmost concern given that states in the subtropical climatic zone are already experiencing high and in some cases unmanageable levels of water stress. According to a recent risk assessment by Maplecroft, all of the sixteen nations that currently endure extreme levels of water stress are found in North Africa and the Middle East.⁸¹ Changing patterns of water availability will in turn have impacts on food availability as agriculture is affected, with yields of crops in some places in sub-Saharan Africa likely to decline by up to eighty-seven percent by the end of the century.⁸²

The picture, however, is a complex one, and it depends on the scale and rate of climate change and population growth during this century and beyond. Generally, as temperatures increase, drier areas will become drier and wetter areas will become wetter, and drier seasons will become drier while wetter seasons will become wetter.⁸³

79. Sanderson, *supra* note 6, at 96; JOSEPH ALCAMO ET AL., CENTER FOR ENVIRONMENTAL SYSTEMS RESEARCH, UNIVERSITY OF KASSEL, WATER AND CLIMATE: A GLOBAL PERSPECTIVE, KASSEL WORLD WATER SER. REP. NO. 6 at 2, 8 (Mar. 2003), available at <http://www.usf.uni-kassel.de/ftp/dokumente/kwws/kwws.6.pdf>.

80. *Id.*

81. *Maplecroft Index Identifies Bahrain, Qatar, Kuwait and Saudi Arabia as World's Most Water Stressed Countries*, MAPLECROFT (May 25, 2011), http://www.maplecroft.com/about/news/water_stress_index.html (last visited Sept. 11, 2011). The top ten are in descending order: Bahrain, Qatar, Kuwait, Saudi Arabia, Libya, Western Sahara, Yemen, Israel, Egypt, Djibouti, and Jordan. *Id.* Water stress is determined by calculating the ratio of total water use (domestic, industrial, and agricultural use) to renewable water supplies (from precipitation, rivers, and groundwater). *Id.*

82. Philip K. Thornton et al., *Agriculture and Food Systems in Sub-Saharan Africa in a 4°C World*, 369 PHIL. TRANSACTIONS OF THE ROYAL SOC'Y A 117, 122 (2011).

83. Fai Fung et al., *Water Availability in +2°C and +4°C Worlds*, 369 PHIL. TRANSACTIONS OF THE ROYAL SOC'Y A 99, 110-11 (2011).

Once population growth is factored in, the majority of the world's 112 river basins will suffer higher levels of stress if temperatures rise 4°C or more.⁸⁴ Some basins such as the Nile and the Murray Darling appear likely to be very hard hit under all climate and population scenarios, while others such as the Ganges may benefit from increased runoff in a 4°C world, even offsetting demand from increasing population.⁸⁵ Moreover, the hydrological cycle will intensify, increasing the proportion of the world's flood-prone populations threatened by flood hazards by up to fifty percent.⁸⁶

What is certain is that there will be substantial changes to water availability beyond natural variability that will challenge the assumptions upon which many water agreements have been built. The question then becomes how can international water law assist states in adapting to changing hydrological conditions. Regrettably the U.N. Watercourses Convention provides limited assistance in its current form. As has been noted, it does not seek to achieve an equitable distribution of water resources in global terms. Conceivably, however, the Convention, being a framework convention, could be augmented by a protocol specifically designed to address water scarcity brought about by climate change.

Nor does the Convention provide a clear basis for including climate change issues in negotiations on new water agreements, let alone as a basis for renegotiating existing agreements. The Convention itself does not refer to climate change, which is surprising given that it was concluded well after the phenomenon of anthropogenic global warming had attracted international concern following the IPCC's First Assessment Report in 1990. Although Article 6(1)(a) of the Convention refers to "climatic" and "other factors of a natural" character as being relevant to determining what is equitable and reasonable utilization,⁸⁷ human-induced climate change is not a "natural" factor. Hence climate change's impacts upon a freshwater system would need to be addressed via a related consideration, such as the reference in Article 6(1)(b) to the "social and economic needs of the watercourse States concerned."⁸⁸

84. *Id.* at 112.

85. *Id.*

86. Nigel Arnell, *Beyond 4°C: Impacts Across the Global Scale* (Sept. 2009), available at www.eci.ox.ac.uk/4degrees/ppt/1-3arnell.pdf (last visited Oct. 15, 2011).

87. Rep. of the Comm. to the Gen. Assembly on the Work of Its 46th Sess., 1994, 49 GAOR Supp. No. 10, U.N. Doc. A/49/10 (1996).

88. Significantly, climate change is not mentioned in the commentaries to the ILC's Draft Articles on the Law of the Non-Navigational Uses of International Watercourses Text adopted by the International Law Commission at its forty-sixth session in 1994, which was submitted to the General Assembly as a part of the Commission's report covering the work

Moreover the Convention does not provide a basis for renegotiating existing agreements, even if they produce inequitable outcomes under changing climatic conditions. This is because the Convention *supplements* rather than *supplants* existing agreements. Article 3(1) provides that in the absence of a contrary agreement, nothing in the Convention shall affect the rights or obligations of a watercourse state arising from agreements in force.⁸⁹ Under Article 3(2) parties are urged to consider harmonizing existing agreements with the basic principles of the Convention.⁹⁰ Furthermore, Article 3(3) provides that watercourse states may enter into agreements that adjust the provisions of the Convention to meet the particular characteristics and uses of a specific watercourse.⁹¹

The incapacity of the central framework for international water law to assist states in addressing climate change is of significant concern because at general international law, states have few options available to them to seek adjustment to existing water agreements. One option is the termination of a water agreement; however, the *Gabčíkovo-Nagymaros* case suggests that the circumstances in which this is possible are limited.⁹² In that case the ICJ rejected Hungary's argument that it was entitled to terminate a river agreement with Slovakia on the grounds of impossibility of performance or a fundamental change in circumstances as a result of "the progress of environmental knowledge and the development of new norms and prescriptions of international environmental law."⁹³ The factual basis of Hungary's argument was that the joint dams project threatened the riverine environment of the Danube.⁹⁴

The court applied Articles 61 and 62 of the Vienna Convention on the Law of Treaties, which deal, respectively, with treaty termination for reasons of supervening impossibility of performance and fundamental change of circumstances.⁹⁵ In relation to impossibility of performance, the court held that the essential object of the bilateral

of that session. *Id.* ¶ 222. Nor is climate change mentioned in the ILC's Draft Articles on the Law of Transboundary Aquifers. Several footnotes in the Commentaries briefly referred to it, but not in any substantive way. *Id.*

89. United Nations: Convention on the Law of the Non-Navigational Uses of International Watercourses, May 21, 1997, 36 I.L.M. 700 (1997).

90. *Id.*

91. *Id.*

92. The *Gabčíkovo-Nagymaros* Project (Hung. v. Slov.), Judgment, 1997 I.C.J. 7, ¶ 104 (Sept. 25).

93. *Id.*

94. *Id.* ¶¶ 53–56.

95. *Id.* ¶¶ 102–04; Vienna Convention on the Law of Treaties, May 23, 1969, 1155 U.N.T.S. 331.

river agreement had not disappeared or been destroyed, and that the agreement actually permitted any necessary readjustments to take into account ecological imperatives.⁹⁶

In relation to the fundamental change of circumstances, which Hungary said was caused by profound political changes, the diminishing economic viability of the project, improved environmental knowledge, and new environmental norms, the court responded that:

The changed circumstances advanced by Hungary are, in the Court's view, not of such a nature, either individually or collectively, that their effect would radically transform the extent of the obligations still to be performed in order to accomplish the Project. A fundamental change of circumstances must have been unforeseen; the existence of the circumstances at the time of the Treaty's conclusion must have constituted an essential basis of the consent of the parties to be bound by the Treaty. The negative and conditional wording of Article 62 of the Vienna Convention on the Law of Treaties is a clear indication moreover that the stability of treaty relations requires that the plea of fundamental change of circumstances be applied only in exceptional cases.⁹⁷

The ILC in its Commentaries on the Articles on Treaties that formed the basis of the Vienna Convention on the Law of Treaties referred to "the type of cases envisaged by [Article 61] is the submergence of an island, the drying up of a river or the destruction of a dam or hydro-electric installation indispensable for the execution of a treaty."⁹⁸ This would suggest that only the complete and permanent drying up of a river would allow a state to terminate a water treaty.

As for fundamental change of circumstances, there has been some consideration of this issue in the context of the effect of rising sea levels upon baselines, and maritime zones projected from them, and maritime boundary agreements,⁹⁹ but not in the context of water agreements. An application of the reasoning of the ICJ in the *Gabčíkovo-Nagymaros* case suggests that because climate change has been of international concern since at least 1990, when the IPCC released its first assessment report, it could not be used as a justification

96. *The Gabčíkovo-Nagymaros Project*, 1997 I.C.J. ¶ 103.

97. *Id.* ¶ 104.

98. 1966 U.N. Int'l Law Comm'n Y.B. 256, U.N. Doc. A/CN.4/SER.A/1966/Add.1.; ANTHONY AUST, *MODERN TREATY LAW AND PRACTICE* 296–97 (2d ed. 2007).

99. Article 62(2) expressly provides that a fundamental change of circumstances may not be invoked as a ground for terminating or withdrawing from a treaty. 1966 U.N. Int'l Law Comm'n Y.B. 261, U.N. Doc. A/CN.4/SER.A/1966/Add.1.

for suspending or terminating a treaty, except in certain cases where the impact on a particular basin was completely unforeseen.

Even if Article 61 or 62 of the Vienna Convention on the Law of Treaties applies, suspension or termination may not be helpful remedies. This is because the articles allow states to withdraw from the relevant regime entirely, potentially leaving no available mechanism such as a river commission through which to fashion an agreed response to changing conditions.¹⁰⁰ The relevant states would therefore be relieved of their treaty obligations under the applicable river regime, and be bound only by those of the U.N. Watercourses Convention (if they were parties to it) or those obligations under customary international law.

What would clearly be preferable is an overarching requirement to renegotiate a regime that meets a specified international standard, in a manner akin to the approach of the Straddling Stocks Agreement, which requires states to bring regional fisheries management organizations in line with a regime which includes a range of state of the art features, including a precautionary approach.¹⁰¹ In practice, however, it may well be that many existing regimes can be successfully adapted. Although many international water allocation regimes are highly inflexible¹⁰²—and these should be the targets of a framework agreement for equitable freshwater distribution—other subsystem or basin-wide agreements do include some provision for responding to changes, such as natural variability in river flows.¹⁰³

V. GLOBALIZATION AND VIRTUAL WATER TRADING

The phenomenon of “virtual water” trading is a further development that underscores the need for international water law to be reimagined to address hydrological scarcity. Each year, food production uses around eighty percent of available freshwater worldwide; water is effectively embedded in agricultural products that are traded internationally.¹⁰⁴ This virtual trade in water is increasing, and states

100. Vienna Convention on the Law of Treaties art. 61, 62, May 23, 1969, 1155 U.N.T.S. 331.

101. See *supra* note 53 and accompanying text.

102. A. Dan Tarlock, *How Well Can International Water Allocation Regimes Adapt to Global Climate Change?*, 15 J. LAND USE & TRANSNAT'L ENVTL. L. 423, 429 (2000).

103. See Alena Drieschova & Itay Fischhendler, *A Toolkit of Mechanisms to Reduce Uncertainty in International Water Treaties* 19, http://internationalwaterlaw.org/bibliography/articles/general/Toolkit-Uncertainty_in_International_Water_Treaties.pdf, (describing an open-ended approach to deal with uncertainties, such as an agreement that may include “the option of the sequential construction of regimes over time rather than immediate finalization”).

104. See Ananthaswamy, *supra* note 77, at 10.

that rely on large imports of food are also in essence importing the water required to produce this product.¹⁰⁵ This is a transfer of water other than via the physical movement of water itself, of the kind McCaffrey alluded to and discussed as a possible response to water scarcity. This process of globalization of water, however, is a process driven not by any overarching framework to address inequality, but rather by a harsh economic logic responding to demographic and environmental change.¹⁰⁶

A key dimension of this virtual trade in water is that some states facing food security issues are seeking to entrench virtual water trading relationships through what is widely termed a “land grab,” especially in Africa.¹⁰⁷ To this end, states such as China, India, Korea, and the Gulf States have leased large tracts of agricultural land in sub-Saharan countries such as the Democratic Republic of the Congo, Ethiopia, and Kenya.¹⁰⁸ For example, Saudi Arabia has scaled back local production of wheat because of the pressure this places on its aquifers and has instead leased around 380,000 hectares of land in Sudan to grow wheat and rice.¹⁰⁹ This phenomenon is concentrated in states in the global South, but is not taking place exclusively in developing nations. For instance, the Qatar government’s sovereign wealth fund is investing heavily in prime pastoral land in Australia, while the Australian government is considering whether to place limits on foreign acquisition of rural land.¹¹⁰

D’Odorico and his co-authors have noted that the effect of the virtual water trade is to allow societies with the financial capacity to import food to exceed their “local water budget.”¹¹¹ D’Odorico and his co-authors have also noted that this practice has significant short-term benefits, allowing societies to address pressing problems such as famine, and can be used from time to time to address threats that could, in the worst case scenario, involve armed conflict.¹¹² They note

105. *Id.*

106. See *id.* (noting that in 2000, five percent of the “worldwide water flow was channeled through just one link between two ‘rich club’ members—the US and Japan”).

107. *Id.*

108. *Maplecroft Index Identifies Bahrain, Qatar, Kuwait and Saudi Arabia as World’s Most Water Stressed Countries*, *supra* note 81.

109. Ananthaswamy, *supra* note 77, at 10.

110. Cameron Houston & Royce Millar, *Qatar Land Grab Angers Bush*, *THE AGE*, (June 19, 2011), <http://www.theage.com/au/victoria/qatar-land-grab-angers-bush-20110618-1g99l.html>.

111. Paolo D’Odorico et al., *Does Globalisation of Water Reduce Societal Resilience to Drought?*, 37 *GEOPHYSICAL RES. LETTERS* L13403, ¶ 1 (2010).

112. *Id.*

that “[t]he trade and transport of virtual water appears to be a great remedy to short term local water deficit.”¹¹³

Left unconstrained, however, the globalization of water in the long term may generate severe structural problems and drive an allocation of water directly in conflict with a unified, distributively fair water ethic, particularly under the effects of climate change. First, it will support population growth in areas that are water poor, and make these areas highly dependent on the flow of virtual water from areas that are water rich. This has the effect of disconnecting societies from the food production systems and water resources that they rely upon. Second, it will reduce the capacity of societies in areas that are water rich to make decisions about their own water resources, and can prevent them from taking appropriate steps to deal with phenomena such as droughts made more severe by climate change. D’Odorico and his co-authors therefore advocate what they term “water solidarity, whereby (1) long distance transport of food occurs mainly in times of crop failure and food shortage, and (2) it does not let the available resources exceed the carrying capacity that the region would have in periods with no drought.”¹¹⁴

VI. CONCLUSION

At the Rio+20 U.N. Conference on Sustainable Development in 2012, global attention will be focused on the achievements and failures of global environmental governance in the twenty years since the U.N. Conference on Environment Development, and the management of water is likely to be an issue front and center in the discussions. At the 1992 Rio Earth Summit, significant attention was given to issues of freshwater scarcity and the declining health of freshwater ecosystems worldwide.¹¹⁵ Water issues were addressed in detail in Agenda 21, the comprehensive plan of action to address global environmental challenges.¹¹⁶ Showing remarkable prescience, Agenda 21 recognized the potential impacts of climate change on water resources, noting that the phenomenon was likely to put “strains on the already fragile balance between supply and demand in many countries.”¹¹⁷ It also set out an ambitious “overall objective . . . to satisfy the freshwater needs of all countries for their sustainable development.”¹¹⁸

113. *Id.* ¶ 11.

114. *Id.*

115. U.N. Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, Agenda 21, U.N. Doc. A/CONF.151/26/Rev.1.

116. *Id.*

117. *Id.* ¶ 18.82.

118. *Id.* ¶ 18.7.

Although it set a global goal, the specific activities and means of implementation identified in Agenda 21 were focused primarily on achieving integrated water resources management at the level of catchment basins that fall within individual states or that are shared by several nations.¹¹⁹ Hence the Earth Summit did not set out a clear blueprint for addressing systemic problems of hydrological disadvantage at a global scale. Indeed the reference in Principle 2 of the Rio Declaration to the “sovereign right” of states “to exploit their own resources pursuant to their own environmental and developmental policies”¹²⁰ is in tension with a global water ethic based on principles of distributive justice.

Given the growing proportion of the world’s population afflicted by water scarcity, McCaffrey’s argument that “the time has come to view fresh water in global terms”¹²¹ is more compelling than it has ever been. McCaffrey freely acknowledged that translating this perspective into legal form is in no way a straightforward task.¹²² Progress is possible, however, if there is acceptance at a conceptual level that the supply of freshwater resources is a common concern of humankind and should be considered in global terms, even if the operationalization of alleviating hydrological disadvantage will often need to be played out on a much more localized scale.¹²³

To some extent the incorporation of concerns of global justice within international water law is foreshadowed by the Millennium Development Goals and also by U.N. General Assembly Resolution 64/292 in 2010, which recognized “the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights.”¹²⁴ These are limited steps toward a reconceptualized international water law; however, as a rights-based approach, they are based on an assumption that individual governments or small groupings of states will be in a position to meet the water needs of their citizens. In reality, the forces unleashed by climate change and by virtual water trading are placing the challenge of equitable water distribution beyond the capacity of individual governments or basin states to achieve. The U.N. Watercourses Convention provides valuable guidance on many issues critical to integrated

119. *Id.* ¶¶ 18.7–18.9.

120. United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), Annex I (Aug. 12, 1992).

121. MCCAFFREY, *supra* note 15, at 168.

122. “The concept of ‘equity’ or ‘equitable allocation’ should be applied to [uneven distribution of the world’s fresh water]. It will not be easy.” *Id.*

123. Falkenmark & Lundqvist, *supra* note 8, at 209–10.

124. G.A. Res. 64/292, ¶ 1, U.N. Doc A/Res/64/292 (Aug. 3, 2010).

water management; however, it remains tethered to a conception of freshwater as a resource within sovereign control rather than as a commodity that is and must be a global public good. As contended in this Article, nothing short of a fundamentally reimagined international water law, accompanied by a system that can achieve directly or indirectly the transfer of water from areas of greatest supply to those of greatest need, is required if hydrological disadvantage is to be effectively addressed.