

SHARING HIMALAYAN GLACIAL MELTWATER: THE ROLE OF TERRITORIAL SOVEREIGNTY

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INTRODUCTION

Mountain glaciers around the world are melting.¹ The Intergovernmental Panel on Climate Change and the World Glacier Monitoring Service both predict that the Andean and Himalayan glaciers, sources of freshwater for millions of people, will retreat irreversibly in the coming decades, forever releasing their savings accounts of freshwater.² Glacial retreat portends significant global justice consequences: seventy-seven percent of the world's freshwater resources is stored in ice—either in the polar ice caps or mountain

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1. See, e.g., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 493 (2007) [*hereinafter* CLIMATE CHANGE 2007] (warning that Himalayan glaciers could disappear by 2035 if they continue retreating at their present rates); UNITED NATIONS ENVIRONMENTAL PROGRAM & WORLD GLACIER MONITORING SERVICE, GLOBAL GLACIER CHANGES: FACTS AND FIGURES 29 (n.d.), <http://www.grid.unep.ch/glaciers/pdfs/glaciers.pdf> [*hereinafter* GLOBAL GLACIER CHANGES] (warning that current climate changes could lead to the disappearance of glaciers in many mountain ranges in the next few decades); WORLD WILDLIFE FUND NEPAL PROGRAM, AN OVERVIEW OF GLACIERS, GLACIER RETREAT, AND SUBSEQUENT IMPACTS IN NEPAL, INDIA AND CHINA 1-2 (2005), *available at* <http://assets.panda.org/downloads/himalayaglaciersonline2005.pdf> [*hereinafter* OVERVIEW OF GLACIERS] (discussing the effects of climate change on alpine glaciers); David Adam, *Water for Millions at Risk as Glaciers Melt Away*, THE GUARDIAN, Oct. 11, 2006, at 13, *available at* <http://www.guardian.co.uk/environment/2006/oct/11/glaciers.travelnews>; Richard Black, *Water – Another Global “Crisis”?*, BBC NEWS, Feb. 2, 2009, *available at* <http://news.bbc.co.uk/2/hi/science/nature/7865603.stm> (graphing glacier melt by region, using data collected by the Intergovernmental Panel on Climate Change).

2. WORKING GROUP II TECHNICAL SUPPORT UNIT, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE AND WATER 28 (2008), *available at* <http://www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf>; GLOBAL GLACIER CHANGES, *supra* note 1, at 29.

glaciers.³ While the polar ice caps store most of the water, mountain glaciers nonetheless bank a portion that is significant, not just in quantity but also in accessibility. In light of the extreme freshwater shortages experts predict, glacial water is of extraordinary value and waste of this resource is to humanity's peril.⁴

A close examination of the Ganges-Brahmaputra River Basin highlights starkly the importance of glacial meltwater to the Himalayan region; it also underscores the complex security concerns and water justice issues so pervasive in Himalayan region politics.⁵ The Ganges-Brahmaputra River Basin significantly depends on glaciers as a primary source of freshwater, including slightly over 11,000 glaciers resting in Nepal, India, the Tibetan plateau, and Bhutan. The vast majority of these glaciers rest in Chinese territory.⁶ These glaciers supply water for Nepal, India, China, Bhutan, and Bangladesh.⁷ Aside from feeding the many rivers and lakes of the Ganges-Brahmaputra River Basin with year-round fresh water, the 11,000 glaciers comprise 2,571.8 cubic kilometers of ice or 617 cubic

3. The oceans store over 97% of the world's water; glaciers and ice caps store only 2% of the total water supply, but 77% of the world's freshwater. PETER G. KNIGHT, *GLACIERS* 12 (1999). Although much of this freshwater is locked away in polar ice caps and glaciers, mountain glaciers account for 0.12% of the world's freshwater. UNITED NATIONS WORLD WATER ASSESSMENT PROGRAMME, *WATER FOR PEOPLE, WATER FOR LIFE* 68 (2003), available at <http://www.unesco.org/water/wwap/wwdr/wwdr1/>. In comparison, rivers account for just 0.006% of the world's freshwater. *Id.*

4. OVERVIEW OF GLACIERS, *supra* note 1, at 3 (estimating that reduced water flows in the Ganges caused by lost glacial meltwater could lead to water shortages for 500 million people and 37% of India's irrigated land).

5. Regarding water conflicts and water security in the region, see generally Surya P. Subedi, *Conclusions and Recommendations*, in *INTERNATIONAL WATERCOURSES LAW FOR THE 21ST CENTURY: THE CASE OF THE RIVER GANGES BASIN* 247, 247-50 (Surya P. Subedi ed., 2005) (describing the lack of a cohesive approach to water management in the region and lamenting the lack of "foresight and wisdom to achieve meaningful cooperation in the area"); B.C. UPRETI, *POLITICS OF HIMALAYAN RIVER WATERS: AN ANALYSIS OF THE RIVER WATER ISSUES OF NEPAL, INDIA, AND BANGLADESH* (1993) (outlining the challenges facing the Himalayan region regarding multilateral riparian cooperation); Shawkat Alam, *An Examination of the International Environmental Law Governing the Proposed Indian River-Linking Project and an Appraisal of its Ecological and Socio-Economic Implications for Lower Riparian Countries*, 19 *GEO. INT'L. ENVTL. L. REV.* 209 (2007) (exploring the conflict between Bangladesh and India over the proposed project); Salman M.A. Salman & Kishor Uprety, *Hydro-politics in South Asia: A Comparative Analysis of the Mahakali and the Ganges Treaties*, 39 *NAT. RESOURCES J.* 295 (1999) (discussing the water politics of India, Nepal, and Bangladesh).

6. *MAP OF GLACIER RESOURCES IN THE HIMALAYAS* 7-1-7-7 (Qin Dahe ed., 1999).

7. *Id.* at 7-1.

miles of frozen water—water that scientists predict the glaciers will soon release.⁸

Although artificially inducing the retreat of glaciers may not be ecologically or climatologically wise, the Himalayan region nonetheless has an interest in storing glacial meltwater that represents the amount of glacial melt in excess of historic levels.⁹ First, the region is heavily reliant on the Himalayan rivers for much of its freshwater needs, including sanitation, drinking water, agricultural and industrial development, and hydroelectricity.¹⁰ Thus, diversion and storage of the water is a rational choice—it would allow the region to maximize the beneficial uses of the water.¹¹ Second, diversion and storage would forestall the potentially catastrophic consequences of glacial melt, such as glacial lake outburst floods and sea-level rise, which threaten many low-lying States—in particular Bangladesh, a country that depends on Himalayan glacial meltwater as a main freshwater source.¹²

The States most well-positioned, inclined, and capable of water storage projects of such tremendous capacity are likely to be the

8. *Id.*

9. While the supply of water will initially increase with rising temperatures, as frozen water storage melts away, these supplies will disappear, too. XU JIANCHU ET AL., THE MELTING HIMALAYAS: REGIONAL CHALLENGES AND LOCAL IMPACTS OF CLIMATE CHANGE ON MOUNTAIN ECOSYSTEMS AND LIVELIHOODS 7 (2007). Combined with population growth and increased water consumption, climate change could lead to calamitous water shortages in the region by 2050. *Id.*

10. BHIM SUBBA, HIMALAYAN WATERS: PROMISE AND POTENTIAL PROBLEMS AND POLITICS 87 (2001) (explaining the uses and stresses on water resources in the region); *see also* OVERVIEW OF GLACIERS, *supra* note 1, at 4 (discussing the consequences of decreased water flows in Nepal); Sumit Ganguly & Manjeet S. Pardesi, *India Rising: What is New Delhi to Do?*, 24 WORLD POL'Y J. 9, 14 (2007) (describing India's current water challenges).

11. SUBBA, *supra* note 10, at 171 (identifying possible uses of stored water).

12. While the plains face the threat of an increase the frequency and severity of floods caused by glacial melt, the more serious threats are in the mountains. OVERVIEW OF GLACIERS, *supra* note 1, at 3-4. As glaciers retreat, they leave behind depressions and moraine deposits, where glacial lakes can form. These lakes are prone to bursting; the resulting glacial lake outburst flood (GLOF) carries with it not just water but also moraine deposits, wreaking havoc on downstream communities and infrastructure. *Id.* For a detailed explanation of GLOFs, see MICHAEL HAMBREY & JÜRIG ALEAN, GLACIERS 253-69 (2d ed. 2004). *See also* SAMJWAL RATNA BAJRACHARYA, PRADEEP KUMAR MOOL & BASANTA RAJ SHRESTHA, IMPACT OF CLIMATE CHANGE ON HIMALAYAN GLACIERS AND GLACIAL LAKES: CASE STUDIES ON GLOF AND ASSOCIATED HAZARDS IN NEPAL AND BHUTAN 3-4 (2007) *available at* <http://books.icimod.org/index.php/downloads/publication/169> (recounting past GLOFs in the region). Sea level rise carries with it many hazards, including increased flooding, coastal erosion, and increased salinization of groundwater supplies. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 48-49 (2007) *available at* <http://www.ipcc.ch/ipccreports/ar4-syr.htm> [*hereinafter* SYNTHESIS REPORT 2007].

wealthier upper riparian States.¹³ This raises a number of interesting and important questions: Does the water, and all rights to benefit from the water, belong to the upper riparian States where the glaciers currently rest? Or, because the glacial meltwater would otherwise run its course through an interconnected, transboundary water system, do lower riparian States also have rights vis-à-vis that glacial meltwater? Unless international law, either customary or treaty, provides downstream or otherwise interconnected States with rights vis-à-vis glacial meltwater and, conversely, imposes duties on upper riparian States, downstream States are at the mercy of seasonal rivers, lakes, and aquifers.

This brief article begins to explore the theoretical underpinnings of the law of non-navigational uses of international watercourses in light of the imminent significance of glaciers as controversial international natural resources. This article critically assesses the scope of the law, specifically whether the Himalayan glaciers that feed the major river basins of the region are included within the scope of the law. Specific substantive rights and duties aside, consideration of whether the law is adequate in scope is germane to understanding whether the law of international watercourses is a good framework under which States should deliberate and cooperate regarding glacial meltwater issues.

Part I of this article describes the basic glacier formation and decay processes and the characteristics that give glaciers an international dimension. Part II considers the foundational property-based tenets of the law of international watercourses, emphasizing the role of territorial sovereignty, even as a limited territorial sovereignty approach currently reigns. Part III examines whether mountain glaciers that exhibit certain international characteristics are subject to international watercourse law. The article concludes that the precept of territorial sovereignty heavily influences our current understanding of the law of international watercourses, and leads to a restricted scope of the law. Thus, as currently understood, the law of non-navigational uses of international watercourses engenders an insufficient identification of important international glaciers and

13. China accounts for almost half of all large dams in the world, with over 22,000; India also ranks in the top five, with over 4,000. WORLD COMMISSION ON DAMS, DAMS AND DEVELOPMENT: A NEW FRAMEWORK FOR DECISION-MAKING 9 (2000) available at <http://www.dams.org/report/>. In contrast, just 1% of irrigation water in Nepal and Bangladesh comes from dams. *Id.* at 13.

therefore likely fails to provide an adequate framework for redressing the concerns of downstream States, such as Bangladesh.

I. BACKGROUND ON GLACIERS

A. Basic Overview of Glaciers

Glaciers form from highly compacted snow, often at the base of mountains.¹⁴ When snow falls at a greater rate than it melts, a portion of the snow remains throughout the year.¹⁵ Then, when new snow falls, it densely packs the snow remaining on the ground, hardening and insulating it.¹⁶ As this process repeats itself over a series of years, the base layers of snow transform into ice and form a glacier.¹⁷

As glaciers age, they grow and retreat simultaneously. Glaciers melt throughout the year, even as snow accumulates. In summer, warmer air temperatures and solar radiation melt the surface of the glaciers, while the pressure of amassing ice and geothermal activity cause the base of the glacier to melt even in winter.¹⁸ Melting glacial ice moves through the glacier in several ways. Some of this melting ice travels unobstructed to the glacier's snout through surface streams, internal channels, and along the glacier bed.¹⁹ In other cases, snow and ice dams temporarily trap some water either on the surface of the glacier, within the glacier, or along the glacier bed, storing it until the dam breaks.²⁰ Other water remains in deep slush at the edge of the glacier and in the ground beneath the glacier.²¹

This complex drainage system makes tracking glacial meltwater difficult.²² As global temperatures rise and glaciers melt faster, this meltwater will become increasingly important. Initially, glacial retreat is likely to flood riverbeds with water as more water than the glaciers otherwise supply is released; following that, however, the absence of the glaciers portends dry river beds except as rain or snowfall may

14. SUBBA, *supra* note 10, at 42-43.

15. *Id.* at 42.

16. HAMBREY & ALEAN, *supra* note 12, at 25-27.

17. *Id.*

18. SUBBA, *supra* note 10, at 46-47.

19. HAMBREY & ALEAN, *supra* note 12, at 122.

20. KNIGHT, *supra* note 3, at 95-96.

21. *Id.*

22. *See* HAMBREY & ALEAN, *supra* note 12, at 127.

supply water.²³ This means less freshwater storage, more potentially catastrophic floods from glacial lakes, and economic losses from industries reliant on a constant supply of water.²⁴

B. The International Nature of Glaciers

Those glaciers that may be considered international and their meltwater can be generally thought of in two categories for legal purposes—transboundary glaciers, those that straddle international borders, and glaciers that exist entirely within a single State's territory. Either of these types of glaciers could be an international glacier. First, a glacier and its meltwater may be transboundary either because the glacier itself straddles an international boundary or because its meltwater traverses one or more international borders. The Siachen glacier is an example of the former scenario. Five of the six largest glaciers outside of the polar regions reside in the Karakoram Range, which spans Pakistan, India and China.²⁵ The largest of these glaciers, the Siachen Glacier, is seventy-five kilometers long, stretches over 450 square kilometers, and extends across the border between India and Pakistan.²⁶ In fact, the Siachen glacier may be a harbinger of what is to come—India and Pakistan have been warring over this territory since 1984, but not necessarily out of concern for freshwater resources.²⁷ Although the Siachen glacier feeds the Indus River, which is indisputedly a transboundary river,²⁸ one could imagine a scenario in which a transboundary glacier

23. See generally INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: IMPACTS, ADAPTATION, AND VULNERABILITY 208-09 (2001); OVERVIEW OF GLACIERS, *supra* note 1, at 3; Fred Pearce, *Flooded Out*, NEW SCIENTIST, June 5, 1999.

24. OVERVIEW OF GLACIERS, *supra* note 1, at 3-4 (enumerating adverse consequences of glacial melt).

25. SUBBA, *supra* note 10, at 45.

26. *Id.*

27. See Neal A. Kemkar, *Environmental Peacemaking: Ending Conflict Between India and Pakistan on the Siachen Glacier Through the Creation of a Transboundary Peace Park*, 25 STAN. ENVTL. L.J. 67, 77-78 (2006). This territorial dispute dates back to partition, when India and Pakistan agreed on a cease-fire line up to the glacier, leaving the status of the glacier itself unclear. *Id.* at 75-76. However, India claims ownership over the territory in part because the glacier is the source of the Nubra River, which flows through India before joining the Indus. See *id.* at 77. See also Tim McGirk with Avarind Adiga, *War at the Top of the World*, TIMEASIA, May 4, 2005, available at <http://www.time.com/time/asia/covers/501050711/story.html> (reviewing the history of the dispute and the current situation).

28. Kemkar, *supra* note 27, at 77.

did not feed an international water body, instead melting into a confined, subglacial lake.²⁹

As an example of the latter scenario, a glacier wholly within the sovereign territory of one State could melt in such a way as to create a glacial lake that crosses an international border, or such a glacier could melt and feed a shared aquifer, giving the glacier's meltwater an international, transboundary character.³⁰ These situations clearly give rise to an international water resource because it is clearly established that a water resource that either traverses or carves an international border is an internationalized water resource.³¹ Additionally, a glacier that rests wholly within the sovereign territory of a single State may feed a river or lake as part of a watershed that extends beyond a single State's borders.³² Many glaciers feed rivers in neighboring countries, giving them an indisputably international character. For example, the East, Central and West Rongbuk Glaciers at the base of Mount Everest in Tibet flow into the Rong River, which then flows into Nepal's Arun River.³³ Tibet's Pumori Glacier also flows to the Arun River via the Rong River, while the Kangshung Glacier drains into the Arun through the Kama River.³⁴ As these examples demonstrate, it is easy to conjure examples of glacial water exhibiting some international character.

III. THE EVOLVING ROLE OF TERRITORIAL SOVEREIGNTY IN INTERNATIONAL WATERCOURSE LAW

International watercourse law is predicated on a number of property-based theories that give rise to varying degrees of rights and obligations, all based on the concept of territorial sovereignty, which provides States the exclusive right to use the land, water, and other

29. On subglacial lakes generally, see generally HAMBREY & ALEAN, *supra* note 12, at 21, 118, 153-57.

30. See, e.g., KNIGHT, *supra* note 3, at 93-122 (explaining the structure and drainage of glaciers).

31. The United Nations Convention on the Non-Navigational Uses of International Watercourses, G.A. Res. 51/229, U.N. Doc. A/RES/51/229 (May 21, 1996) (defining an international watercourse as "a watercourse, parts of which are situated in different states). See, e.g., ILC, Commentary, *Draft Articles on the Law of the Non-Navigational Uses of International Watercourses*, ¶ 222, pt. 1, art. 2(a), commentary (2) ("The most common examples [of international watercourses] would be a river or stream that forms or crosses a boundary, or a lake through which a boundary passes.").

32. See *supra* notes 18-24 and accompanying text.

33. ENCYCLOPEDIA BRITANNICA ONLINE, MOUNT EVEREST (2009), <http://www.search.eb.com/eb/print?articleId=108438&fullArticle=true&tocId=9108438>.

34. *Id.*

resources found within its borders. These theories include absolute territorial sovereignty, absolute territorial integrity, and limited territorial sovereignty—all variations on the degree to which a State must consider the transboundary effects of its use of its water resources. This section explores the role of territorial sovereignty in international watercourse law by defining the different theoretical approaches that States' have used to negotiate and argue the parameters of international watercourse law. It concludes that limited territorial sovereignty is properly seen as a move away from absolute territorial sovereignty, but that the core concept of territorial sovereignty remains influential and dominant in defining the parameters of international watercourse law.

A. Absolute Territorial Sovereignty

The doctrine of absolute territorial sovereignty provides that States have exclusive sovereignty over their territory and that this sovereignty is unfettered by the interests of any other State, meaning that a State may exploit natural resources situated in its territory to the extent desired, regardless of any transboundary consequences.³⁵ Perhaps the earliest, the most direct, and the most famous articulation of absolute territorial sovereignty is then U.S. Attorney General Judson Harmon's assertion that the United States did not owe to Mexico a duty to desist its diversions of water from the Rio Grande so that Mexico could also enjoy the use of the river's waters.³⁶

Harmon rooted his property argument in three tenets of international law. First, that States enjoy sovereignty within its territory is axiomatic. Second, he based his argument on a longer-standing theory of jurisdiction that suggests that in the absence of an international or bilateral agreement, States are free to act in their best interests within their territory.³⁷ Third, in articulating the doctrine,

35. STEPHEN C. MCCAFFREY, *THE LAW OF INTERNATIONAL WATERCOURSES* 77 (Oxford Univ. Press 2007) (defining the Harmon Doctrine).

36. Judson Harmon, *Treaty of Guadalupe Hidalgo—International Law*, 21 OP. ATT'Y GEN. 274 (Dec. 12, 1895). The theory is also known as the Harmon Doctrine. See MCCAFFREY, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 77 (noting that the Harmon Doctrine is “virtually synonymous” with absolute territorial sovereignty). See *generally id.* at 76-110.

37. See MCCAFFREY, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 69 (defining “territoriality” and describing jurisdictional consequences); see also OPPENHEIM'S *INTERNATIONAL LAW* 384, § 118 (Sir Robert Jennings & Sir Arthur Watts eds., 9th ed. 1992). As evidence for this theory, Harmon relied on general principles of law relating to jurisdiction, citing the United States Supreme Court decision *Schooner Exchange v. McFadden*, 7 Cranch

Harmon relied on the idea that States may take action in the pursuit of self-preservation, though the concept of self-preservation is more accurately thought of as an excuse for taking a particular action rather than providing a right to take any action.³⁸

In important ways, however, these tenets are misapplied in the shared river context, and Harmon is not viewed as having expressed the customary law of the time.³⁹ Indeed, absolute territorial sovereignty still does not reflect customary law.⁴⁰ Perhaps most significant, no State prior to Harmon's assertion had identified absolute territorial sovereignty as a reason or justification for exploiting water resources to the detriment of a downstream riparian.⁴¹ However, despite States' general unwillingness to justify downstream implications on the grounds of absolute territorial sovereignty, States continue to assert their right to territorial sovereignty as a bedrock principle of international water law, often initiating negotiations and excusing participation in regional and bilateral agreements with reference to territorial sovereignty.⁴² In this way, even though absolute territorial sovereignty is not customary

116, 136, for the proposition that States enjoyed exclusive sovereignty. In that case, the Supreme Court noted that

The jurisdiction of the nation within its own territory is necessarily exclusive and absolute. It is susceptible of no limitation not imposed by itself . . . All exceptions, therefore, to the full and complete power of a nation within its own territories must be traced up to the consent of the nation itself.

Harmon, *supra* note 36, at 281-82 (citing *Schooner Exchange*, *supra*).

38. OPPENHEIM, *supra* note 37, at 426-27 (defining the concept of self-preservation).

39. See Stephen C. McCaffrey, *Water, Water Everywhere, But Too Few Drops to Drink: The Coming Fresh Water Crisis and International Environmental Law*, 28 DEN. J. INT'L. L. & POL'Y 325, 327 (asserting that "Harmon's conclusions were not supported, much less compelled, by the law as it existed at the time").

40. See generally Stephen C. McCaffrey, *The Harmon Doctrine One Hundred Years Later: Buried, Not Praised*, 36 NAT. RESOURCES J. 549 (1996) (arguing that the Harmon Doctrine should not be international law).

41. See McCAFFREY, INTERNATIONAL WATERCOURSES, *supra* note 35, at 113 (suggesting that while often asserted, states have seldom put the idea of absolute territorial sovereignty into practice); Jerome Lipper, *Equitable Utilization*, in THE LAW OF INTERNATIONAL DRAINAGE BASINS 15, 23 (Garretson et al. eds., 1967) ("Research has disclosed no evidence that the Harmon Doctrine was ever applied to contiguous rivers."). In fact, years after the United States had staked its claim to the waters of the Rio Grande based on its assertion of absolute territorial sovereignty, it renounced the doctrine, suggesting that the U.S. State Department had considered the recitation of what is now known as the Harmon Doctrine an obtusely biased position statement. See Joseph W. Dellapenna, *The Customary International Law of Transboundary Fresh Waters*, 1 INT'L. J. GLOBAL ENVTL. ISSUES 264, 270 (2001) (suggesting that the Harmon Doctrine did not reflect State practice).

42. See *id.* at 269 (noting that upper riparian States invariably begin negotiations by taking note of absolute territorial sovereignty).

international law, it is a powerful negotiating position, and it holds powerful political sway in international fora. Absolute territorial sovereignty remains an important and influential underlying principle in international water law.

B. Absolute Territorial Integrity

The principle of absolute territorial integrity provides that an upstream State may not undertake an activity that would affect the natural flow of water to the downstream State.⁴³ Some scholars and downstream States, suggest that the right to absolute territorial integrity provides downstream States with a veto power over the activities of upper riparian States, but the notion that absolute territorial integrity provides veto authority is generally not accepted.⁴⁴ Nonetheless, like upper riparian States, lower riparian States push absolute territorial integrity more as a negotiating tool than as customary law.⁴⁵ In fact, the substantive results of negotiated compromises between upper and lower riparian States suggest the erosion of the absoluteness of both principles, bridging the schism with a mitigated version of both—the principle of limited territorial sovereignty.⁴⁶

C. Limited Territorial Sovereignty

Limited territorial sovereignty represents the fundamental substantive underpinning of international water law, and, in fact, it is widely viewed as customary international law.⁴⁷ Built on compromise and middle ground, it attempts to meld the rights-based theories of absolute territorial sovereignty and absolute territorial integrity into a holistic, integrated framework through an expression of rights

43. See LIPPER, *supra* note 41, at 18 (relating territorial integrity to the common law concept of private water rights).

44. *Id.* (noting that no evidence supports the notion of territorial integrity resolving a dispute between coriparians, either in a tribunal or diplomatic settlement).

45. Dellapenna, *supra* note 41, at 269 (“Downstream states . . . generally open [negotiations] by claiming a right to the ‘absolute integrity of the watercourse.’”).

46. See MCCAFFREY, INTERNATIONAL WATERCOURSES, *supra* note 35, at 131-32 (concluding that neither absolute territorial sovereignty nor absolute territorial integrity are truly “absolute” in practice).

47. See LIPPER, *supra* note 41, at 38 (concluding, after thorough analysis of State practice, decisions of international panels and courts, and the writings of commentators and publicists, that limited territorial sovereignty “is a rule of international law”); see also MCCAFFREY, *supra* note 35, at 135 (noting that limited territorial sovereignty is “the prevailing theory of international watercourse rights and obligations today”).

coupled with an acknowledgement of duties.⁴⁸ The concept of limited territorial sovereignty is substantively interpreted as the right of territorial sovereignty and the corollary duty not to cause significant harm to the sovereign rights of other States.⁴⁹

While some scholars might argue that the birth of this principle represents a clear abdication of the principle of absolute territorial sovereignty, this principle hardly entirely renounces territorial sovereignty.⁵⁰ In fact, instead of integrating the concepts of territorial sovereignty and integrity, articulations of limited territorial sovereignty merely juxtapose the right to territorial sovereignty and the duty to protect the territorial integrity of other States.⁵¹ It is thus an abdication only of the extent of the right, not the right itself. The history of the law of international watercourses has evolved based on assertions of rights and negotiating positions, which, over time, has meant that expressions of rights have always subjugated the expression of duties—this is entirely evident in various iterations of “limited territorial sovereignty.”⁵² In most articulations of this principle, the right of territorial sovereignty remains influential and dominant, whereas the duty not to cause harm is more measured. In fact, it is never defined as simply the duty not to cause harm; at best,

48. See James O. Moermond III & Erickson Shirley, *Critical Essay: A Survey of the International Law of Rivers*, 16 DENV. J. INT'L L. & POL'Y 139, 145 (1987-1988) (noting the hybrid nature of limited territorial sovereignty).

49. See LIPPER, *supra* note 41, at 25 (describing early articulations of the limited territorial sovereignty doctrine, including France's position in its arbitration with Spain over withdrawals from Lake Lanoux, wherein France asserted “the sovereignty in its own territory” but also recognized “the correlative duty not to injure the interests of a neighboring State”); see also MCCAFFREY, *supra* note 35, at 135 (summarizing the principle of limited territorial sovereignty as territorial sovereignty confined by the duty not to cause significant harm to other States).

50. See, e.g., Dante A. Caponera, *Patterns of Cooperation in International Water Law: Principles and Institutions*, 25 NAT. RESOURCES J. 563, 568 (1985) (suggesting that the principles of reasonableness and equity, hallmark substantive beacons of limited territorial sovereignty, “mark the rejection” of absolute territorial sovereignty).

51. Although not solely applicable to freshwater resources, Principle 21 of the Stockholm Declaration espouses an analogous principle. Principle 21 identifies in clear terms the nature of the juxtaposition:

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Stockholm Declaration of the United Nations Conference on the Human Environment Principle 21, June 16, 1972, 11 I.L.M. 1416.

52. See *supra* notes 41-42 and accompanying text, describing assertions of rights as negotiating positions, rather any acknowledgment or even allegation of duties.

it is articulated as the duty not to cause *appreciable* harm and sometimes even the duty not to cause significant harm.⁵³

Because limited territorial sovereignty softens the substantive impact of absolute territorial sovereignty, rather than extinguishing the rights inherent in the principle of absolute territorial sovereignty, territorial sovereignty remains germane to international water law.⁵⁴ This is an important distinction for both the substance of the law and the scope of the law. As noted above, substantively, limited territorial sovereignty portends a definite deference to territorial sovereignty in its recognition that some level of harm to downstream States may be perfectly acceptable.⁵⁵ Thus, while no longer “absolute,” the concept of territorial sovereignty remains a significant justification and basis for State action. In terms of scope, States’ protection of their territorial sovereignty is likely a limitation on implementation of limited territorial sovereignty because upper riparian States, out of concern for their sovereign and exclusive right to the water situated in or flowing through their territory, are resistant to consent to agreements wherein substantive rights and duties are based on a limited territorial sovereignty paradigm.⁵⁶ In this way, many upper riparian States are not party to freshwater management agreements and therefore, the scope of those agreements only includes a portion

53. See G.A. Res. 51/229, *supra* note 31, art. 7 (stating “Watercourse States shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States”). When the ILC first presented its draft articles to the United Nations General Assembly, Article 7 was titled “Obligation not to cause appreciable harm.” International Law Commission, *Draft Articles on the Law of Non-Navigational Uses of International Watercourses: Draft Report of the International Law Commission*, U.N. GAOR, 43rd Sess., at 1, UN Doc. A/CN.4/L.463/Add/4 (1991). For a thorough discussion of the draft articles, see generally INTERNATIONAL WATER LAW: SELECTED WRITINGS OF CHARLES B. BOURNE (Patricia Wouters ed., 1997).

54. See LIPPER, *supra* note 41, at 33 (concluding that limited territorial sovereignty requires that states, in exercising their sovereignty, also consider their neighbors’ concerns).

55. See McCAFFREY, INTERNATIONAL WATERCOURSES, *supra* note 35, at 135 (explaining limited territorial sovereignty as an obligation not to cause significant harm). See Lake Lanoux Arbitration (Fr. v. Spain), 24 I.L.R. 101, 124 (Arbitral Trib. 1957) (taking note that Spain conceded France’s right to use water in French territory as long as it caused only a “limited amount of damage, a minimum of inconvenience” to Spain).

56. See R.R. Baxter, *The Indus Basin*, in THE LAW OF INTERNATIONAL DRAINAGE BASINS 452-58 (A.H. Garreston et al. eds., 1967). During a stalemate over the development of the Indus River, India held strong to its belief that India and Pakistan had “full and exclusive jurisdiction over the management, control and utilisation of natural waters available in their territories. *Id.* at 456. It was only when the two parties agreed temporarily to put legal considerations aside and allow both parties to withdraw water from the river while the parties negotiated that the stalemate was broken. *Id.* at 458.

of the relevant watercourse.⁵⁷ Thus, while limited territorial sovereignty may be the prevailing legal theory in the development of international water law,⁵⁸ States' protection of territorial sovereignty remains a limitation on the territorial expanse in which upper riparian States are willing to accept the duties flowing from a limited territorial sovereignty approach.⁵⁹

III. INTERNATIONAL GLACIERS AND THE SCOPE OF THE LAW OF INTERNATIONAL WATERCOURSES

To ascertain whether any rights or duties exist vis-à-vis glaciers and their meltwater, it is first imperative to examine the status of glaciers in international law and thus the scope of international watercourse law. Throughout the last century, the law of international watercourses has expanded to recognize that many more freshwater bodies than just transboundary rivers, lakes, and aquifers are sufficiently interconnected to warrant status under international law. Thus, after a historical examination of the scope of transboundary water resource law, this section turns to consider the evolution of the concept of "watercourse" as it is currently embodied in the 1997 UN Convention. This section concludes that, while the Convention includes a broad definition of its scope, the influence of territorial sovereignty has meant that the 1997 UN Convention is not customary international law and that it is unlikely to enter into force in its own right. This ultimately means that the law of non-navigational uses of international watercourses excludes many important international glaciers.

A. Transboundary Freshwater Bodies

Transboundary freshwater bodies—those freshwater bodies bisected by at least one international boundary—have long been exposed to the balance of rights and duties comprising international

57. See *infra* Part III.A.

58. Moermond & Erickson, *supra* note 48, at 145 (citing a number of scholars for the proposition that limited territorial sovereignty is generally accepted as international law).

59. See, e.g., Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, Apr. 5, 1995, 34 I.L.M. 864 (China and Burma, both upper riparians, failed to join this agreement on the development and use of the Mekong waters) [hereinafter Mekong Agreement]; Agreement for the Full Utilization of the Nile Waters, Nov. 8, 1959, Sudan-Egypt, 453 U.N.T.S. 6519 (Egypt and Sudan allocated all of the waters of the Nile between themselves, without including the eight riparian States above them).

law.⁶⁰ Early agreements reflect an understanding among co-riparians that cooperation was necessary for the most effective utilization of the major rivers that gave birth to early civilizations, such as the Nile and the Tigris-Euphrates, and the major rivers of the Himalayan region, such as the Indus, Yangtze, and Yellow rivers.⁶¹ But, while the earliest known water agreement resulted in an upstream diversion for agricultural purposes, controversies over non-navigational uses of shared water bodies arose much less frequently than disputes between upper and lower riparian States regarding the right to passage.⁶² Thus, agreements, disagreements, and pronouncements concerning the navigational uses of transboundary waters really gave rise to modern international water law, but the role of territorial sovereignty can be seen most clearly as the law evolved to include the non-navigational uses of transboundary waters.⁶³

Historical State practice regarding the navigational uses of shared freshwater bodies suggests that navigable rivers have long

60. See generally MCCAFFREY, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 58-64 (providing general history of the development of bilateral and regional cooperative agreements regarding water resources, including for both non-navigational and navigational purposes); see also Dellapenna, *supra* note 41, at 269-73 (examining the status of shared management of transboundary resources as customary international law). See also *id.* at 34 (noting that “[h]istorically, and indeed until very recently, [S]tate practice in the field of international watercourses was concerned almost exclusively with international rivers and lakes shared by two or more [S]tates”); see also Gabriel Eckstein, *Development of International Water Law and the UN Watercourse Convention*, in *HYDROPOLITICS IN THE DEVELOPING WORLD: A SOUTHERN AFRICAN PERSPECTIVE* 81-82 (Turton & Henwood eds., 2002) (highlighting that the principle *sic utere tuo ut alienam non laedus* is a longstanding principle of international water law first applied in cases of transboundary waters) [hereinafter Eckstein, *Development of International Water Law*].

61. See MCCAFFREY, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 58 (describing the nature of early civilizations to develop along major river courses and of these civilizations’ need to cooperate in support of agricultural development).

62. *Id.* at 181 (asserting that the demand of water resources for non-navigational purposes was far less controversial; instead, navigation disputes were more influential in shaping the nascent law of international watercourses); see also Eckstein, *Development of International Water Law*, *supra* note 59, at 82 (indicating that as early civilizations took root and grew, navigation became the dominant use of transboundary waterways and that international law on non-navigational uses only took shape as industrialization increased pressure on transboundary waterbodies).

63. MCCAFFREY, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 172-73 (highlighting that the earliest agreement in a compilation of water agreements relates to freedom to navigate the Rhine); see also Cecil J. Olmstead, *Introduction*, in *THE LAW OF INTERNATIONAL DRAINAGE BASINS* 3 (Garretson et al. eds., 1967) (stating that some states are reluctant to concede that international law is applicable to the whole of a drainage basin and that such reservations “probably [stem] in part from traditional notions of national sovereignty,” which have taken on greater significance as water value increases in the face of competing non-navigational uses).

been perceived as shared resources, subject to the navigation rights of all riparian States.⁶⁴ Early declarations of such navigation rights have their basis in Roman law, which provided that rivers were public resources and that all citizens retained the freedom of navigation.⁶⁵ For example, when Thomas Jefferson argued that the United States enjoyed freedom of navigation on the lower Mississippi, parts of which were subject to Spanish sovereignty, he reinforced his assertion with a reminder of a central tenet of Roman law: that rivers are rooted in nature and are open to all citizens for navigation (*flumina publica sunt, hoc est populi Romani*).⁶⁶ Importantly, Jefferson only claimed navigation rights to a clear transboundary waterbody—the Mississippi at that time crossed from the sovereign territory of the United States to the sovereign territory of Spain—and one to which the United States was riparian.⁶⁷ Spain ultimately agreed with the United States and averred as such by treaty.⁶⁸

The dynamic between Spain and the United States reflects the historical and current understanding of co-riparian States—it is clear that co-riparian States, for the most part, have formed relationships based on an understanding that they each have a commensurate right to freedom of navigation of transboundary watercourses.⁶⁹ The decision of the Permanent Court of Justice in the *River Oder* decision confirmed the nature of these relationships.⁷⁰ The Court identified a

64. See McCaffrey, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 172 (describing early state practice).

65. See Ludwik A. Teclaff, *Fiat or Custom: The Checkered Development of International Water Law*, 31 NAT. RESOURCES J. 45, 46 (1991) (tracing the history of navigation and noting that the Roman Republic first introduced the concept of freedom of navigation). Prior to the Roman doctrine, riparian tribes, cities, and local rules controlled navigation, which they viewed as a privilege deserving of reciprocal benefit. *Id.*

66. See McCaffrey, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 181-82 (stating that Jefferson's invocation of Roman law reflected the general understanding of legal scholars at the time).

67. *Id.* at 181.

68. *Id.* at 182. The Kingdom of Spain formally granted the United States liberty to navigate the Spain's stretches of the Mississippi in Article IV of the treaty of October 27, 1975. *Id.*

69. See generally *id.* at 183-84 (identifying a number of bilateral and regional agreements following on Jefferson's report to George Washington and a similar proclamation by the Provisional Executive Council of the French Republic stating that river-courses are common to all riparian States and therefore all riparian States enjoy inalienable freedoms vis-à-vis shared rivers).

70. The *River Oder* Decision resolved a dispute between Poland, on the one hand, and the six other members of the International Commission of the Oder over the navigational rights on the tributaries of the Oder. Territorial Jurisdiction of the International Commission of the River Oder, (Czech., Den., Fr., F.R.G., Gr. Br., Swed. and Pol.) 1929 P.C.I.J. (ser. A) No. 23, at 5-6 (Sept. 10). The two tributaries at issue, the Warta and Notec, rise in Poland and flow a

“common legal right” extending navigation rights to the whole of a navigable watercourse.⁷¹

Over time, States have also come to accept that they share rights and duties vis-à-vis co-riparian States as a matter of customary international law, even as regards non-navigational uses of clear transboundary resources. In the *Gabčíkovo-Nagymoros* decision, the International Court of Justice affirmed that Hungary and Czechoslovakia each had an equal right to the benefits of the Danube’s water resources, including the use of the water for hydropower, recreational enjoyment, fisheries, and other benefits, because the Danube lies contiguous to both Hungary and Czechoslovakia for a portion of its path and traverses the border of each.⁷² In arriving at this conclusion, the Court noted that both Hungary and Czechoslovakia enjoyed a customary right “to an equitable and reasonable sharing of the resources of an international watercourse.”⁷³ Thus, the case reinforces that transboundary

considerable distance through Poland, eventually crossing into Germany before joining the Oder in Germany. *Id.* at 25. Poland argued that these tributaries should be internationalized only “from [their] confluence with the Oder up to the Polish frontier,” retaining complete sovereignty over waters from those rivers within their territory. *Id.* at 14. The other members disagreed, contending that all navigable sections of the river should be internationalized, regardless of state boundaries. *Id.* The Court agreed, explaining that the purpose of internationalizing rivers was to provide freedom of navigation to all states, not just to riparian states. *See id.* at 28. Thus, the Court concluded that the Polish tributaries were internationalized as far as navigable. *Id.* at 29. *See id.* at 27 (holding that the common right of navigation extends to “the whole course of the river”).

71. The Court, by way of discussing the principle of navigation as it applied to downstream States seeking to navigate upstream tributaries situated wholly within sovereign territories, took note that:

[W]hen consideration is given to the manner in which States have regarded the concrete situations arising out of the fact that a single waterway traverses or separates the territory of more than one State, and the possibility of fulfilling the requirements of justice and the considerations of utility which this fact places in relief, it is at once seen that a solution of the problem has been sought not in the idea of a right of passage in favour of upstream States, but in that of a community of interest of riparian States. This community of interest in a navigable river becomes the basis of a common legal right, the essential features of which are the perfect equality of all riparian States in the use of the whole course of the river and the exclusion of any preferential privilege of any one riparian State in relation to the others.

Id. at 27. The International Court of Justice Case concerning the Gabčíkovo-Nagymoros project further develops the theory of community interest, relying on it to suggest that Czechoslovakia, by unilaterally acting without regard to the Danube River’s shared nature, deprived Hungary of its right to its share of the water resources. *Gabčíkovo-Nagymoros Project (Hung. v. Slov.)*, 1997 I.C.J. 7, ¶ 85 (Sept. 25) [hereinafter *Gabčíkovo-Nagymoros*]. On the “community of interests” theory generally, see Lipper, *supra* note 41, at 38-40. *See also* MCCAFFREY, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 147-67.

72. *See* *Gabčíkovo-Nagymoros*, *supra* note 71, at ¶ 85.

73. *Id.* ¶ 78.

waterbodies are subject to the rights and duties of customary international law.

Transboundary lakes, rivers, and aquifers ineluctably fall within the scope of international law. Thus, transboundary glaciers and transboundary meltwater, such as glacial lakes or streams that traverse an international border, are direct analogues of transboundary rivers, lakes, and aquifers, they most likely also fall well within the scope of the law of international watercourses. Therefore, even if a specific treaty does not apply to a particular transboundary glacier, the customs and principles of international water law apply. But neither treaty practice nor international adjudication nor arbitration exists specifically as to glaciers, and thus customs and principles have not been applied in glacier-related contexts. Moreover, very few glaciers actually traverse international borders and most are less directly connected to a transboundary waterbody, meaning that the more salient concern is whether international water law also encapsulates all physically interconnected waters and water sources.

B. Beyond a Transboundary Approach?

The notion that transboundary waterbodies are international resources, to which co-riparian States each have rights and duties is widely accepted.⁷⁴ However, questions remain, given concerns about territorial sovereignty, whether the scope of international law includes non-navigational uses of sovereign tributaries of international waterbodies and, more importantly, sub-tributaries and other less directly connected elements of a water system. The arbitral decision in the Lac Lanoux makes clear that international water law does consider hydrologic relationships and that this understanding has been folded into the scope of international watercourse law because the case concerns diversions from a lake wholly within

74. The United Nations Food and Agricultural Organization (FAO) lists over 2,000 international legal instruments relating to water resources, mostly in the form of bilateral agreements. MCCAFFREY, *INTERNATIONAL WATERCOURSES*, *supra* note 35, at 62. Based on member states' responses to the Secretary General's questionnaire regarding the laws and legislation in force in member states, the Secretary General noted that many of the national laws treated water as a "natural resource which should be utilized for the common good." The Secretary General, *Supplementary Report Submitted by the Secretary-General Pursuant to General Assembly Resolution 2669 (XXV)*, Legal Problems Relating to the Non-Navigational Uses of International Watercourses, *The Law of the Non-Navigational Uses of International Watercourses*, U.N. DOC. A/CN.4/274 (1974), reprinted in [1974] 1(2) Y.B. INT'L L. COMM'N 265, 272, ¶ 13.

France's territory but that feeds rivers traveling through Spain.⁷⁵ What is less clear is the extent of this understanding, or rather the extent to which water resources that lie wholly within the sovereign territory of one State are subject to international law when the interconnectedness is more attenuated than an immediate physical relationship to some transboundary freshwater resource.⁷⁶

1. The Lac Lanoux Arbitration

The Lac Lanoux arbitration is the starting point for examining the status of sovereign waterbodies interconnected to international river systems. Lac Lanoux is situated entirely within the borders of France in the Eastern Pyrenees.⁷⁷ The lake feeds two river basins, one that drains into Spain by way of the Font-Vivres and Carol rivers and one that travels through France via the Ariège and Garonne rivers.⁷⁸ In 1950, France proposed to divert water from Lac Lanoux for the purpose of generating hydropower.⁷⁹ Spain took offense to this because it would affect the flow of the Carol river, which crosses the border from France into Spain.⁸⁰ After some negotiation, France agreed that it would replenish water to the Carol via a manmade diversion, thus ensuring that the flow of the Carol remained consistent with historical levels.⁸¹ Nonetheless, Spain opposed any diversion on the grounds that it would "modif[y] the natural conditions of the hydrographic basin"⁸² and, relatedly, that France could not undertake such a project without arranging a prior agreement with Spain.⁸³

75. Lake Lanoux Arbitration, *supra* note 55, at 101-02. For a discussion of that Arbitration, see *infra* notes 76-85 and accompanying text.

76. See, e.g., Comments and Observations Received from Governments: General Comments of Costa Rica, *The Law of the Non-Navigational Uses of International Watercourses*, in *documents of its forty-fifth session*, [1993] II (1) Y.B. INT'L L. COMM'N 145, 151, ¶ 9, U.N. DOC. A/CN.4/447 and Add.1-3 (questioning whether "the circumstance of [a river] crossing a small part of the territory of a neighbouring State and flowing into its waters [would] be sufficient to qualify that entire river or tributary as an 'international watercourse'").

77. Lake Lanoux Arbitration, *supra* note 55, at 101.

78. *Id.* at 101-02.

79. See *id.* at 107. The subject of diverting waters from Lac Lanoux first arose in 1917, and was the subject of dialogue between Spain and France until 1930, when world events took precedence. In 1949, the two countries renewed their dialogue; in 1950, a French hydropower company applied for, and was granted, a concession from the French Government to divert waters from Lac Lanoux to the River Ariege. *Id.* at 105-07.

80. *Id.* at 112.

81. *Id.* at 109-10.

82. *Id.* at 124.

83. *Id.* at 113-14.

In addressing these issues, the arbitral tribunal implicitly spoke to the extent of international water law. The panel recognized, by way of background, prior to arriving at any substantive conclusions, that the waters of Lac Lanoux, though wholly situated within the sovereign territory of France, are nonetheless an element of an international water system because of the interconnectedness of the lake and at least one transboundary river system.⁸⁴ The panel pointed out that “there is a rule prohibiting the upper riparian State from altering the waters of a river in circumstances calculated to do serious injury to the lower riparian State.”⁸⁵ By so stating, the Panel confirmed that the customary international water law regarding non-navigational uses includes within its scope lakes and other waterbodies that, though wholly situated within a sovereign territory, feed an international watercourse.⁸⁶

In this regard, the arbitral panel made no distinction among waterbodies directly connected to transboundary rivers and those that are less directly connected, but the facts of the dispute did not cause the panel to delve any deeper into the matter of the scope of international law.⁸⁷ To say that this decision wholly endorses a water-system approach is an overstatement, but it does begin to lay the groundwork for a broader approach to international water law.⁸⁸ In fact, following this decision, the International Law Association, took up codification and development of the law of international water resources and promoted a drainage basin approach to defining the scope of international water law.

2. The Helsinki Rules

The Helsinki Rules on the Uses of Waters of International Rivers, adopted by the International Law Association (ILA) in 1966

84. *Id.* at 125 (“The Tribunal does not overlook the reality, from the point of view of physical geography, of each river basin, which constitutes . . . a ‘unit.’”).

85. *Id.* at 129.

86. See John G. Laylin & Rinaldo L. Bianchi, *The Role of Adjudication in the International River Disputes*, 53 AM. J. INT’L L. 30, 43-45 (1959) (explaining the Tribunal’s decision to limit France’s sovereignty over international rivers and lakes in certain instances).

87. See J.G. LAMMERS, POLLUTION OF INTERNATIONAL WATERCOURSES 516-17 (1984) (noting that the Tribunal simply applied the principle of good neighborliness to the riparian context).

88. “The unity of a basin is sanctioned at the juridical level only to the extent that it corresponds to human realities.” Lake Lanoux Arbitration, *supra* note 55, at 125. See Samuel A. Bleicher, *An Overview of International Environmental Regulation*, 2 ECOLOGY L.Q. 1, 25-27 (1972) (noting that although France prevailed, it did not have unfettered discretion in its use of waters from Lake Lanoux).

as one of the earliest attempts at codifying the emerging international law governing the uses of transboundary rivers, identifies the rules pertaining to “international drainage basins.”⁸⁹ An international drainage basin is more than simply a transboundary river, it is the entire geographic area of a watershed.⁹⁰ The definition identifies the limits of any given watershed as a water system, comprising both the surface and ground waters and co-terminating at a single point of outflow.⁹¹ The rules thus contemplate a broad understanding of the freshwater resources subject to international water law. In fact, under this theory, even a wholly sovereign tributary to a transboundary river attains international status despite it lacking a transboundary nature of its own.⁹² Or, a domestic lake, if interconnected through surface waters or even groundwaters to a watershed spanning an international border, falls within the purview of international law as

89. International Law Association, *Helsinki Rules on the Uses of the Waters of International Rivers*, 52 INT'L L. ASS'N REP. CONF. 484, 484 (1966) [*hereinafter* Helsinki Rules]. The Helsinki Rules have been superseded by the Berlin Rules, adopted in 2004, but the Helsinki Rules remain the more authoritative and widely recognized set of rules. International Law Association, *Berlin Rules on Water Resources*, 71 INT'L L. ASS'N REP. CONF. 334, 343 (2004), available at <http://www.ila-hq.org/download.cfm/docid/B6F3AD1C-11B5-45A389534097AD1FE E95>.

90. Helsinki Rules, *supra* note 89, art. 2 cmt. b at 485 (elaborating on the elements of a basin).

91. Art. 2 provides that “[a]n international drainage basin is a geographical area extending over two or more States determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus.” *Id.* at 484-85. See Stephen C. McCaffrey, *International Organizations and the Holistic Approach to Water Problems*, 31 NAT. RESOURCES J. 139, 141-44 (1991) [*hereinafter* McCaffrey, *Holistic Approach*] (explaining the scope of an international drainage basin); Teclaff, *supra* note 65 at 68-69 (briefly discussing the foundation of the Helsinki Rules); Gabriel Eckstein, *A Hydrogeological Perspective of the Status of Ground Water Resources Under the UN Watercourse Convention*, 30 COLUM. J. ENVTL. L. 525, 533-35 (2005) (acknowledging that some countries objected to the breadth of the term drainage basin and it was ultimately not incorporated in the 1997 UN Convention). See also Joseph W. Dellapenna, *Designing the Legal Structures of Water Management Needed to Fulfill the Israeli-Palestinian Declaration of Principles*, 7 PALESTINE Y.B. INT'L L. 63, 80 (1992-1994) (noting that the Helsinki Rules, while significant, have only persuasive value in international law); Joseph W. Dellapenna, *The Customary International Law of Transboundary Fresh Waters*, 1 INT'L J. GLOBAL ENVTL. ISSUES 264, 273-74 (2001) (commenting on the remarkable influence of the ILA as a non-governmental organization).

92. Helsinki Rules, *supra* note 89, art. 3 cmt. at 486 (including in its definition of basin state “all States whose territories contribute waters to the international drainage basin, whether or not ‘riparian’”). See McCaffrey, *Holistic Approach*, *supra* note 91, at 143 (“[T]he rules of international law stated by the Helsinki Rules apply not only to the main stem of a river, or to portions of a stream forming a boundary, but to tributaries of an international watercourse as well.”).

articulated by the ILA.⁹³ In either case, according to the Helsinki rules, any interconnected fresh water composing the drainage basin, no matter how far removed from a transboundary resource, is subject to international water law.

3. The 1997 United Nations Convention on Non-navigational Uses of International Watercourses

While the ILA conducted its work, the International Law Commission (ILC), established in 1948 by the United Nations Charter and charged with the codification and progressive development of international law, embarked on a mission to codify the law of international rivers.⁹⁴ This effort, initiated in 1970, culminated in the 1997 Convention on the Non-Navigational Uses of International Watercourses (1997 UN Convention).⁹⁵ While most of the Convention's substantive prescriptions are considered customary international law, the scope of the Convention remains highly contentious, in large part as a result of upper riparian States' reluctance to cede any sovereignty to the interests of lower riparian States.⁹⁶

Turkey expressed the sentiment and fears of upper riparian States when, during the debate of the draft articles at the UN General Assembly, it stated that "the term 'watercourse system' has also been

93. Helsinki Rules, *supra* note 89, art. 3 cmt. at 486 ("recogni[zing] . . . that underground waters may flow from a State without reaching the surface in its territory into the territory of other States in an international drainage basin where they contribute substantially to the surface flow").

94. Article 13(1)(a) of the Charter of the United Nations provides the authority for the United Nations General Assembly to convene a Commission dedicated to the codification and progression of international law. See U.N. Charter art. 13, para. 1a. The United Nations General Assembly convened the Commission on December 11, 1946 during the second half of its first meeting. See G.A. Res. 94(I), at 187 (Dec. 11, 1946), available at <http://daccessdds.un.org/doc/RESOLUTION/GEN/NR0/033/45/IMG/NR003345.pdf?OpenElement>. The Commission comprises 34 international law scholars, serving five-year terms. See United Nations, International Law Commission, <http://www.un.org/law/ilc/> (last visited Feb. 10, 2009).

95. United Nations, Resolution 2669 (XXV) (Dec. 8, 1970) (providing terms of reference for Commission's study of the law of the non-navigational uses of international watercourses), available at <http://daccessdds.un.org/doc/RESOLUTION/GEN/NR0/349/34/IMG/NR034934.pdf?OpenElement> (last visited Feb. 11, 2009). The ILC produced a set of draft Articles in 1991 and a second draft in 1994, after which the General Assembly instructed the Commission to pull together a draft convention for the member governments' consideration. *Draft Articles, supra* note 53; International Law Commission, *Draft Articles on the Law of Non-Navigational Uses of International Watercourses*, in *Report of the 46th Meeting of the International Law Commission*, UN Doc. A/49/10 (1994); United Nations Convention on the Law of Non-Navigational Use of International Watercourses, UN Doc. No. A. 51/869 (May 21, 1997).

96. See *infra* Part III.C.

given too broad a meaning. This term includes glaciers, canals and, especially, underground waters, and naturally leads to the sharing of these resources.”⁹⁷ Turkey posited that defining the scope of the treaty so broadly would unacceptably infringe the permanent sovereignty that States retain over the natural resources situated within their territory.⁹⁸ Despite States’ objections, the ILC nonetheless moved forward with a broad definition, though it did reject the ILA’s drainage basin approach.⁹⁹

97. Comments and Observations Received from Governments: General Comments of Turkey, *The Law of the Non-Navigational Uses of International Watercourses, in documents of its forty-fifth session*, [1993] II (1) Y.B. INT’L L. COMM’N 145, 168, ¶ 5, U.N. DOC. A/CN.4/447 and Add.1-3 [hereinafter Comments of Turkey]. The debate over the proper definition of an international watercourse extended over two and a half decades. See James L. Wescoat, Jr., *Beyond the River Basin: The Changing Geography of International Water Problems and International Watercourse Law*, 3 COLO. J. INT’L ENVTL. L. & POL’Y 301, 304 (1992) (tracing the evolution of the term “watercourse” in the 1997 UN Convention).

98. In discussions over the scope of waters included in the 1997 U.N. Convention, Turkey expressed its preference for a narrow scope, arguing that otherwise the result “would be inconsistent with the generally accepted principle of international law concerning the permanent sovereignty of States over their own natural resources.” Turkey further stated that it would only give its approval if the scope of the draft articles was limited in scope to surface waters. See Comments of Turkey, *supra* note 97, at 168, ¶ 5.

99. The contentious nature of defining the scope of the Convention is evidenced by the fact that the ILC took up the scope as one of its last items, after nearly 23 years of debate. See Stephen C. McCaffrey, Special Rapporteur, *Seventh Report on the Law of the Non-Navigational Uses of International Watercourses*, U.N. Doc. A/CN.4/436/Corr. 1-3 (Mar. 15, 1991); see also McCaffrey, *Holistic Approach*, *supra* note 91, at 153 (noting that the general lack of agreement regarding the definition of the term “watercourse” forestalled further pursuit of the matter at the outset of the ILC’s work). For a discussion of the ILC’s work on the scope of the Convention, see Margaret J. Vick, *International Water Law and Sovereignty: A Discussion of the ILC Draft Articles on the Law of Transboundary Aquifers*, 21 PAC. MCGEORGE GLOBAL BUS. & DEV. L. J. 191, 196-97 (2008). In 1980, the ILC agreed to a framework understanding of “watercourse” based on the idea that each watercourse is a system of interconnected waters and provided the following explanation of its understanding:

A watercourse system is formed of hydrographic components such as rivers, lakes, canals, glaciers, and groundwater constituting by virtue of their physical relationship a unitary whole; thus, any use affecting waters in one part of the system may affect waters in another part.

An “international watercourse system” is a watercourse system, components of which are situated in two or more States.

To the extent that parts of the waters in one State are not affected by or so not affect uses of waters in another State, they shall not be treated as being included in the international watercourse system. Thus, to the extent that the uses of the waters of the system have an effect on one another, to that extent the system is international, but only to that extent; accordingly, there is not an absolute, but a relative, international character of the watercourse.

International Law Commission, *Law of the Non-Navigational Uses of International Watercourses*, U.N. Doc. A/CN.4/L.316 (July 17, 1980), available at http://untreaty.un.org/ilc/documentation/english/a_cn4_1316.pdf.

Despite the ILC's rejection of the ILA's use of "drainage basin" to define "watercourse," the ILC still conceptually rejected the international river as forming the sole basis of the international law of watercourses.¹⁰⁰ The 1997 UN Convention defines "watercourse" functionally the same as the ILA, stating that a watercourse is a system of surface and groundwaters that are physically interconnected and that usually co-terminate.¹⁰¹ Significantly, the 1997 UN Convention defines an international watercourse as "a watercourse, parts of which are situated in different States."¹⁰²

This definition is broad and encompasses all interconnected waters, including rivers, tributaries, lakes, glaciers, aquifers, reservoirs, and canals.¹⁰³ An international watercourse exists when any portion, whether a tributary, lake, or other surface waterbody receives water from or contributes water to another State.¹⁰⁴ Mountain glaciers indisputably function as part of a water system when they supply rivers, lakes, and aquifers with water, and thus, these glaciers are encapsulated by the broad definition espoused by the 1997 UN Convention. Consequently, if a mountain glacier is physically connected to a water system that meets the requirements of the 1997 UN Convention, then certain rights and duties would apply to the use

100. Many upper riparian States favored the "international river" approach taken in the Final Act of the Congress of Vienna in 1815, which would have limited the scope of the ILC's work to rivers that either separate or traverse at least two States. See McCaffrey, *Holistic Approach*, *supra* note 91, at 152 (analyzing the responses of governments to a questionnaire on setting the scope of the ILC's work).

101. See 1997 UN Convention, *supra* note 31, art. 2(a) ("'Watercourse' means a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus."); see also MCCAFFREY, INTERNATIONAL WATERCOURSES, *supra* note 35, at 37 (noting that the distinction between an international drainage basin and a watercourse system, at least legally, is merely of historical interest because "the concept of the drainage basin is functionally equivalent—at least hydrologically—to that of the watercourse system").

102. See 1997 UN Convention, *supra* note 31, art. 2(b) ("'International watercourse' means a watercourse, parts of which are situated in different States.").

103. See MCCAFFREY, INTERNATIONAL WATERCOURSES, *supra* note 35, at 35 (pointing out that "watercourse" as defined by the International Law Commission in the 1997 UN Convention includes "rivers and their tributaries, lakes, aquifers, glaciers, reservoirs and canals"). One of the Special Rapporteurs appointed by the International Law Commission, Stephen McCaffrey has stated in remarks, "[The 1997 UN Convention's definition of 'watercourse'] covers not only the boundary river or successive river, but also lakes and other surface waters that may be shared. It applies to a tributary or any other component or subtributaries that may be involved." Stephen C. McCaffrey, *The Non-Navigational Uses of International Watercourses* (Remarks), 84 AM. SOC'Y INT'L L. PROC. 228, 233 (1990).

104. See MCCAFFREY, INTERNATIONAL WATERCOURSES, *supra* note 35, at 41.

of that glacier.¹⁰⁵ This is true whether the glacier itself is transboundary or whether it resides solely in sovereign territory.

C. The Watercourse Approach as Customary International Law

The 1997 UN Convention proffers an expansive scope of applicability—one that likely provides downstream States rights vis-à-vis glacial meltwater stored in upstream States, but these rights are only salient if either the Convention enters into force and all relevant States are party or the Convention's expansive watercourse approach represents customary international law.¹⁰⁶ While many of the substantive provisions of the Convention are likely considered customary law, upper riparian States have a good argument for the claim that the scope of the customary law of international watercourses is not as geographically and hydrologically inclusive in its breadth as the 1997 UN Convention.¹⁰⁷ At the very least, many upper riparian States, especially China, may argue that they are persistent objectors and that, therefore, if the 1997 UN Convention's watercourse approach is customary law, it does not apply to them. This section examines these arguments, focusing particularly on State practice in the Himalayan region.

State reaction to the 1997 UN Convention is evidence of State practice, and, generally, upper riparian States reacted negatively to adoption of the Convention. In fact, few States have ratified the treaty, and far fewer have ratified than is needed for it to enter into force—only sixteen States have submitted their ratifications, and the treaty requires thirty-five ratifications to enter into force.¹⁰⁸ Although a number of upper riparian States have ratified the treaty, these

105. These rights and duties include equitable and reasonable utilization and participation, 1997 UN Convention, *supra* note 31, art. 5, obligation not to cause significant harm, *id.* art. 7, and information exchange and notification, *id.* art. 9-19.

106. See BOLESŁAW A. BOCZEK, INTERNATIONAL LAW: A DICTIONARY 30 (2005) (explaining the complementary nature of customary law and treaty law).

107. See *infra* notes 108-117 and accompanying text.

108. See 1997 UN Convention, *supra* note 31, art. 36(1) ("The present Convention shall enter into force on the ninetieth day following the date of deposit of the thirty-fifth instrument of ratification, acceptance, approval or accession with the Secretary-General of the United Nations."); United Nations Treaty Collection, Databases, Multilateral Treaties Deposited with the Secretary-General, Status of Treaties, Chapter XXVII(12), <http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&id=530&chapter=27&lang=en#1> (indicating that sixteen States have signed the Convention and sixteen have ratified it) (last visited Feb. 10, 2009) [hereinafter UNTC Database]. Those States that have ratified the Convention are Finland, Germany, Hungary, Iraq, Jordan, Lebanon, Libyan Arab Jamahiriya, Namibia, Netherlands, Norway, Portugal, Qatar, South Africa, Sweden, Syrian Arab Republic, and Uzbekistan. *Id.*

States are also all lower riparian States with respect to major rivers.¹⁰⁹ Of these, only two primarily upper riparian States have ratified the treaty—South Africa and Uzbekistan, both of which have considerable interests to protect as lower riparian States as well.¹¹⁰ None of the Himalayan States have signed or ratified the treaty.¹¹¹ Moreover, many States, including India and Pakistan, abstained from voting on the Convention during the General Assembly debate, evincing suspicion and general disregard of the treaty.¹¹² Many of the States that abstained are upper riparian States.¹¹³ Three States voted against it—again, all upper riparian States in major international river basins and, importantly, China was one of these States.¹¹⁴ In addition, prior to drafting the treaty, the ILC surveyed governments as to whether it should use a drainage basin concept to identify the scope of the treaty.¹¹⁵ Of the upriver or upper riparian States that responded, most eschewed the drainage basin concept, favoring instead the concept of “international river.”¹¹⁶ On the other hand, lower riparian States responded mostly favorably to a drainage basin concept.¹¹⁷ This schism in responses and the low ratification yield of

109. See UNTC Database, *supra* note 108; Eckstein, *Development of International Water Law*, *supra* note 59, at 91-96 (detailing states’ status as either upper or lower riparian or both).

110. See Eckstein, *Development of International Water Law*, *supra* note 59, at 93, 94 (noting that South Africa and Uzbekistan are mostly upper riparian States); see also Central Intelligence Agency, World Factbook, Uzbekistan, <https://www.cia.gov/library/publications/the-world-factbook/geos/uz.html> (last visited Feb. 13, 2008) (showing map of Uzbekistan’s two major rivers, the Amu Darya and Syr Darya, which originate in Tajikistan and Kyrgyzstan respectively); Food and Agricultural Organization of the United Nations, *Irrigation Potential in Africa: A Basin Approach* (1997), <http://www.fao.org/docrep/W4347E/w4347e0q.htm> (last visited Feb. 13, 2009) (identifying Lesotho as the upper Riparian State vis-à-vis the Orange River).

111. UNTC Database, *supra* note 108.

112. UNITED NATIONS, YEARBOOK OF THE UNITED NATIONS 1997, at 1343 (1997). Nepal and Bangladesh voted in favor of the Convention. *Id.*

113. See Eckstein, *Development of International Water Law*, *supra* note 60, at 91-96 (identifying upper versus lower riparian States voting in favor and abstaining from the vote to adopt the Convention).

114. UNITED NATIONS, *supra* note 111.

115. When the ILC began its deliberations, it started by circulating a questionnaire to member States inquiring whether it should employ the ILC’s drainage basin concept as a parameter for its work. See *Report of the International Law Commission to the General Assembly*, U.N. Doc. A/9610/Rev.1 (1974), reprinted in [1974] 2 Y.B. INT’L L. COMM’N 302, U.N. Doc. A/CN.4/SER.A/1974/Add.1.; see also McCaffrey, *International Organizations*, *supra* note 91, at 151-52 (detailing the history of the ILC’s work).

116. Of the twenty-five States that originally responded to the questionnaire, half expressed opposition to incorporation of the international drainage basin concept, leading the Special Rapporteur to eschew that terminology. *Id.* at 152.

117. *Id.*

the treaty suggests that the watercourse approach is not widely accepted and that it is not customary international law.

State practice in the Himalayan region further supports upper riparian States' arguments that the glaciers are not subject to the rights and duties of international watercourse law.¹¹⁸ Of the agreements that pertain to the waters of the region, only two manage river basins in any sort of comprehensive way; however, even these agreements underscore the role of territorial sovereignty.¹¹⁹ The Mekong River Agreement defines its scope expansively, relying on an ecosystem approach, but China, wherein the headwaters of the Mekong originate, refuses to ratify the agreement and only participates in management negotiations and problem-solving as an observer.¹²⁰ The Indus River Agreement between Pakistan and India also identifies a broad scope of application including all tributaries and all connecting lakes of the Indus, Jhelum, Chenab, Ravi, Beas, and Sutlej Rivers, but the substantive provisions of the treaty apply variously to different tributaries and all tributaries that originate in Pakistan and flow only through Pakistani territory are excluded from any substantive impact.¹²¹

118. This section takes a particular look at state practice in the Himalayan region for two reasons: This Article is specifically concerned with the glaciers and glacial meltwater distribution of the Himalayan region, and ascertaining the customary law as it pertains to glaciers requires an examination of state practice vis-à-vis glaciers—the Himalayan region represents the most significant multi-State, glacier dependent region.

119. See Indus Waters Treaty, Sep. 19, 1960, 419 U.N.T.S. 126, (including in its scope all tributaries that eventually join the main river, even if they flow only intermittently); Mekong Agreement, *supra* note 59 (addressing not just the water but also the surrounding environment). See also Agreement on Sharing of the Ganges' Waters, Bangl.-India, Nov. 5, 1977, 1066 U.N.T.S. 16 (regulating the waters of the Ganges at Farrakka Barrage, just east of the India-Bangladesh border); Amended Agreement Between His Majesty's Government of Nepal and the Government of India on the Kosi Project, India-Nepal, Dec. 19, 1966, *reprinted in* Subedi, *supra* note 5, at 253 (agreeing to construct a hydroelectric dam for mutual benefit and adjusting the water allocation accordingly); Agreement Between His Majesty's Government of Nepal and the Government of India on the Gandak Irrigation and Power Project, India-Nepal, Dec. 4, 1959, *reprinted in* Subedi, *supra* note 5, at 262 (cooperatively managing the construction and use of a dam on the Gandak River); Treaty between His Majesty's Government of Nepal and the Government of India concerning the Integrated Development of the Mahakali River, India-Nepal, Feb. 12, 1996, 36 I.L.M. 531, *reprinted in* Subedi, *supra* note 5, at 267 (allocating water between Nepal and India on the Mahakali River).

120. Mekong Agreement, *supra* note 59. For a discussion of China's interests in the Mekong River, see L. Waldron Davis, *Reversing the Flow: International Law and Chinese Hydropower Development on the Headwaters of the Mekong River*, 19 N.Y. INT'L L. REV. 1 (2006).

121. See generally Indus Waters Treaty, *supra* note 119. The Indus Waters Treaty is the upshot of long negotiations among India, Pakistan, and the International Bank of Reconstruction and Development. For more on the political history of the negotiations, see Baxter, *supra* note 57.

Thus, although some precedent exists for managing rivers and interconnected waters, the majority of the agreements in the region are simply agreements for the construction and running of dams in the context of a singular international river—evidence that the States in the region do not see themselves as legally obliged to multilaterally manage entire water systems, including glaciers, as single entities.¹²² This assertion is buttressed by the fact that no State in the region has ratified any regional or bilateral water agreements since the adoption of the 1997 UN Convention.¹²³ In addition, China has roundly refused to ratify any water agreements, whether bilateral, regional, or international.¹²⁴

Moreover, that the responses to the 1997 UN Convention, as well as State treaty practice, split so clearly along lower riparian versus upper riparian lines is meaningful. It evinces a strong underlying current of territorial sovereignty and territorial integrity. No State that has within it valuable natural resources wants to subsume its liberty to act according to its best interest to the interest of any other State that may be affected. Thus, while limited territorial sovereignty may be the prevailing substantive theory, it has never been applied comprehensively to an entire physically interconnected water system—either because upper riparian States declined to enter into comprehensive management regimes or because the agreements that do bring upper riparian States to the table include compromises and major concessions to upper riparian States' interests, usually by limiting the geographic scope of the agreement. Generally, upper riparian States disfavor internationalizing freshwater resources outside of a limited radius of a transboundary waterbody, and, in this way, territorial sovereignty remains the dominant limiting factor in defining the scope of international water law.

122. See Subedi, *supra* note 5, at 248 (“Unlike the regional or sub-regional arrangements that exist in other parts of the world with regard to the shared international watercourses of the region, there is no sub-regional, regional or basin-wide approach adopted in these treaties to the broader water or environmental problems facing [India, Nepal, and Bangladesh].”).

123. The Mekong Agreement is the most recent, entering into force in 1995. See Mekong River Commission Secretariat, Mekong River Commission, <http://www.mrcmekong.org/> (last visited Feb. 13, 2009) (detailing history of the Commission).

124. See Alex Liebman, *Trickle-down Hegemony? China's "Peaceful Rise" and Dam Building on the Mekong*, 27 CONTEMP. SOUTHEAST ASIA 281, 290, 299 (2005) (concluding that China's costs are many upon signing water management agreements with lower riparian States); Eric W. Sievers, *Transboundary Jurisdiction and Watercourse Law: China, Kazakhstan, and the Irtysh*, 37 TEX. INT'L L.J. 1, 31 (2002) (noting that despite repeated efforts by Russia and Kazakhstan to compose a general agreement of cooperation on the Irtysh River, China failed to sign).

CONCLUSION: GLACIERS IN CONTEXT

This approach is problematic when it is applied to glaciers. While some glaciers, such as the Siachen glacier that traverses both India and Pakistan, are transboundary in the most straightforward sense of term, other glaciers are wholly within sovereign territories but nonetheless international because of some physical interconnectedness to a transboundary freshwater resource. Moreover, many glaciers connected to watersheds feed headwaters of rivers that are connected only distantly from a mainstem water resource. These glaciers are not clearly subject to the law of international watercourses. They would be if the 1997 UN Convention actually reflected customary international law, but State practice does not seem to support the 1997 UN Convention's approach to the scope of international watercourse law.

As such, States may argue forcefully, based on territorial sovereignty, that many international glaciers are not subject to the customary law of international watercourses and will rely on this argument to forestall regional and bilateral agreements that promote cooperative sharing and distribution of the waters' benefits based on parity and comity. If States, such as China, are not clearly the subject of a set of rights and duties designed to foster cooperation, then in the absence of agreements otherwise, such States, are likely to aggressively exploit glacial meltwater and arguably are not subject to a duty to share or cooperate in the exploitation of the these glaciers' meltwater.

In this way, water justice in the Himalayan region requires a new way of thinking about shared water resources. The current model, reflected in State practice and reluctance to endorse the 1997 UN Convention's broad definition of "watercourse," is inadequate to foster true water accord in the region.