

A MODERN TREATY FOR THE COLUMBIA RIVER

BY

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The Columbia River supports tens of millions of people in seven states and British Columbia through power generation, water supply, fishing, flood control, transportation, and other ecosystem services. Yet the river faces a number of environmental problems that negatively impact those same people. Salmon populations have collapsed, taking with them the commercial fisheries and depressing coastal communities. Salmon conservation efforts cost hundreds of millions of dollars each year. In Canada, reservoirs flood hundreds of square miles of land, causing mudflats and dust storms and transforming beautiful valleys into muddy wastelands. And everywhere on the river and its tributaries, human development has polluted water, destroyed habitat, and degraded ecosystems. Both the United States and Canada have domestic programs to slow or reverse these environmental problems, but the Columbia River Treaty is a large obstacle to these efforts. By the terms of the treaty, 15.5 million acre feet of storage—the majority of storage on the river—must be allocated only to maximize power generation and prevent floods, and cannot be allocated for environmental reasons.

A new treaty for the Columbia River should be negotiated, one that includes an ecosystem function as a primary purpose of river governance. This ecosystem function should chiefly be a provision requiring environmental flows, which are a practical means for addressing environmental issues within the scope of existing international governance. The international law principle of equitable and reasonable use is the framework that should be used to resolve water allocation conflicts among the purposes identified in the treaty and the sharing of benefits with Canada. This new treaty will address the river's serious environmental issues and ensure it continues to benefit the people dependent on it.

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I. INTRODUCTION

The waters of the Columbia River are intertwined with the human communities that have grown up throughout the Pacific Northwest. People rely on the river for uses and benefits that support their communities and enrich their lives. Thus, the environmental challenges that face the river involve the people around the river as well. These environmental challenges include the loss of salmon runs, loss of valuable land in Canada, ecosystem degradation, and destructive floods. Canada and the United States have implemented domestic programs to address these problems. Although the Columbia River Treaty provides for international coordination of river operations, flooding is the only environmental issue that may be addressed within its legal structure. This limitation impairs the ability of Canada and the United States to address the international component of other environmental problems.

Fortunately, the operation of the treaty will significantly change in 2024, opening the door for the parties to negotiate a new treaty.¹ This Article suggests that the new treaty should include an ecosystem function that will require the international governance of the river to consider environmental factors. The analysis proceeds as follows. Part II provides the factual context in which these issues take place: the nature of the Columbia Basin, the environmental problems it faces, and the operation of the current Columbia River Treaty. Part III highlights the essential environmental issues in the basin and places those issues in a larger legal context of sustainable development. It also analyzes the change that occurs in 2024 that will likely lead the parties to negotiate a new treaty. Part IV looks at the international legal framework of water law that has developed over the past decades. The principle of equitable and reasonable use is the dominant rule of international water law and is appropriate for application to the Columbia River. This part also looks at the principle of environmental flows, which is a legal mechanism used to address international environmental issues. Part V is a political analysis of the parties' pre-negotiation documents that signal their positions regarding a new treaty. Part VI is a prescription for a modern Columbia River Treaty. A modern treaty should include an ecosystem function that allows environmental issues to be part of international governance decisions. This ecosystem function should be primarily limited, however, to a requirement that environmental flows be provided. Water allocation between the three primary purposes of a modern treaty should be resolved by referral to the equitable and reasonable use framework, which

¹ See *infra* Part III.C.

will also provide guidance on how to fairly share the benefits that result for the coordinated use of the river.

II. THE RIVER AND THE TREATY

A. *The Columbia River and its Uses*

The Columbia River begins in the Canadian Rocky Mountains and drains an area the size of France (seven states and one Canadian province) on its way to the ocean.² It is the fourth largest river by volume in North America.³ The Columbia Basin has been home to native people for ten thousand years, who benefitted from its tremendous runs of salmon, thought to be the largest in the world.⁴ The arrival of Europeans changed that, and now the basin is home also for tens of millions of Americans and Canadians in addition to the tribes that remain. Thousands of dams have been built on the river and its tributaries in the last 150 years, yielding immense benefits: control of spring floods; hydroelectric power generation; water for agricultural, municipal, and industrial purposes; and recreation.⁵ These benefits came at a cost: the historic runs of salmon crashed, many went extinct, and the wild river that galloped to the sea turned into a series of slack water pools extending for miles behind dams.⁶ It is said that the Columbia River “died and was reborn as money.”⁷

B. *The Columbia River Treaty*

In 1948, an overnight spring flood completely destroyed the town of Vanport, Oregon.⁸ All but a few of the residents evacuated to safety, but when the waters receded, over eighteen thousand people no longer had a home.⁹ This flood was an impetus for the Columbia River Treaty, negotiated between the United States and Canada in the 1950s, signed in 1961, and

² Matthew McKinney, *Managing Transboundary Natural Resources: An Assessment of the Need to Revise and Update the Columbia River Treaty*, in *THE COLUMBIA RIVER TREATY REVISITED: TRANSBOUNDARY RIVER GOVERNANCE IN THE FACE OF UNCERTAINTY* 84, 84 (Barbara Cosens, ed., 2012) [hereinafter *TRANSBOUNDARY RIVER GOVERNANCE*].

³ James D. Barton & Kelvin Ketchum, *The Columbia River Treaty: Managing for Uncertainty*, in *TRANSBOUNDARY RIVER GOVERNANCE*, *supra* note 2, at 43, 43.

⁴ See *infra* Part VI.B.3.

⁵ Danny C. Lee et al., *Broadscale Assessment of Aquatic Species and Habitats*, in 3 *AN ASSESSMENT OF ECOSYSTEM COMPONENTS IN THE INTERIOR COLUMBIA BASIN AND PORTIONS FOR THE KLAMATH AND GREAT BASINS* 1057, 1093 (Thomas M. Quigley & Sylvia J. Arbelbide eds., 1997), <https://perma.cc/QMB8-8R8Z>. See generally, RICHARD WHITE, *THE ORGANIC MACHINE: THE REMAKING OF THE COLUMBIA RIVER* (1995) (discussing the history of human development in the Columbia Basin).

⁶ See *infra* Part II.C.

⁷ CARL SAFINA, *SONG FOR THE BLUE OCEAN* 226 (1997).

⁸ ROBERT WILLIAM SANDFORD ET AL., *THE COLUMBIA RIVER TREATY: A PRIMER* 10–11 (2014)

⁹ *Id.*

entered into force in 1964.¹⁰ Geographically, the best sites for building dams with sufficient storage to prevent floods like the one that destroyed Vanport were located in Canada.¹¹ Development along the Columbia in Canada was sparse, however, and Canada lacked a reason to engage in the large-scale construction necessary to tame the spring freshet.¹²

The treaty solved this problem. To fulfill the first purpose of the treaty, reducing the risk of floods, Canada was obligated to build and operate three large dams to control the risk of downstream flooding.¹³ In exchange for this benefit, the United States pledged a payment of \$64 million.¹⁴ The second purpose of the treaty was to maximize hydroelectric generation by controlling reservoir levels in a way that made best use of the high-capacity hydroelectric plants located in the United States.¹⁵ In exchange, the treaty created the “Canadian Entitlement”: Canada was entitled to half of the downstream power generated.¹⁶ To coordinate both of these purposes, the treaty established a number of institutions that used forecast data to make water operations plans that control the flow of water from Canadian reservoirs to maximize downstream power production while ensuring protection from floods.¹⁷ The treaty does not permit water allocation decisions to be made on any basis other than flood prevention or power generation—including environmental reasons.¹⁸

C. River Basin Environmental Problems

Development of the Columbia Basin, including the construction of dams contemplated by the Columbia River Treaty, caused a number of environmental problems in the basin.¹⁹ The treaty addresses only one environmental problem: the possibility for destructive floods.²⁰ The treaty has worked to prevent catastrophic floods in the past 60 years—in 2012

¹⁰ *Id.* at 11.

¹¹ John Shurts, *Rethinking the Columbia River Treaty*, in TRANSBOUNDARY RIVER GOVERNANCE, *supra* note 2, at 192, 193.

¹² *See id.* at 194 (“[T]he storage projects, and thus the costs (both monetary and in terms of inundated lands and dislocated land uses and communities), would be in Canada. Almost all of the expected benefits would occur in the United States— significant flood protection; increased generation from the U.S. hydro-projects; and the bulk of electricity demand and use, at that time and as projected into the future.”).

¹³ Columbia River Basin Treaty: Cooperative Development of Water Resources art. II, Can.-U.S., Jan. 17, 1961, 15 U.S.T. 1555 [hereinafter Columbia River Treaty].

¹⁴ *Id.* art. VI.

¹⁵ *Id.* art. IV.

¹⁶ *Id.* art. V.

¹⁷ *Id.* art. XIV.

¹⁸ *Id.* art. IV.

¹⁹ *See infra* Part II.C.

²⁰ *See* Columbia River Treaty, *supra* note 13, art. IV.

alone, it is estimated that the treaty's flood protection prevented \$2 billion in damage in the United States.²¹

The treaty is an accomplice to another major environmental problem: the demise of salmon runs.²² Historic salmon runs of up to sixteen million fish per year provided a source of food, supported commercial fishing, and were a vital part of the ecosystem.²³ Today, salmon runs are between one and two million, the vast majority of which are hatchery fish.²⁴ Commercial fishing is heavily restricted and reliant coastal communities have economically collapsed.²⁵ Salmon is still worth billions of dollars to the Pacific Northwest economy, but that value is threatened.²⁶ In addition to the lost commercial value of the salmon fishery, efforts to prop up the struggling salmon runs are extremely expensive, with the efforts by the Bonneville Power Administration (BPA) costing more than \$14.5 billion between 1978 and 2014—costs that are passed along to regional electricity ratepayers.²⁷ There is an added human cost as well: endangered salmon and lamprey are central to many native tribes' cultures, which are incomplete without the fish.²⁸ The collapse of the salmon fishery ended the age-old human reliance on the Columbia River as a source of sustenance,²⁹ caused the irreplaceable loss of genetic diversity,³⁰ and cost billions of dollars in the process.

The decline of salmon populations is emblematic of a larger deterioration of the river ecosystem. Development along shorelines,

²¹ B.C. MINISTRY OF ENERGY & MINES, U.S. BENEFITS FROM THE COLUMBIA RIVER TREATY – PAST, PRESENT AND FUTURE: A PROVINCE OF BRITISH COLUMBIA PERSPECTIVE 5 (2013), <https://perma.cc/WU9Q-UB8S>.

²² SAFINA, *supra* note 7, at 216 (“Less than 5 percent of the natural populations remain, and even with hatcheries about 75 percent of the original runs in the Northwest are either going or gone.”); Chris Peery, *The Effects of Dams and Flow Management on Ecosystem Processes*, in TRANSBOUNDARY RIVER GOVERNANCE, *supra* note 2, at 138, 140 (“[I]t is estimated that 55 percent of original spawning and rearing habitat is currently inaccessible to salmon.” (citation omitted)).

²³ NW. POWER PLANNING COUNCIL, COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM 7 (2000), <https://perma.cc/YJU5-Y7VM>; SAFINA, *supra* note 7, at 216; Guido Rahr, *Why Protect Salmon*, Wild Salmon Ctr., <https://perma.cc/38S4-TMQX> (last visited Feb 25, 2017).

²⁴ Peery, *supra* note 22, at 138.

²⁵ INST. FOR FISHERIES RES., THE COST OF DOING NOTHING: THE ECONOMIC BURDEN OF SALMON DECLINES IN THE COLUMBIA RIVER 1 (1996) (discussing economic dislocation caused by dwindling salmon stocks); SAFINA, *supra* note 7, at 200 (discussing the economic impact on fishing communities).

²⁶ See Kirk Johnson, *Finding Cold Water Where Salmon Can Run, and Hide*, N.Y. TIMES, Dec. 12, 2015, at A14 (“The industry is still vital to the Pacific Northwest economy, injecting billions of dollars through sport fishing, tourism and the Alaskan fishing fleet, much of which is based in Washington and Oregon.”).

²⁷ NW. POWER & CONSERVATION COUNCIL, 2014 COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM COSTS REPORT 8, 28 n.iii (2014), <https://perma.cc/4TTD-3M6S>.

²⁸ EUGENE S. HUNN, NCH’I-WANA “THE BIG RIVER”: MID-COLUMBIA INDIANS AND THEIR LAND 151–155 (1990); see also *infra*, Part VI.B.3 (discussing indigenous practices).

²⁹ Mary L. Pearson, *The River People and the Importance of Salmon*, in TRANSBOUNDARY RIVER GOVERNANCE, *supra* note 2, at 70, 73.

³⁰ See Eric M. Iwamoto et al., *Resurrecting an Extinct Salmon Evolutionarily Significant Unit: Archived Scales, Historical DNA and Implications for Restoration*, 21 MOLECULAR ECOLOGY 1567, 1568 (2012).

pollution, invasive species, and flow changes resulting from dams and reservoirs have interfered with the natural ecological processes of the river to the point that the river is much changed from its “natural” state.³¹ Native populations of fish, birds, wildlife, and flora have fallen, reflecting the larger trend of environmental degradation of the 20th century.³² This degradation negatively impacts the ability of the river to provide ecosystem services upon which human developments rely.³³ But environmental quality is also valuable as an end in itself: the people who live near the river care about its ecosystem health.³⁴ A 2011 survey of residents in Oregon, Washington and Idaho found that a majority of respondents indicated concern over a number of ecological and environmental factors related to the river.³⁵ The quantifiable, economic effects of the environmental problems facing the Columbia River are severe, and perhaps no less important than the benefits to quality of life that a healthy river system has on the people who live near it.

In Canada, the environmental problems relating to the river are somewhat different. Canada has fewer dams, though with much larger reservoirs.³⁶ Populations are less dense and more dispersed.³⁷ Nonetheless, fifty years after the treaty went into effect, there are still strong feelings relating to the environmental effects of the dams.³⁸ When they were built, hundreds of square miles of farmland, forest, First Nations sites, and wetlands were inundated and lost.³⁹ Reservoirs on the Canadian Columbia are operated to ensure that U.S. reservoirs remain at optimal levels, and as a result, the reservoirs in Canada regularly undergo changes in water level of tens to hundreds of feet.⁴⁰ These changes in level reveal huge mudflats,⁴¹

³¹ See generally Peery, *supra* note 22.

³² See generally ROBIN CODY, *VOYAGE OF A SUMMER SUN: CANOEING THE COLUMBIA RIVER* (1995) (describing changes to the Columbia River ecosystem).

³³ See SANDFORD ET AL., *supra* note 8, at 65–68 (“We realize now that we turned off our biodiversity-based planetary life support system so that we could turn on our electric lights in the Pacific Northwest.”); Barbara Cosens & Alexander Premier, *Assessing System Resilience and Ecosystem Services in Large River Basins: A Case Study of the Columbia River Basin*, 51 IDAHO L. REV. 91, 121 (2014) (noting a “general decline in the biophysical resilience” in the contemporary post-dam building era).

³⁴ See STEPHEN HAWLEY, *RECOVERING A LOST RIVER: REMOVING DAMS, REWILDING SALMON, REVITALIZING COMMUNITIES*, at xxii–xxiii (2012) (describing anecdotally rising public support for environmentalism).

³⁵ David Steves, *Survey Finds Consensus on Better Salmon Habitat But not on Dam Removal*, EARTHFIX (Dec. 9, 2011), <https://perma.cc/B5WW-7877>.

³⁶ SANDFORD ET AL., *supra* note 8, at 17–18.

³⁷ INDEP. SCI. ADVISORY BD., NW. POWER & CONSERVATION COUNCIL, *HUMAN POPULATION IMPACTS ON COLUMBIA RIVER BASIN FISH AND WILDLIFE* 7 (2007), <https://perma.cc/Q5QJ-VKSJ> (listing the Columbia Basin population size as the highest in Oregon, followed by Washington, Idaho, British Columbia, and Montana).

³⁸ Becky Kramer, *B.C. Residents Push for More-Stable Reservoir Levels as Columbia River Treaty is Renegotiated*, SPOKESMAN-REV. (Aug. 9, 2015), <https://perma.cc/FVP2-BME9>; see also SANDFORD ET AL., *supra* note 8, at 30.

³⁹ SANDFORD ET AL., *supra* note 8, at 30.

⁴⁰ See Kramer, *supra* note 38.

prevent shorelines from developing, interfere with recreational purposes,⁴² and lead to dust storms.⁴³ Finally, Canada no longer has Columbia River salmon of its own, as those runs were ended entirely by the construction of U.S. dams without fish passage facilities.⁴⁴ For these reasons, and the perceived failure of the Canadian Entitlement to provide adequate compensation for these negative impacts, many in British Columbia view the treaty as a losing deal for Canada.⁴⁵

Some suggest that the Columbia Basin defines the area known as the Pacific Northwest.⁴⁶ Certainly, whether they know it or not, the river influences the lives of the people around it, in seven states and British Columbia. The river has been a source of great riches for the region, but at the cost of changes to the river itself, which can no longer support the salmon runs that were its defining characteristic. The Columbia River Treaty played an important role in the second half of the 20th century by providing the flood protection and cheap electricity to enable the growth of communities.⁴⁷ Now, it may be time to change the focus of that treaty, so that it protects the health of the river itself in addition to looking out for the people of the region. Because in the long run, as has been for millennia, the people of the Pacific Northwest and the Columbia River will rise or fall together.

III. PROBLEMS IN THE CURRENT MANAGEMENT OF THE COLUMBIA BASIN

A new treaty for the Columbia River is good policy for one reason: the current treaty promotes unsustainable development. It is the product of the pre-environmental era, before the American public and politicians awoke to the importance of environmentalism.⁴⁸ The ideas underlying the move to environmentalism also support the arguments for including an ecosystem function in the new treaty. The treaty itself imposes a deadline for crafting its own replacement: after 2024, the function of the treaty changes.⁴⁹ In that

⁴¹ CODY, *supra* note 32, at 121 (“Last year we had big sailboats here for the regatta,” Anderson said. “They drew the water down at night, and the boats keeled over on the mud flats.”).

⁴² See Kramer, *supra* note 38.

⁴³ CODY, *supra* note 32, at 85, 96.

⁴⁴ SANDFORD ET AL., *supra* note 8, at 33–34.

⁴⁵ Kramer, *supra* note 38.

⁴⁶ See TIMOTHY EGAN, *THE GOOD RAIN: ACROSS TIME AND TERRAIN IN THE PACIFIC NORTHWEST* 22 (1990) (defining the Pacific Northwest as “wherever the salmon can get to”); see also SAFINA, *supra* note 7, at 138 (adopting Egan’s definition).

⁴⁷ WHITE, *supra* note 5, at 77; Michael C. Blumm, *The Northwest’s Hydroelectric Heritage: Prologue to the Pacific Northwest Electric Power Planning and Conservation Act*, 58 WASH. L. REV. 175, 242 (1983).

⁴⁸ See EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY 1, 5 (1989) [hereinafter, WEISS, INTERGENERATIONAL EQUITY] (noting a shift in perspective, and acknowledgment that “[t]oday, we have the power to alter planet Earth irreversibly, on a global scale, in many different ways”).

⁴⁹ U.S. ENTITY, *THE COLUMBIA RIVER TREATY 2014/2024 REVIEW 4* (2013), <https://perma.cc/UGY9-3N94>.

year, the obligations of the parties become less clear and the predictable outcomes that have inured to the parties since 1964 will give way to uncertainty.⁵⁰

A. Legal Principles Support a New Treaty

Legal principles have developed since the treaty was written that demand a sustainable approach to environmental resources. These principles—including sustainable development and intergenerational equity—reflect the reality that environmental quality is fundamentally an issue of human survival.⁵¹ Scientific research describes how human activities threaten Earth systems vital to safe human development, such as healthy freshwater ecosystems.⁵²

In 1962, one year after the Columbia River Treaty was signed, Rachel Carson published *Silent Spring*.⁵³ The book “initiated a transformation in the relationship between humans and the natural world and stirred an awakening of public environmental consciousness.”⁵⁴ Carson’s book showed America and the world that assumptions about human and ecosystem resilience to pollution and exploitation were often unfounded and dangerous. The dominant assumption prior to the environmental movement, and underlying the design of the Columbia River Treaty, was that natural resources must be used to create economic gain, else they are wasted—the relation to land was “strictly economic, entailing privileges but not obligations.”⁵⁵ Carson’s book began a movement to view natural resources differently: as expendable and valuable systems that support human life and civilization.⁵⁶ Environmentalism today looks to global problems and incorporates scientific knowledge not available in Carson’s time to show that global human activities threaten the status of the Earth as a safe place for human development.⁵⁷

Many of the obligations of modern environmental law rest on the concept of “sustainable development.” The term emerged in the 1970s, although the concept is much older.⁵⁸ Sustainable development was influentially defined as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.”⁵⁹ Over 170 countries, including Canada and the United States, recognized the importance of sustainable development in the 1992 *Rio*

⁵⁰ See *infra* Part III.C.

⁵¹ JOHAN ROCKSTRÖM ET AL., WATER RESILIENCE FOR HUMAN PROSPERITY 9 (2014).

⁵² See *infra* notes 74–77 and accompanying text.

⁵³ See RACHEL CARSON, SILENT SPRING (40th Anniversary ed., Mariner Books 2002) (1962).

⁵⁴ Linda Lear, *Introduction* to CARSON, *supra* note 53, at x.

⁵⁵ ALDO LEOPOLD, A SAND COUNTY ALMANAC: AND SKETCHES HERE AND THERE 203 (1949).

⁵⁶ Lear, *supra* note 54 at x.

⁵⁷ See *infra* notes 74–77 and accompanying text.

⁵⁸ See KLAUS BOSSELMANN, THE PRINCIPLE OF SUSTAINABILITY: TRANSFORMING LAW AND GOVERNANCE 1 (2008) (tracing the origins of the concept).

⁵⁹ WORLD COMM’N ON ENV’T & DEV., OUR COMMON FUTURE 43 (1987).

Declaration on Environment and Development.⁶⁰ At its core, the adoption of sustainable development represents the recognition that living within the boundaries of ecological systems is necessary to prevent social crisis or collapse.⁶¹ Less drastically, a commitment to sustainable development means achieving a balance between the dynamic forces of development and the conservative needs of an ecosystem.⁶²

Intergenerational equity is a principle that emerged from the concept of sustainable development.⁶³ It is an application of the notion of cost on a time scale: resources used by the present generation may not be available for use by future generations—therefore, the intergenerational effect of resource allocation decisions should be considered.⁶⁴ The principle expands the fundamental moral obligation of parents to care for their children to a macro scale and transforms those “moral obligations to future generations . . . into legally enforceable norms.”⁶⁵ Professor Edith Brown Weiss describes three ways in which the current generations’ use of resources creates intergenerational equity problems: “depletion of resources for future generations, degradation in quality of resources for future generations, and access to use and benefits of the resources received from past generations.”⁶⁶ The present generations’ obligation to avoid those effects gives rise to legal obligations, which become enforceable as they are codified into international and domestic law and applied to specific contexts and problems.⁶⁷ Applied to fresh water issues, Professor Brown Weiss concludes that intergenerational equity requires river basin management to seek long-term sustainable development of the water resource.⁶⁸ The principle of intergenerational equity, articulated after the Columbia River Treaty was written, shows that the necessity of environmental conservation derives from the basic human precept to care for our children.

The concepts of sustainable development and intergenerational equity were a foundational justification for the emergence of environmental

⁶⁰ U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/Rev. 1 (Vol. I), annex I (Aug. 12, 1992). The Rio Declaration was a product of the United Nations Conference on Environment and Development and a “major environmental legal landmark.” GÜNTHER HANDL, DECLARATION OF THE UNITED NATIONS CONFERENCE ON THE HUMAN ENVIRONMENT (STOCKHOLM DECLARATION) 1972 AND THE RIO DECLARATION ON ENVIRONMENT AND DEVELOPMENT, 1992, at 1 (2012), <https://perma.cc/SYV6-GXVJ>. For example, Principle 4 of the Rio Declaration states: “In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.” *Rio Declaration on Environment and Development*, *supra*, princ. 4.

⁶¹ BOSSELMANN, *supra* note 58, at 22. Bosselmann writes, “Going back into history, we find that continuity of cultures and societies could only be ensured if ecological systems were sustained.” *Id.* at 10.

⁶² *Id.* at 22.

⁶³ WEISS, INTERGENERATIONAL EQUITY, *supra* note 48, at 38–39.

⁶⁴ *Id.* at 5.

⁶⁵ *Id.* at 21.

⁶⁶ *Id.* at 6.

⁶⁷ *Id.* at 47.

⁶⁸ *Id.* at 240.

conservation and environmental law.⁶⁹ From the perspective of modern legal and ethical approaches to environmental concerns, the Columbia River Treaty is a remnant of the pre-environmental era.⁷⁰ The treaty itself does not reference any environmental purposes and contains no mechanisms for environmental monitoring, conserving, or sustainable development—all considered essential elements of modern river management.⁷¹ Instead, the dominant mindset behind the treaty was that an unused river—meaning, an undammed river—represented “waste.”⁷² The river in its natural form had little or no value—as stated in the treaty’s preamble, the “greatest benefit” from the river was achievable through “cooperative measures for hydroelectric power generation and flood control.”⁷³ Today, scientists recognize that global water use is an essential part of maintaining the Earth as a safe place for human development.⁷⁴ Freshwater itself is particularly important: it “determines the quality and quantity of all terrestrial and aquatic ecosystem services in human societies, and is therefore an, or even *the*, underlying determinant of social and economic growth.”⁷⁵ In short, fresh water is the “environmental crisis of the 21st century.”⁷⁶

Since 1961, there has been a paradigm shift in humankind’s approach to the natural world. We now understand that human development causes irreversible deterioration of the natural world, which can have significant negative consequences for the habitability of the planet now and in the future.⁷⁷ Advances in environmental science, ethics, and legal regimes indicate that sustainable development must be a foundational principle for humanity’s interaction with nature if human society is to continue to benefit from natural resources. The importance of sustainable development generally, and its role in alleviating the environmental challenges specific to the Columbia River, are the strongest arguments for ending the current treaty and replacing it with a modern treaty. President Obama said, “[t]his planet is a gift from God and our common home. We should leave it to our kids in better shape than we found it.”⁷⁸ Creating a new environmentally conscious Columbia River Treaty will help us do that.

⁶⁹ HANDL, *supra* note 60 at 4, 7–8.

⁷⁰ See SANDFORD, ET AL., *supra* note 8, at 50 (2014) (“[The environmental] movement was just gaining momentum at the time the Treaty was signed in 1961, however. Political realities with respect to the environment were only beginning to change when the [International Joint Commission] completed its study and made its recommendations.”).

⁷¹ See EDITH BROWN WEISS, INTERNATIONAL LAW FOR A WATER-SCARCE WORLD 88 (2013) [hereinafter WEISS, WATER-SCARCE WORLD] (“In aggregate, almost 50% of the agreements adopted since 2000 have dealt with issues of water allocation and use.”).

⁷² WHITE, *supra* note 5, at 83 (stating that Washington D.C. politicians viewed the Columbia flowing unused to the sea as a waste); accord CODY, *supra* note 32, at 146 (“Wild was wasteful.”).

⁷³ Columbia River Treaty, *supra* note 13, pmbl.

⁷⁴ Rockström et al., *A Safe Operating Space for Humanity*, 261 NATURE 472, 472 (2009).

⁷⁵ *Id.*

⁷⁶ WEISS, WATER-SCARCE WORLD, *supra* note 71, at 1.

⁷⁷ Rockström et al., *supra* note 74, at 472–74.

⁷⁸ President’s Weekly Address, 2015 DAILY COMP. PRES. DOC. 754 (Oct. 25, 2015).

B. The Current Treaty is Not Consistent with Sustainability

In the United States, the paradigmatic environmental problem for the Columbia River is the decline of salmon populations. Once the defining species of the river, today their continued existence is only ensured by extensive ongoing efforts to mitigate the effects of dams and other development.⁷⁹ In Canada, environmental issues relate to the large reservoirs behind treaty dams, which cause problems to the surrounding areas.⁸⁰

1. In the United States

Federal law imposes a number of environmental obligations on dam operators in the Columbia Basin.⁸¹ Perhaps most significant is the Endangered Species Act⁸² (ESA), which requires the federally operated dams to ensure that their actions are “not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat” designated as critical to its conservation.⁸³ The ESA exerts practical effect through Biological Opinions (BiOps), which analyze the effect of a federal action on a protected species and suggest “reasonable and prudent alternatives” to minimize the negative impact on protected species.⁸⁴ On the Columbia River, the most impactful federal actions are the operation of dams, which are the subject of lengthy and contested BiOps.⁸⁵ BiOps require federal dam operators to undertake extensive efforts to protect the thirteen species of salmon and steelhead and two resident (non-anadromous) fish species (hereinafter, salmon) protected under the ESA.⁸⁶ The ESA and other legal obligations⁸⁷ require that dams

⁷⁹ See *supra* notes 19–35 and accompanying text; see also Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 184 F. Supp. 3d 861, 868–69, 880–82 (D. Or. 2016) (summarizing ongoing mitigation efforts and litigation relating to those efforts).

⁸⁰ See *supra* notes 36–47 and accompanying text.

⁸¹ Federally owned dams on the Columbia and Snake Rivers are operated by the Federal Columbia River Power Basin Federal Caucus, together with BPA, the United States Army Corps of Engineers, and the United States Bureau of Reclamation; eight additional federal agencies play some role in managing the river, operating dams, or supporting salmon recovery. *Agencies, COLUMBIA RIVER BASIN FED. CAUCUS*, <https://perma.cc/76JA-36U2> (last visited Feb. 25, 2017).

⁸² Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2012).

⁸³ *Id.* § 1536(a)(2).

⁸⁴ *Id.* § 1536(b)(3)(A).

⁸⁵ The several BiOps relating to protected species in the Columbia and Snake Rivers have been extensively litigated. See Nat'l Wildlife Fed'n, 184 F. Supp. 3d at 868–72 (summarizing legal challenges to the BiOps).

⁸⁶ *Federal Columbia River Power System Biological Opinion*, NAT'L OCEANIC & ATMOSPHERIC ADMIN FISHERIES W. COAST REGION, <https://perma.cc/4FM3-Z8UB> (last visited Feb. 25, 2017) (stating that the Federal Columbia River Power System operation affects thirteen listed salmon and steelhead species in the Columbia Basin). The two non-anadromous species are bull trout (*Salvelinus confluentus*) and Kootenai River white sturgeon (*Acipenser transmontanus*). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States, 75 Fed. Reg. 63,898 (Oct. 18, 2010) (codified at 50 C.F.R. § 17.95); Endangered and Threatened Wildlife and Plants; Critical Habitat Revised Designation for the Kootenai River Population of the White Sturgeon (*Acipenser transmontanus*), 73 Fed. Reg. 39,506 (July 9, 2008) (codified at 50 C.F.R. § 17.95).

operate for purposes beyond flood protection and power management, the two purposes of dam management envisioned by the Columbia River Treaty.⁸⁸

Indeed, although dominant in the text of the Columbia River Treaty, beyond that document the importance of flood protection and power generation fades as purposes of river management. For decades, courts reviewing dams and river development under the ESA and NEPA have required federal agencies to mitigate the negative impact on endangered fish and the environment.⁸⁹ Agency documents reflect these environmental mandates. The 2015 Water Management Plan, the operating guidelines for the federal agencies that operate the fourteen federal dams on the Columbia and Snake Rivers, lists four purposes for dam operations—three of which are environmental.⁹⁰ Dam operations for the benefit of salmon include increased spill during spawning seasons, in which water spills over the dam rather than through the hydroelectric turbines, increasing salmon pass-through survival but decreasing power output; adjusting flows to ensure the water temperature remains cold enough for fish; and ensuring reservoir levels are seasonally optimal for spawning.⁹¹ Beyond operations of dams, federal agencies engage in other mitigation work that improves fish habitat. BPA's expenditures for fish and wildlife programs, including foregone hydroelectric generation, totaled \$782 million in 2014—roughly one-third of the BPA's entire power business budget.⁹² Both the actual operating guidelines of the river's major dams and the BPA's large financial commitment to environmental purposes demonstrate that environmental purposes are a significant consideration in the management of the river.

⁸⁷ The dams' operations must take into account international obligations (e.g. Treaty Concerning Pacific Salmon, Can.-U.S., Jan. 28, 1985, T.I.A.S. No. 11,091), interstate compacts (e.g. Columbia River Compact, Act of Apr. 8, 1918, ch. 47, 40 Stat. 515), obligations to Native Americans, and state laws. COMM. ON WATER RES. MGMT., INSTREAM FLOWS, & SALMON SURVIVAL IN THE COLUMBIA RIVER BASIN, NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., MANAGING THE COLUMBIA RIVER: INSTREAM FLOWS, WATER WITHDRAWALS, AND SALMON SURVIVAL 108, 111–12, 116–17, 133 (2004).

⁸⁸ Columbia River Treaty, *supra* note 13, pmbl.

⁸⁹ *E.g.*, *Nat'l Wildlife Fed'n*, 184 F. Supp. 3d at 942–43, 947.

⁹⁰ BONNEVILLE POWER ADMIN, U.S. BUREAU OF RECLAMATION, U.S. ARMY CORPS OF ENG'RS, 2015 WATER MANAGEMENT PLAN 1, 5 (2014) [hereinafter 2015 WATER MANAGEMENT PLAN], <https://perma.cc/GNH3-GDG9>. The four purposes are: 1) to “[i]mplement water management measures” of relevant BiOps issued under the ESA, 2) to “[a]ssist in meeting the biological performance standards” of BiOps, 3) to meet non-ESA requirements such as “[flood risk management], hydropower, irrigation, navigation, recreation, and fish and wildlife not listed under the ESA,” and 4) to “[c]onsider the recommendations [of the] Northwest Power and Conservation Council’s Fish and Wildlife Program.” *Id.* at 5.

⁹¹ *Operations*, COLUMBIA RIVER BASIN FED. CAUCUS, <https://perma.cc/U9EG-BETR> (last visited Feb. 25, 2017).

⁹² NW. POWER & CONSERVATION COUNCIL, *supra* note 27, at 6. In 2014, the total for all BPA's fish and wildlife costs since 1978 was \$14.53 billion. *Id.* at 28 n.iii. The BPA receives no federal funding, so these costs are entirely passed on to the region's electricity ratepayers. Press Release, Bonneville Power Admin., BPA Rate Proposal Focuses on Cost Management, Maintaining Value (Nov. 10, 2016), <https://perma.cc/SFJ6-6EZQ>.

The multiple demands on the Columbia River are often not all achievable: even among environmental purposes, “there is often insufficient water to accomplish all the objectives addressed in the [ESA BiOps] for the benefit of listed fish.”⁹³ Objectives for listed species may be incompatible with each other⁹⁴ and conflict with other purposes for water.⁹⁵ As the majority of Columbia River storage capacity is located in Canada, the U.S. agencies are better able to meet their many environmental objectives by coordinating with water storage and release from Canadian sources.⁹⁶ This coordination cannot take place under the institutions and processes of the Columbia River Treaty, which does not allow the river flows to be managed for purposes other than flood prevention and power generation.⁹⁷ As a result, since 1978, the United States and Canada have jointly negotiated twenty-three supplemental operating agreements to support domestic environmental river management.⁹⁸ These agreements govern the use of Canadian non-treaty storage⁹⁹ and use of treaty storage for purposes that cannot be addressed within the institutions of the treaty.¹⁰⁰ These agreements take the form of contracts between the BPA and British Columbia Hydro and Power Authority (BC Hydro),¹⁰¹ alleviating any need for lengthy treaty ratification processes at the federal level. The current agreement, running from 2012 until Canadian flood prevention obligations under the treaty expire in 2024, has the “purpose of obtaining additional operational flexibility and power and non-power benefits through the

⁹³ 2015 WATER MANAGEMENT PLAN, *supra* note 90, at 10.

⁹⁴ For example, a conflict exists between the need for a spring spawning pulse at the Libby Dam to benefit listed sturgeon and the need to fill the reservoir to provide summer flow augmentation to benefit listed salmon. *Id.* at 11–12.

⁹⁵ *Id.* at 10.

⁹⁶ See Shurts, *supra* note 11, at 217 (“[T]he Entities have found ways to adjust Canadian project operations during the summer to solve particular fish issues in the United States . . .”).

⁹⁷ See *id.* (“The Canadians have no legal obligation to operate the storage projects in any way other than to optimize flood control and power generation in the United States and receive the maximum possible downstream power benefits in return.”) (citing Nigel D. Banks, *The Columbia Basin and The Columbia River Treaty: Canadian Perspectives in the 1990s* (Nw. Water Law & Policy Project, Research Paper No. PO95-4, 1996), <https://perma.cc/8XZ7-SXUB>).

⁹⁸ *Previous Non-Treaty Storage Agreements*, BONNEVILLE POWER ADMIN, <https://perma.cc/7YGA-6MFB> (last visited Feb. 25, 2017). In addition, the United States and Canada have created domestic institutions to work towards environmental objectives that cannot be pursued under provisions of the treaty. SANDFORD ET AL., *supra* note 8, at 26–27 (e.g. the Pacific Northwest Electric Power Planning and Conservation Act, 16 U.S.C. § 839 (2012), the establishment by the United States of the Northwest Power and Conservation Council, the Canadian 2004 Columbia River Water Use Plan, the Duncan Dam water use plan, and the Columbia Basin Fish and Wildlife Compensation Program).

⁹⁹ Non-treaty storage is the result of the Mica dam in Canada being built with more storage capacity than was required by the 1961 treaty. BONNEVILLE POWER ADMIN., ADMINISTRATOR’S DECISION RECORD: NON-TREATY STORAGE AGREEMENT WITH BC HYDRO 1 (2012) [hereinafter ADMINISTRATOR’S DECISION RECORD], <https://perma.cc/4K5G-FT5Q>. That extra storage capacity is managed outside of the requirements of the treaty. *Id.* at 1–2.

¹⁰⁰ *Id.*

¹⁰¹ *E.g., id.*

coordination of flow operations.”¹⁰² Practically, this means that BPA will have access to 1.5 million acre-feet (maf)¹⁰³ of Canadian storage that it can use free from the requirements of the treaty to support fish spawning and downstream migration in the spring and summer.¹⁰⁴ That amount compares with the 15.5 maf of Canadian storage controlled by the treaty.¹⁰⁵

2. In Canada

The controversy surrounding the imperiled existence of salmon in the lower Columbia presents a sharp contrast with the status of salmon in Canada: nonexistent. The completion of the Grand Coulee dam in 1941 blocked 1,100 miles of spawning grounds, including the entire Canadian Columbia River.¹⁰⁶ “June hogs”—huge salmon weighing one hundred pounds or more—were unable to spawn and went extinct.¹⁰⁷ Thus, the current operation of treaty dams in Canada does not create problems with salmon in Canada’s Columbia, because there are none.¹⁰⁸ But operation of Canadian treaty dams causes other environmental problems. Fluctuations in reservoir levels create huge mudflats, preventing shoreline ecosystem from developing and leading to dust storms.¹⁰⁹ For example, the British Columbia town of Nakusp is located on a reservoir that can rise and fall as much as seventy feet.¹¹⁰ Before each spring, the reservoir is drawn down to make room for runoff, “exposing mudflats that dry out and blanket the town with choking dust storms.”¹¹¹ In addition, reservoirs flooded 420 square miles of forest, wetlands and farms.¹¹² These ongoing environmental problems might

¹⁰² B.C. Hydro & Power Auth. & Bonneville Power Admin., Columbia River Non-Treaty Storage Agreement 3 (Contract No. 12PG-10002, April 10, 2012) [hereinafter Columbia River Non-Treaty Storage Agreement], <https://perma.cc/NS6N-Z9TE>.

¹⁰³ An acre-foot is the volume of water that will cover an acre of area to a depth of one foot. *What’s An Acre-Foot?*, WATER EDUC. FOUND., <https://perma.cc/3KVA-4NK2> (last visited Feb. 25, 2017).

¹⁰⁴ See ADMINISTRATOR’S DECISION RECORD, *supra* note 99, at 4–5.

¹⁰⁵ Columbia River Treaty, *supra* note 13, art. II.

¹⁰⁶ John Harrison, *Grand Coulee Dam: Impacts on Fish*, NW. POWER & CONSERVATION COUNCIL (Jan. 22, 2010), <https://perma.cc/5EJU-PG7A>. The reservoir behind Grand Coulee dam flooded Kettle Falls, an important Native American fishing and cultural site. Prior to its flooding, archaeological evidence suggests that native people had fished there for nine thousand years. HUNN, *supra* note 28, at 20.

¹⁰⁷ See SAFINA, *supra* note 7, at 197, 208 (“When the dam closed, those big salmon just went up there for six or eight years, beating themselves to death against the concrete, until they died off forever.”).

¹⁰⁸ See Shurts, *supra* note 11, at 239 (stating that “fish habitat and fish . . . are not such a major driver in British Columbia debates” around the structure and policies of the dams; rather, “locally important issues” include stabilizing reservoir levels, water quality issues, and wetland and wildlife habitat issues).

¹⁰⁹ Reservoir levels change “by up to 12 meters at the Arrow Lakes, 25 meters at Koochanusa and 30 meters at the Duncan and Kinbasket reservoirs.” SANDFORD ET AL., *supra* note 8, at 31–33.

¹¹⁰ Kramer, *supra* note 38.

¹¹¹ *Id.*; accord CODY, *supra* note 32, at 96.

¹¹² SANDFORD ET AL., *supra* note 8, at 30.

be mitigated by changes in dam operation, but they are ignored by the treaty and thus not a valid basis for making dam operation decisions.

The experience of salmon in the Columbia—extinct in the upper, continued survival in the lower reliant on a vast support system—shows that the treaty’s system of operating dams has exacted a toll on the ecosystem of the Columbia River.¹¹³ The ecosystem of the Columbia River is more than just the thirteen species protected by the ESA. But they are indicators of the overall impact of human development on the health of the river ecosystem.¹¹⁴ Dams have an immense effect on the ecosystem of a river,¹¹⁵ and the most influential dams on the Columbia are controlled by the Columbia River Treaty.¹¹⁶ The development of the river has not been sustainable; past and current generations are leaving a slew of environmental problems to future generations. These environmental problems have been recognized by the leadership of the parties to the treaty, which have independently and jointly created legal mechanisms to address environmental issues.¹¹⁷ Attempts to mitigate environmental harm, however, are limited by the fundamental failure of the treaty to allow environmental considerations to be the basis for river management decisions.

C. The Treaty’s Value Declines Significantly After the Expiration of Terms in 2024

The treaty’s own terms impose a de facto deadline for creating a new treaty. The treaty controls the river’s flow changes and protects downstream development from flooding.¹¹⁸ However, the operation of the treaty changes in 2024 to limit the Canadian obligation to prevent flooding in the United States.¹¹⁹ Commentators disagree about the extent to which this legal change will affect actual river operations.¹²⁰ This increased uncertainty about river operation and flood protection presents a strong argument for negotiating a new treaty to replace the existing one before 2024.

¹¹³ Peery, *supra* note 22, at 144 (“[R]egulation and extraction of flow from the river, along with channelization for flood control, has interrupted the natural river-flood plain interaction and diminished or eliminated the up- and downstream flux of nutrients and substrate required to maintain habitat complexity and primary/secondary productivity in natural systems.”).

¹¹⁴ See Emily A. Holt & Scott W. Miller, *Bioindicators: Using Organisms to Measure Environmental Impacts*, NATURE EDUC. KNOWLEDGE PROJECT (2010), <https://perma.cc/TH46-R22P> (finding that species, such as the cutthroat trout (*Oncorhynchus clarkii*), can be used as indicators of ecosystem health to determine the effects of anthropogenic perturbations).

¹¹⁵ Peery, *supra* note 22, at 140.

¹¹⁶ COLUMBIA BASIN TR., *An Overview: Columbia River Treaty* (2016), <https://perma.cc/ZD3L-U7Y5> (last visited Feb. 25, 2017).

¹¹⁷ See, e.g., Endangered Species Act, 16 U.S.C. §§ 1531–44 (2012); Pacific Northwest Electric Power Planning and Conservation Act, 16 U.S.C. § 839 (2012), in the US; Species at Risk Act, S.C. 2002, c 29 (Can.); COLUMBIA BASIN TR., CHARTER (1997), <https://perma.cc/KQM5-7DAQ>.

¹¹⁸ Columbia River Treaty, *supra* note 13, pmbl.

¹¹⁹ Annex to Exchange of Notes Regarding the Columbia River Treaty: Protocol, Can.-U.S., Jan. 22, 1964, 15 U.S.T. 1579 [hereinafter Can.-U.S. Annex]; Shurts, *supra* note 11, at 192, 203.

¹²⁰ See *infra* notes 145–150 and accompanying text.

The Columbia River Treaty is valuable to the parties because it provides a structure for river management that results in predictable behavior of the river.¹²¹ The river itself can be highly unpredictable: at the U.S.–Canada border, the natural flow ranges from 14,000 cubic-feet per second (cfs) to 550,000 cfs.¹²² In addition to causing flooding, seasonal high water can exceed the hydroelectric capacity of a dam, requiring it to send water through a spillway, rather than through the hydroelectric plant.¹²³ By implementing river-wide storage plans, flooding is avoided and power generation is optimized.

Predictable and stable river flow levels are achieved in the United States by drafting (filling) Canadian reservoirs when natural river flow is high and draining reservoirs when natural river flows are low.¹²⁴ The operation of 8.45 maf of Canadian storage to accomplish this is dictated by flood control plans made under the treaty.¹²⁵ The flood control plans are made by the United States Entity and submitted to the Canadian Entity.¹²⁶ The Canadian Entity may modify the plans and substitute storage at one dam for another provided that the substitute storage scheme has the same flood-prevention effectiveness.¹²⁷ The United States paid Canada \$64 million when the dams were constructed for this use and that purchased flood protection will end in 2024.¹²⁸

After 2024, the United States will no longer submit flood control plans to Canada and will no longer have guaranteed annual flood storage. Rather, Canada will be obligated to provide ‘called upon’ flood protection.¹²⁹ That is, “Canada shall, when called upon . . . operate within the limits of existing facilities any storage in the Columbia River Basin in Canada as the [United

¹²¹ Barton & Ketchum, *supra* note 3, at 47 (“The treaty has provided a governance structure to manage many different types of uncertainty.”).

¹²² *Id.* at 45.

¹²³ *E.g.*, *NW Environmental News: Heavy Spring Runoff has Columbia River Basin Dams Spilling More, Can Spell Trouble for Fish, Wind Power*, OREGONIAN, (May 27, 2011), <https://perma.cc/VB4N-GFGX> (“The Columbia River is running at a fevered peak right now,” said Charles Hudson, head of governmental affairs for the commission. “The fact is that Mother Nature is running the river right now, not federal agencies, not judges and certainly not Congress.”).

¹²⁴ *See* B.C. MINISTRY OF ENERGY & MINES, *supra* note 21, at ii (“Coordination under the Treaty allows the hydro system to respond to seasonal challenges during cold winter conditions when inflows are reduced, as well as dry hot summers when irrigation, fisheries and recreation are competing for the same low flows.”).

¹²⁵ Columbia River Treaty, *supra* note 13, art. IV.

¹²⁶ *Id.* annex A, ¶ 5.

¹²⁷ *Id.* (“[T]he United States entity will submit flood control operating plans . . . for each of the dams. The Canadian entity will operate in accordance with these diagrams or any variation which the entities agree will not derogate from the desired aim of the flood control plan.”).

¹²⁸ *Id.* art. VI. The payments were structured this way to provide the initial capital to build the dams. SANDFORD ET AL., *supra* note 8, at 15–16. Adjusting for inflation, that amount is \$495 million in 2016 dollars. *CPI Inflation Calculator*, U.S. BUREAU OF LABOR STATISTICS, <https://perma.cc/H5UA-GN2D> (last visited Feb. 25, 2017). The value of the flood control provided by Canada has far exceeded the initial payment. SANDFORD ET AL., *supra* note 8, at 19.

¹²⁹ Columbia River Treaty, *supra* note 13, art. IV(3).

States] requires to meet flood control needs.”¹³⁰ This obligation will exist even if the treaty is terminated; however, termination would create additional uncertainty because information sharing mechanisms would end and there would be no coordinated management for power generation.¹³¹ In the event of called upon flood protection, the United States would pay Canadian operating costs and compensation for any economic loss resulting from the flood protection.¹³² In the absence of called upon protection, Canada would operate the treaty dams at its discretion for the first time since their construction.

What this newfound freedom would mean for dam operation and river flows is unclear. A 1964 protocol to the treaty instructs that a call for additional flood protection “shall be made only to the extent necessary to meet forecast flood control needs . . . that cannot adequately be met by flood control facilities” in the United States.¹³³ Problematically, the crucial terms “forecast flood control needs” and “adequately be met” are undefined.¹³⁴ A 2011 white paper addressing post-2024 flood control procedures notes the “importance” of developing a method of flood forecasting that considers “available flood control space, forecast seasonal volume, the uncertainty of runoff volume and shape, real-time runoff conditions, and U.S. flood control objectives.”¹³⁵ The clarifications called for in the white paper have not emerged; in 2013 a Canadian official acknowledged that the United States and Canada “disagree on how called upon flood control would be implemented, particularly . . . when to call upon Canada.”¹³⁶

Predictions differ as to how the shift to called upon flood protection will affect the operation of the river. A Canadian source describes the probable outcomes for the United States as “complex,” explaining that Canadian storage could only be called upon when the potential for flooding downstream remained despite U.S. storage being fully committed to flood protection.¹³⁷ As a result, “[British Columbia] would not be required to keep [a] reservoir drawn down to accommodate excess water bound for the US except in . . . an emergency, and could therefore generally maintain it at a higher, more stable level that would benefit local residents and

¹³⁰ *Id.*

¹³¹ *Id.* (“[F]or so long as the flows in the Columbia River in Canada continue to contribute to potential flood hazard in the United States of America, Canada shall . . . [provide called upon flood protection].”); NW. DIV., U.S. ARMY CORPS OF ENG’RS, WHITE PAPER ON COLUMBIA RIVER POST-2024 FLOOD RISK MANAGEMENT PROCEDURE 46, 50 (2011) [hereinafter WHITE PAPER] (“[T]he degree of uncertainty will increase under the ‘Treaty Terminated’ scenario.”).

¹³² Columbia River Treaty, *supra* note 13, art. VI(4).

¹³³ Can.-U.S. Annex, *supra* note 119, ¶ 1.

¹³⁴ See B.C. MINISTRY OF ENERGY & MINES, *supra* note 21, at 9–11 (describing areas of disagreement between the United States and Canada in the interpretation of the Columbia River Treaty).

¹³⁵ WHITE PAPER, *supra* note 131, at 6.

¹³⁶ *The Future of the U.S.-Canada Columbia River Treaty, Building on 60 Years of Coordinated Power Generation and Flood Control: Oversight Field Hearing Before the H. Comm. on Nat. Res.*, 113th Cong. 14 (2013) [hereinafter *Hearing*] (statement of Kathy Eichenberger, Exec. Director, Columbia Treaty Review Team, B.C. Ministry of Energy & Mines).

¹³⁷ SANDFORD ET AL., *supra* note 8, at 23.

ecosystems.”¹³⁸ The British Columbia government estimates that the United States would not face higher flood risk after 2024, but that if it resorts to called upon flood protection, U.S. sources would face costs of \$40 to \$150 million in lost power generation and negative impacts on other river uses, such as recreation and ecosystem.¹³⁹

However, U.S. sources disagree. A technical study by the United States Entity concluded that the risk of flooding was between two and four times more likely in a post-2024 scenario as compared to current conditions.¹⁴⁰ At the same time, a commentator predicts that the obligation to provide on call flood protection would “seriously constrain how free British Columbia would be to change the structures or significantly alter their operation, even upon termination of the other treaty provisions.”¹⁴¹ The uncertainty regarding post-2024 flood control suggests that “the flood control provisions more than any other aspect of the treaty will drive the parties to the negotiation table for a modified agreement.”¹⁴²

The juxtaposition of the modern importance of sustainable development with the omission of any reference to the environment in the treaty makes clear that the treaty is out of date. Scientific consensus around the importance of freshwater ecosystems generally, and the degradation of the Columbia River specifically, show that freshwater use decisions are vital to the well-being of current and future generations.¹⁴³ So far, the absence of an ecosystem function from the treaty has not been sufficiently persuasive to drive the parties to negotiate a new treaty. But the 2024 expiration of Canadian flood prevention obligations will decrease the value of the existing treaty to the parties by increasing uncertainty and limiting beneficial cooperation. Canada and the United States have a “window of opportunity” to build on a “social-ecological transformation” and create a governance structure for the river that ensures a future of sustainable development.¹⁴⁴

IV. A LEGAL FRAMEWORK OF WATER LAW

A new Columbia River Treaty will not be negotiated in a vacuum. Since 1961, the body of international water law has developed to include a number of substantive and procedural obligations recognized as part of customary international law. This legal background is valuable as a distillation of global experience regarding how to structure effective, fair water agreements, but it also is the law that will govern the parties’ behavior in the absence of an agreement and informs the interpretation of the agreement itself. International water law is dominated by the principle of equitable and

¹³⁸ *Id.* at 23–24.

¹³⁹ B.C. MINISTRY OF ENERGY & MINES, *supra* note 21, at 9, 11.

¹⁴⁰ U.S. Entity, Iteration #2 Alternatives & Components: General Summary of Results 38 (Apr. 10, 2013), <https://perma.cc/7WN7-6798>.

¹⁴¹ Shurts, *supra* note 11, at 204.

¹⁴² *Id.*

¹⁴³ See *supra* notes 74–77, 113–117.

¹⁴⁴ ROCKSTRÖM ET AL., *supra* note 51, at 241.

reasonable use, which can be understood in contrast with discredited historical approaches. Equitable and reasonable use demands a fact-based allocation of benefits and acknowledges harm to states as inevitable. In the case of the Columbia River, the important facts under this paradigm are those relating to the existing uses of the river, population dependence on the river, indigenous practices, and ecosystem protection. Ecosystem protection as a basis for making allocation decisions is disputed: it may have relevance separate from state environmental interests. Regardless, ecosystem protection is recognized by international law as essential to sustainable development and equitable use and for that reason should be part of Columbia River governance.

A. Discredited Principles: Absolute Territorial Integrity and Sovereignty

The history of international water law is to some extent a vacillation between two incompatible principles: territorial sovereignty and territorial integrity.¹⁴⁵ Territorial sovereignty is the idea that because a state has absolute sovereignty over its own territory, it therefore has absolute sovereignty to do as it wishes with international water flowing through its territory.¹⁴⁶ This position is notable for its embrace of the upstream state's right to harm a downstream state. The inverse of absolute territorial sovereignty is the principle of absolute territorial integrity, which holds that because a state has a right to the natural flow of an international river, no upstream states may impede or change that flow.¹⁴⁷ In practice, territorial sovereignty benefits (and is advocated by) upstream states, while territorial integrity pairs with downstream states.¹⁴⁸

These two principles "may be useful as tools of advocacy, but they afford little assistance in the resolution of concrete controversies."¹⁴⁹ Their history of practice shows that states espouse these principles opportunistically.¹⁵⁰ Today, absolute territorial integrity is a fully discredited idea: at the negotiations for the 1997 Convention on the Law of Non-Navigational Uses of International Watercourses¹⁵¹ (Watercourses Convention), which rejected territorial integrity, no country defended the principle.¹⁵²

Today, international law regarding international waters threads a middle course between the absolute positions of territorial integrity and

¹⁴⁵ BJØRN-OLIVER MAGSIG, INTERNATIONAL WATER LAW AND THE QUEST FOR COMMON SECURITY 47 (2015).

¹⁴⁶ STEPHEN C. MCCAFFREY, THE LAW OF INTERNATIONAL WATERCOURSES 113–14 (2d ed., 2007).

¹⁴⁷ *Id.* at 126.

¹⁴⁸ *Id.* at 122, 125–28.

¹⁴⁹ *Id.* at 128.

¹⁵⁰ In the 20th century, the United States contemporaneously asserted both principles in negotiations with Canada and Mexico. *Id.* at 102–07.

¹⁵¹ Convention on the Law of Non-Navigational Uses of International Watercourses, May 21, 1997, 36 ILM 700 (1997) [hereinafter Watercourses Convention].

¹⁵² MCCAFFREY, *supra* note 146, at 398.

territorial sovereignty. Limited territorial sovereignty is the concept underpinning the binding principle of equitable and reasonable use and the obligation to do no harm.¹⁵³ Limited territorial sovereignty balances a state's right to use its territory as it wishes against its obligation to not cause significant harm to other states.¹⁵⁴ Compared with the absolute approaches, limited territorial sovereignty gains fairness at the cost of clarity. Identifying uses that are consistent with this principle, and harm that is not, is complicated and difficult. Articulating the analytical process for achieving equitable and reasonable use is the primary focus of the doctrine.

B. The Dominant Principle: Equitable and Reasonable Use

Reasonable and equitable use is the dominant norm of international water law and is a general rule of international law.¹⁵⁵ Reasonable and equitable use guarantees that the uses and benefits of the watercourse will be shared equitably.¹⁵⁶ Under this norm, no use of water is per se allowed and protection from harm is not guaranteed.¹⁵⁷ Instead, a fact- and context-specific analysis, considering all relevant factors, determines which uses and harms are consistent with the norm.¹⁵⁸ In the Columbia Basin, particularly relevant factors include existing uses, population dependence, and indigenous customs. The context-dependent nature of the norm means it is flexible to changes in circumstances, and in practice, requires following procedural norms to be compliant. This section will examine these aspects of the norm in detail.

The rule has ancient roots, with equity being the basis for water allocations in Rome and other ancient civilizations.¹⁵⁹ In the modern era, the International Law Association adopted the 1966 Helsinki Rules on the Uses of Waters of International Rivers that states, "each basin state is entitled within its territory, to a reasonable and equitable share in the benefits of an international drainage basin."¹⁶⁰ This principle of reasonable and equitable sharing was generally accepted as customary international law.¹⁶¹ In 1997, the United Nations adopted the Watercourses Convention and incorporated the principle from the Helsinki Rules.¹⁶² However, the name of the principle was changed to "equitable and reasonable utilization."¹⁶³ The Watercourses Convention, to which neither the United States nor Canada is a party,

¹⁵³ MAGSIG, *supra* note 145, at 47–48; WEISS, WATER-SCARCE WORLD, *supra* note 71, at 21.

¹⁵⁴ WEISS, WATER-SCARCE WORLD, *supra* note 71, at 21.

¹⁵⁵ MCCAFFREY, *supra* note 146, at 391.

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ MAGSIG, *supra* note 145, at 48.

¹⁵⁹ WEISS, WATER-SCARCE WORLD, *supra* note 71, at 21.

¹⁶⁰ Int'l Law Ass'n, Helsinki Rules on the Uses of Waters of International Rivers, art. IV (Aug. 20, 1966).

¹⁶¹ WEISS, WATER-SCARCE WORLD, *supra* note 71, at 26.

¹⁶² Watercourses Convention, *supra* note 151, art. 5.

¹⁶³ *Id.*

entered into force in 2014.¹⁶⁴ Though not binding on nonparty states, it provides a codification of customary international law regarding equitable and reasonable use.¹⁶⁵ The International Court of Justice, in *Gabčíkovo-Nagymaros Project*,¹⁶⁶ quoted the convention with approval and confirmed the status of equitable and reasonable utilization as a general rule of international law.¹⁶⁷

The doctrine of equitable and reasonable use is useful because it defines legal rights. The principle does not guarantee each state an equal share of the water; rather, it guarantees each state “an equal right to an equitable share of the uses and benefits” of an international watercourse.¹⁶⁸ Similarly, the principle does not give a state the right to be free from harm.¹⁶⁹ Harm in fact must be distinguished from harm to the legally protected interest.¹⁷⁰ A downstream state may be harmed in fact by an upstream state’s use, but an upstream state can also be harmed in fact when its preferred use of the water is limited by requirements of the downstream state.¹⁷¹ To the extent that either state acts in a manner different from how it would act in the absence of the other state, it is harmed in fact, even if there is no physical damage.¹⁷² However, the principle of equitable use does not forbid this harm. Rather, only when the legally protected interest is infringed, by one state exceeding its equitable share, is a state entitled to relief under equitable and reasonable use.¹⁷³

The nature of harm in the context of watercourses emerges from the fact that uses of watercourses are often zero sum. Certainly consumptive uses are: water lost to evaporation in irrigation canals in an upstream state is

¹⁶⁴ *Id.* art. 36; Convention on the Law of the Non-Navigational Uses of International Watercourses, May 21, 1997, U.N. Treaty Registration No. I-52106.

¹⁶⁵ See MCCAFFREY, *supra* note 146, at 376 (“As is its practice, the [International Law Commission draft on which the convention was based] did not indicate which of the provisions codify, and which progressively develop the law. But it seems clear that the most important elements of the Convention—equitable utilization, prevention of harm, prior notification, protection of ecosystems—are, in large measure, codifications of norms that either exist or, in the case of ecosystem protection, are at least emerging.”). The International Law Commission is a body of the United Nations tasked with the progressive development of international law and its codification.

¹⁶⁶ *Gabčíkovo-Nagymaros Project* (Hung./Slovk.), Judgment, 1997 I.C.J. Rep. 7 (Sept. 25).

¹⁶⁷ *Id.* ¶¶ 78, 85, 147, 150 (Sept. 25) (“The Court considers that Czechoslovakia, by unilaterally assuming control of a shared resource, and thereby depriving Hungary of its right to an equitable and reasonable share of the natural resources of the Danube . . . failed to respect the proportionality which is required by international law.”).

¹⁶⁸ MCCAFFREY, *supra* note 146, at 391.

¹⁶⁹ *Id.*

¹⁷⁰ *Id.* at 388–89.

¹⁷¹ *Id.* at 387 (citing R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960)) (discussing the reciprocal nature of harm in fact). For example, a downstream state’s use of a river as a source of domestic drinking water may require the upstream state to incur costs to prevent pollution. To the extent that the upstream state would not prevent the pollution in the absence of the downstream state, the costs to do so represent harm in fact to the upstream state.

¹⁷² See *id.* (explaining that harm results when a state limits its use of water resources because of uses in another state).

¹⁷³ *Id.* at 388–89.

not available for domestic use in a downstream state. Nonconsumptive uses can exclude other uses as well, by changing the flow of a river (through the use of dams and reservoirs) or the water quality (through pollution or wetland degradation). For example, an upstream state's hydroelectric system may require that reservoirs are filled during the spring and emptied in the summer to match peak energy demand, but this cycle may disrupt fish breeding patterns downstream, disrupt recreational uses, or cause flooding. These harms in fact are not per se inconsistent with equitable and reasonable use; rather, their status is dependent on the entire factual context of the river.

Determining what constitutes equitable and reasonable use requires considering "all relevant factors and circumstances."¹⁷⁴ Furthermore, factors should be weighed based on their importance relative to other considerations—no factor is presumptively more important.¹⁷⁵ International treaties and conventions showing state practice, dispute settlements showing judicial decisions, and scholarly works are all recognized sources of international law and flesh out the content of the principle of the equitable and reasonable use.¹⁷⁶ The Watercourses Convention provides a starting point for identifying relevant considerations:

- (a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
- (b) The social and economic needs of the watercourse States concerned;
- (c) The population dependent on the watercourse in each watercourse State;
- (d) The effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
- (e) Existing and potential uses of the watercourse;
- (f) Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;
- (g) The availability of alternatives, of comparable value, to a particular planned or existing use.¹⁷⁷

Despite the natural inclination to privilege an existing use, factors (e) and (g) indicate that existing uses do not receive any per se preference over other possible uses.¹⁷⁸ To the contrary, Professor McIntyre suggests that, "existing uses will be scrutinized in terms of their adverse or beneficial environmental impact, particularly where improved understanding of

¹⁷⁴ Watercourses Convention, *supra* note 151, art. 6, ¶ 1. Irrelevant factors that should not be considered probably include, *inter alia*, the watercourse's state of origin, the uses prior in time, and the relative economic development of the states concerned. MCCAFFREY, *supra* note 146, at 396; OWEN MCINTYRE, ENVIRONMENTAL PROTECTION OF INTERNATIONAL WATERCOURSES UNDER INTERNATIONAL LAW 157–58 (2007).

¹⁷⁵ Watercourses Convention, *supra* note 151, art. 6, ¶ 3. A proposal that sustainable development and vital human needs be given special consideration was rejected during the drafting of the Watercourses Convention. MCINTYRE, *supra* note 174, at 155–56. Therefore, the Watercourses Convention's direction that a conflict between uses be resolved "with special regard" for vital human needs likely does not describe customary international law. *Id.*; Watercourses Convention, *supra* note 151, art. 10, ¶ 2.

¹⁷⁶ Statute of the International Court of Justice art. 38, ¶ 1, June 26, 1945, 59 Stat. 1031.

¹⁷⁷ Watercourses Convention, *supra* note 151, art. 6, ¶ 1.

¹⁷⁸ MCINTYRE, *supra* note 174, at 165.

adverse environmental impacts might be considered a ‘fundamental change in circumstances.’”¹⁷⁹ Another commentator concludes that the term “existing and potential uses” is an attempt to encourage a cost-benefit analysis of the “possibility of conflicting uses.”¹⁸⁰ This line of analysis goes to factor (g), the availability of alternatives. The presence of alternatives “relates to the true extent of the dependence” of a state on the watercourse for social and economic needs.¹⁸¹ On the Columbia River, relevant alternatives include new technology for producing electricity that emerged after the completion of the hydroelectric dams.¹⁸²

This framework will be applied to the Columbia River in Part V.B.1.

C. The Procedural Component of Equitable and Reasonable Use

The principle of equitable and reasonable use is flexible and responsive: a system of uses and benefits in a waterbasin that is consistent with the principle today may not be tomorrow because of a change in a relevant factor.¹⁸³ Indeed, the principle’s suitability to a dynamic world is one of its chief virtues.¹⁸⁴ Changes in circumstances such as new users, technological advances, water quantity, and economic development can all shift what is an equitable use.¹⁸⁵ The dynamism of the doctrine in practice means that the principle of equitable and reasonable use is “best understood as a *process*.”¹⁸⁶

As a process, the principle of equitable utilization creates procedural obligations in addition to its substantive obligations.¹⁸⁷ It provides a standard for determining whether a proposed use of an international watercourse is

¹⁷⁹ *Id.* (quoting Francis N. Botchway, *The Context of Trans-Boundary Energy Resource Exploitation: The Environment, the State and the Methods*, 14 COLO. J. INT’L ENVTL. L. & POL’Y 191, 218 (2003)).

¹⁸⁰ ATTILA TANZI & MAURIZIO ARCARI, *THE UNITED NATIONS CONVENTION ON THE LAW OF INTERNATIONAL WATERCOURSES: A FRAMEWORK FOR SHARING* 132 (2001).

¹⁸¹ MCINTYRE, *supra* note 174, at 177.

¹⁸² *See Report of the International Law Commission to the General Assembly on the Work of Its Forty-Sixth Session: Draft Articles on the Law of the Non-Navigational Uses of International Watercourses*, 49 U.N. GAOR Supp. No. 10, at 89, 101 cmt. 4, U.N. Doc. A/49/10 (1994), *reprinted in* [1994] 2 Y.B. Int’l L. Comm’n 89, 101 cmt. 4, U.N. Doc. A/CN.4/SER.A/1994/Add.1 (Pt. 2) [hereinafter *Draft Articles*] (“The alternatives may thus take the form not only of other sources of water supply, but also of other means—not involving the use of water—of meeting the needs in question, such as alternative sources of energy or means of transport.”).

¹⁸³ MCCAFFREY, *supra* note 146, at 386, 388.

¹⁸⁴ WEISS, *WATER-SCARCE WORLD*, *supra* note 71, at 28.

¹⁸⁵ *Id.* at 28–29.

¹⁸⁶ MCCAFFREY, *supra* note 146, at 403.

¹⁸⁷ Owen McIntyre, *The Contribution of Procedural Rules to the Environmental Protection of Transboundary Rivers in Light of Recent ICJ Case Law*, in *INTERNATIONAL LAW AND FRESHWATER: THE MULTIPLE CHALLENGES*, (Boisson de Chazournes, et al. eds., 2013) 239, 242–43 [hereinafter McIntyre, *Procedural Rules*] (discussing the International Court of Justice’s move towards viewing the substantive and procedural rules of international water law “as functionally connected to [one] another, while at the same time comprising a coherent and integrated set of obligations”).

equitable, by consideration of the relevant factors.¹⁸⁸ In an international waterbasin without a governing treaty, each state has a duty to determine whether its own uses are equitable and reasonable, and thus whether it is in compliance with international law.¹⁸⁹ Making such a determination requires data from the entire waterbasin.

Thus, a corollary obligation of the principle of equitable utilization is a duty to provide and receive relevant information regarding the waterbasin.¹⁹⁰ Together with the requirement of prior notification and negotiation this obligation takes the form of a duty to conduct transboundary environmental impact assessments.¹⁹¹ The International Court of Justice, in *Pulp Mills on the River Uruguay*,¹⁹² described this obligation as part of general international law: “it may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource.”¹⁹³ These data are to be shared when projects are proposed and throughout the lifetime of the project: the duty is of ongoing continuous monitoring.¹⁹⁴ Only through compliance with these procedural duties can a state comply with the substantive commands of the principle of equitable and reasonable use.¹⁹⁵

In practice, much of customary international law may be displaced by agreements between the parties, with no requirement that a negotiated agreement be consistent with the obligations of international law.¹⁹⁶ In the Columbia Basin, the institutions created by the treaty play the direct role in mediating the interaction of party states: sharing information, coordinating action, and offering a formal mode of communication.¹⁹⁷ Given the large quantity of information that must be shared to comply with the customary international law, the role of established institutions is vital.¹⁹⁸ These

¹⁸⁸ MAGSIG, *supra* note 145, at 54.

¹⁸⁹ MCCAFFREY, *supra* note 146, at 399.

¹⁹⁰ WEISS, WATER-SCARCE WORLD, *supra* note 71, at 33–34 (“The 1997 UN Watercourses Convention sets forth four basic procedural duties, which resonate in international environmental law: the duties to notify, to consult, to provide information, and to co-operate.”).

¹⁹¹ MCCAFFREY, *supra* note 146, at 402–03; McIntyre, *Procedural Rules*, *supra* note 187, at 240.

¹⁹² *Pulp Mills on the River Uruguay* (Arg. v. Uru.), Judgment, 2010 I.C.J. Rep. 14 (Apr. 20).

¹⁹³ *Id.* ¶ 204. However, as with many duties under customary international law, the specific requirements of the transboundary environmental impact assessment are not stated with binding authority anywhere.

¹⁹⁴ *Id.* ¶ 205.

¹⁹⁵ McIntyre, *Procedural Rules*, *supra* note 187, at 242.

¹⁹⁶ See HUGH THIRLWAY, THE SOURCES OF INTERNATIONAL LAW 35 (2014) (citing Vienna Convention on the Law of Treaties art. 48, May 23, 1968, 1155 U.N.T.S. 331).

¹⁹⁷ Anthony G. White, *The Columbia River: Operation under the 1964 Treaty*, in TRANSBOUNDARY RIVER GOVERNANCE, *supra* note 2, at 50, 54 (“[M]anagement of the Columbia River is as much about international relations as it is about public administration . . .”).

¹⁹⁸ McIntyre, *Procedural Rules*, *supra* note 187, at 254.

institutions draw authority from their specialization and the common grant of authority from the party states.¹⁹⁹

D. The Duty to Prevent Harm

It is a general principle of international law that a state has an obligation to not cause harm to another.²⁰⁰ This principle applies in the context of international watercourses as well.²⁰¹ On its face, this directive seems incompatible with the principle of equitable use, which concedes that sharing the limited resources of an international watercourse will almost always result in harm-in-fact to at least one of the states.²⁰² However, in the context of international watercourses, the obligation to prevent harm is not a prohibition on all harm. Rather, it “requires avoidance of harm in a way and to an extent that is reasonable under the circumstances.”²⁰³ Thus, the no-harm principle is consistent with the equitable utilization principle.²⁰⁴

Like the equitable utilization principle, the no-harm principle is poorly suited to resolving disputes after the fact. States have been unable to agree on principles of state-to-state liability in an environmental context that would allow for ex post resolution of disputes.²⁰⁵ The ideal role of the no-harm principle is to “trigger discussions between states concerned” regarding the prevention of harm.²⁰⁶

E. The Emerging Principle of Ecosystem Protection

There may be an obligation under customary international law for states to protect international watercourse ecosystems, independent of state environmental interests. This obligation has a basis in the well-established principle of sustainable development and legal support from the International Court of Justice. Such an obligation would extend to cover domestic land-based actions with an impact on international waters. The concept of environmental flows has emerged as a legitimate means of addressing the ecosystem protection obligation and should be considered for the Columbia River.

¹⁹⁹ *Id.* (citing *Pulp Mills on the River Uruguay*, 2010 I.C.J. Rep. 14, ¶ 89).

²⁰⁰ WEISS, WATER-SCARCE WORLD, *supra* note 71, at 29 (citing U.N. Conference on the Human Environment, *Declaration of the United Nations Conference on the Human Environment*, princ. 21, U.N. Doc. A/CONF.48/14/Rev.1 (June 17, 1972)).

²⁰¹ *Id.*

²⁰² See discussion *supra* Part IV.B.

²⁰³ MCCAFFREY, *supra* note 146, at 407.

²⁰⁴ *Id.* at 407–08.

²⁰⁵ See WEISS, WATER-SCARCE WORLD, *supra* note 71, at 35.

²⁰⁶ MCCAFFREY, *supra* note 146, at 408.

1. The Extent of the Obligation Under Customary International Law

Traditionally, international law regulated the relationships of states.²⁰⁷ In this paradigm, environmental values are only considered when they overlap with the interests of states.²⁰⁸ Such an approach to environmental conservation is under-inclusive and encourages neither cooperative behavior nor effective environmental protection.²⁰⁹ However, advances in scientific awareness of the importance of ecosystems,²¹⁰ changes in the paradigm of international law,²¹¹ and developments in state practice have made it so that there is at least an “emerging obligation [under international law] to protect international watercourse systems and their ecosystems against degradation.”²¹²

In fact, an independent obligation of ecosystem protection has a foundation in other well-established concepts of international environmental law, including the precautionary approach, sustainable development, and the avoidance of harm principle.²¹³ Given the known value of ecosystems, and the fact that scientific knowledge about the importance of intact ecosystems will continue to grow, the International Law Commission characterizes the obligation to protect ecosystems as “a general application of the principle of precautionary action.”²¹⁴ An independent obligation of ecosystem protection is thus strengthened by its logical relation to the precautionary approach. The International Court of Justice in *Gabčíkovo-Nagymaros* expressed the independent importance of environment:

[T]he environment is not an abstraction but represents the living space, the quality of life and the very health of human beings, including generations unborn. The existence of a general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other states or

²⁰⁷ See Bruno Simma, *From Bilateralism to Community Interest in International Law*, 250 RECUEIL DES COURS, 217, 230–32 (1994).

²⁰⁸ MCINTYRE, *supra* note 174, at 286.

²⁰⁹ See Jutta Brunnée & Stephen J. Toope, *Environmental Security and Freshwater Resources: Ecosystem Regime Building*, 91 AM. J. INT’L L. 26, 27 (1997) (“[E]nvironmental security can only be achieved through an ecosystem orientation of international norms and regimes . . .”).

²¹⁰ See TANZI & ARCARI, *supra* note 180, at 8 (“The progress made in scientific research further shows that the uses of watercourses can affect and be affected by processes related to other natural elements, such as soil degradation and desertification, deforestation, and climate change.” (footnotes omitted)).

²¹¹ Judge Bruno Simma calls this new paradigm “community interest” and defines it as “a consensus according to which respect for certain fundamental values is not to be left to the free disposition of States individually or *inter se* but is recognized and sanctioned by international law as a matter of concern to all States.” Simma, *supra* note 207, at 233. Environmental protection is an example of such a fundamental value. *Id.* at 238. The concept of “common concerns of mankind” may also be the basis for the emergence of the protection of environmental values independent of state interest. WEISS, WATER-SCARCE WORLD, *supra* note 71, at 70–71.

²¹² MCCAFFREY, *supra* note 146, at 457.

²¹³ *Id.* at 456–60.

²¹⁴ *Draft Articles*, *supra* note 182, at 119 n.328.

of areas beyond national control is now part of the corpus of internal law relating to the environment.²¹⁵

While no international agreement imposes a binding obligation to abide by the precautionary approach, it has the persuasive power of being sound policy, widely adopted in environmental law, and near-unanimous endorsement by the world's nations in the *Rio Declaration on Environment and Development*.²¹⁶

Similarly, support for ecosystem protection as part of the substance of customary international law is rooted in sustainable development and the prevention of significant harm.²¹⁷ The Watercourses Convention justifies utilization with the notion of sustainable development, which itself is "closely linked" to the principle of ecosystem protection.²¹⁸ Article 20 of the Watercourses Convention suggests that ecosystem protection is required to be part of states' equitable use balancing when the analysis is undertaken according to the Convention.²¹⁹

2. The Substance of the Obligation of Ecosystem Protection

The substance of ecosystem protection draws meaning from the scientific understanding of ecosystem. The concept is expansive: "in ecosystems, everything depends on everything else."²²⁰ This means that purely land-based activities, such as logging and grazing, may be included within a water's ecosystem and thus within the scope of a rule regarding ecosystem protection.²²¹ Also, ecosystem protection may encompass ecosystem effects that are not, or not yet, transboundary.²²² This is because the transboundary effects of intrastate ecosystem degradation may not be apparent or may not be apparent until they are irreversible.²²³ International conventions that protect domestic ecosystems already exist, such as the

²¹⁵ Gabčíkovo-Nagymaros Project (Hung./Slovk.), Judgment, 1997 I.C.J. Rep. 7, ¶ 53 (Sept. 25) (quoting Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. Rep. 226, ¶ 29 (July 8)).

²¹⁶ Principle 15 of the Declaration states "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." *Rio Declaration on Environment and Development*, *supra* note 60, princ. 15.

²¹⁷ MCCAFFREY, *supra* note 146, at 456–58.

²¹⁸ MCINTYRE, *supra* note 174, at 304.

²¹⁹ Watercourses Convention, *supra* note 151, art. 20 ("Watercourse States shall, individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses."); MCINTYRE, *supra* note 174, at 304–05.

²²⁰ MCCAFFREY, *supra* note 146, at 459; accord TANZI & ARCARI, *supra* note 180, at 240–41.

²²¹ MCCAFFREY, *supra* note 146, at 459.

²²² *Id.*; see also MCINTYRE, *supra* note 174, at 301 ("[A] comprehensive ecosystem approach may give rise to obligations in respect of purely internal waters as well as the waters of international watercourses.").

²²³ MCCAFFREY, *supra* note 146, at 459.

Ramsar Convention²²⁴ and the Convention on Biological Diversity.²²⁵ Article 20 of the Watercourses Convention, discussed above, is similarly not limited by its text to only transboundary ecosystem effects.²²⁶ Thus, a responsibility to protect the ecosystem of an international watercourse includes both relevant domestic activities and land-based activities.

An “essential component” of watercourse sustainable development is the concept of environmental flows, which addresses the quantity, quality, and duration of a river flow regime for environmental purposes.²²⁷ Environmental flows are more than a guaranteed minimum flow; the World Commission on Dams defines environmental flows as: “[a] specific release of water from a dam to ensure the maintenance of downstream aquatic ecosystems and key species. The flows may include seasonal or annual flows and/or regular or irregular pulses to meet ecosystem needs. They may also be linked to livelihood needs of downstream affected people.”²²⁸ In some ways, environmental flows resemble the needs balancing process of equitable utilization analysis, because of the dynamic natures of the needs to be balanced and the necessity of ongoing monitoring and adjustment.²²⁹

The status of environmental flows as a legitimate mechanism for addressing international fresh water environmental concerns was confirmed by the Arbitration Panel in the *Indus Waters Kishenganga* case,²³⁰ involving a dispute between India and Pakistan over the shared Indus River.²³¹ In its Partial Award, the court stated India has a duty to ensure a “minimum flow” reaches Pakistan and based that obligation in customary international law.²³² The court took care to distinguish the concepts of minimum flow and environmental flow:

[A]n environmental flow is not necessarily a fixed minimum, affecting only the dry season, but is rather the flow regime anticipated to maintain environmental change resulting from infrastructure and development within the range considered acceptable under the circumstances of the river in question. Environmental flows may therefore be higher or lower, depending on those

²²⁴ Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Feb. 2, 1971, 996 U.N.T.S. 246.

²²⁵ Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S. 79.

²²⁶ Watercourses Convention, *supra* note 151, art. 20.

²²⁷ John Scanlon & Alejandro Iza, *International Legal Foundation for Environmental Flows*, 14 Y.B. INT'L ENVTL. L. 81, 82–83 (2004).

²²⁸ WORLD COMM'N ON DAMS, DAMS AND DEVELOPMENT: A NEW FRAMEWORK FOR DECISION-MAKING 345 (2000).

²²⁹ See Scanlon & Iza, *supra* note 227, at 86.

²³⁰ *Indus Waters Kishenganga Arbitration* (Pak. v. India), PCA Case Repository No. 2011-01, Final Award (Perm. Ct. Arb. Dec. 20, 2013).

²³¹ *Id.* ¶¶ 97 & n.151, 100.

²³² *Indus Waters Kishenganga Arbitration* (Pak. v. India), PCA Case Repository No. 2011-01, Partial Award, ¶ 447 (Perm. Ct. Arb. Feb. 18, 2013) (“India’s duty to ensure that a minimum flow reaches Pakistan also stems from the Treaty’s interpretation in light of customary international law.”).

circumstances, and may include requirements affecting the high flow seasons of a river that cannot reasonably be described as a “minimum.”²³³

The arbitration panel also acknowledged the dynamic and procedural nature of environmental flows by providing either party with a right to review the minimum flow award through treaty mechanisms beginning seven years after the minimum flow ruling was enacted.²³⁴ The *Kishenganga* decision represents “significant” support for the concept of environmental flows as a means of addressing the substantive environmental obligations present in international law.²³⁵

The doctrine of minimum stream flow serves as a reminder that “not all beneficial uses of water result from diversion.”²³⁶ In the context of the Columbia River, changes in hydrography due to climate change,²³⁷ increasing demand for consumptive uses, coupled with an increased awareness of the ecological importance of seasonal flows for fish, mean that environmental flows should play a critical role in ensuring that river management provides sufficient ecological protection.²³⁸

V. A NEW TREATY

A new Columbia River treaty will be enacted at the interstate level between the federal governments of Canada and the United States, representing the interests of the seven U.S. states and the province of British Columbia. In 2013 and 2014, the United States and Canadian Entities released official treaty review documents to guide the formal negotiations of a new treaty.²³⁹ Despite this preparation at the local level and the urging of

²³³ *Indus Waters Kishenganga Arbitration*, ¶ 97 n.151 (Perm. Ct. Arb. Dec. 20, 2013).

²³⁴ *Id.* ¶ 119.

²³⁵ Owen McIntyre, *The Protection of Freshwater Ecosystems Revisited: Towards a Common Understanding of the ‘Ecosystems Approach’ to the Protection of Transboundary Water Resources*, 23 REV. EUR. COMMUNITY & INT’L ENVTL. L. 88, 91 (2014) [hereinafter McIntyre, *Protection of Freshwater Ecosystems*].

²³⁶ Albert E. Utton & John Utton, *The International Law of Minimum Stream Flows*, 10 COLO. J. INT’L ENVTL. L. & POL’Y 7, 9 (1999).

²³⁷ See Johnson, *supra* note 26 (describing threat to salmon posed by climate change).

²³⁸ See Stephen McCaffrey et al., *The Columbia River Treaty in 2014 and Beyond: International Experiences and Lessons Learned*, in TRANSBOUNDARY RIVER GOVERNANCE, *supra* note 2, at 365, 373.

²³⁹ The United States Entity (composed of three federal agencies) engaged in a multiyear review of the treaty, including public, tribal, and state participation, to create its treaty review document. U.S. ENTITY, REGIONAL RECOMMENDATION FOR THE FUTURE OF THE COLUMBIA RIVER TREATY AFTER 2024 (2013) [hereinafter U.S. RECOMMENDATION], <https://perma.cc/6XUA-4DP3>. This Recommendation was officially created for the United States Department of State to guide its negotiations with Canada and/or British Columbia. *Id.* at 7.

The Canadian treaty review document was created by the Province of British Columbia, owner and sole shareholder of BC Hydro, the Treaty-designated Canadian Entity. BRITISH COLUMBIA, COLUMBIA RIVER TREATY REVIEW: B.C. DECISION (2014) [hereinafter B.C. DECISION], <https://perma.cc/C8MV-BGHJ>. Creation of the B.C. Decision involved consultation with the public and regional stakeholders. It will guide “[a]ny changes to the Treaty that may be pursued by the Province.” *Id.* at 2. The role of British Columbia as a Canadian province is unlike a U.S.

local representatives, as of January 2017, the federal governments had not yet begun negotiations.²⁴⁰ Two chief differences between the parties will have to be bridged by the negotiation: the scope of the new treaty—i.e., whether the United States will succeed in including an ecosystem function—and the basis for calculation of the Canadian entitlement. Lurking in the background of these issues is the question of whether the Canadian dam and storage system will continue to exist in its current form.

A. Disagreement over an Ecosystem Function

The United States Entity's treaty review document (U.S. Recommendation) departs from the status quo by recommending that an "ecosystem-based function" join hydropower and flood management as the primary purposes of the treaty.²⁴¹ This ecosystem function would "formalize, provide certainty, and build on the many ecosystem actions already undertaken through annual or seasonal mutual agreements."²⁴² In practice, this component of the treaty would ensure "streamflows from Canada with appropriate timing, quantity, and water quality to promote productive populations of anadromous and resident fish and provide reservoir conditions to promote productive population of native fish and wildlife."²⁴³ In addition, cautious language suggests a program to "investigate" and possibly "implement restored fish passage and reintroduction of anadromous fish on the main stem of the Columbia River to Canadian spawning grounds" through the installation of fish passage facilities at the Grand Coulee and Chief Joseph Dams.²⁴⁴ In justifying the inclusion of an ecosystem function, the U.S. Recommendation references the significant efforts undertaken by river managers to address ESA obligations and other environmental considerations and cites the benefits of long-term ecosystem planning rather than "negotiating for these functions on an annual basis."²⁴⁵

On its face, the Canadian position on an ecosystem function contrasts with the U.S. position. The conclusion of the Canadian treaty review document (B.C. Decision) is: "Continue the Columbia River Treaty and seek improvements within the existing Treaty framework."²⁴⁶ This probably means

state with regard to foreign affairs, as the province has more input on negotiations with foreign States. See France Morrisette, *Provincial Involvement in International Treaty Making: The European Union as a Possible Model*, 37 QUEEN'S L.J. 577, 583–84, 592–93 (2013) (discussing the role that provinces play in international negotiations). The B.C. Decision was released in March 2014, after the release of the U.S. Recommendation.

²⁴⁰ Roy MacGregor, *A River Worth a Dam*, GLOBE & MAIL (Toronto) (Jan. 27, 2017), <https://perma.cc/Q7PC-ND8U>.

²⁴¹ U.S. RECOMMENDATION, *supra* note 239, at 2. The U.S. Recommendation was released at approximately the same time that the twelve-year Non-Treaty Storage Agreement was signed. Columbia River Non-Treaty Storage Agreement, *supra* note 102.

²⁴² U.S. RECOMMENDATION, *supra* note 239, at 2.

²⁴³ *Id.* at 5.

²⁴⁴ *Id.* at 5–6.

²⁴⁵ *Id.* at 1, 5.

²⁴⁶ B.C. DECISION, *supra* note 239, at 2.

allowing the Canadian flood control obligation to expire in 2024 and establishing procedures for a smooth transition to called upon flood protection—a course that would give Canada control over treaty dams for the first time since their construction. The B.C. Decision counters the U.S. proposal to include an ecosystem function by noting that “there are a number of available mechanisms inside and outside the Treaty” that address “ecosystem based improvements.”²⁴⁷ Furthermore, the B.C. Decision disclaims any interest in restoring salmon to the Columbia River in Canada, stating that “restoration of fish passage and habitat, if feasible, should be the responsibility of each country regarding their respective infrastructure.”²⁴⁸ These parts of the B.C. Decision suggest that Canada is not interested in expanding the treaty to include an ecosystem function. However, the document itself is somewhat contradictory: despite its headline support for a treaty with limited purposes, in places it also calls for an expansive treaty that could include environmental considerations.

B. Equitable Distribution of Benefits

Some parts of the B.C. Decision suggest that Canada is interested in a more expansive treaty that considers environmental and other aspects of river management and results in equitable sharing of the benefits from the uses of the river. The first principle of the B.C. Decision states in full: “The primary objective of the Treaty should be to maximize benefits to both countries through the coordination of planning and operations.”²⁴⁹ This language does not suggest maintaining the treaty’s narrow focus on power generation and flood prevention. The B.C. Decision advocates recognition of all downstream benefits:

All downstream U.S. benefits, such as flood risk management, hydropower, ecosystems, water supply (including municipal, industrial and agricultural uses), recreation, navigation, and any other relevant benefits, including associated risk reduction arising from coordinated operations compared to alternatives available to each country, *should be accounted for and such value created should be shared equitably between the two countries.*²⁵⁰

Canada’s basis for an expansive treaty aligns with the general rule of international law of equitable and reasonable use: by considering all relevant factors in the equitable sharing of uses and benefits of the river, Canada will be entitled to compensation from the United States in exchange for the downstream benefits that it receives and the costs imposed on Canada.²⁵¹

²⁴⁷ *Id.* at 3; *accord Hearing, supra* note 136, at 17 (statement of Ms. Eichenberger) (“[It is not necessary] [t]o make ecosystems a formal part of the treaty, as we’ve demonstrated that the treaty has been able to address ecosystem needs in the past and can continue to do so.”).

²⁴⁸ B.C. DECISION, *supra* note 239, at 3.

²⁴⁹ *Id.* at 2.

²⁵⁰ *Id.* at 2–3 (emphasis added).

²⁵¹ This interpretation is further enforced by the second principle of the B.C. Decision that states:

Thus, the B.C. Decision can be read to support either of two alternatives: either 1) a continuance of the current treaty, including the 2024 switch to called upon flood protection, a position distasteful to the United States; or 2) the negotiation of a treaty that considers the full range of the benefits and harms caused by Canadian dams and calculates a Canadian Entitlement that equitably distributes those impacts. The first position is likely a negotiating tactic, a reminder to the United States that the switch to called upon flood storage will occur unless Canada can be persuaded of an alternative. The second position represents Canada's true interest: a comprehensive treaty under which Canada will receive monetary compensation as its equitable share of the beneficial uses of the river.

On the other hand, the U.S. Recommendation contains a single position: the United States' best-case scenario for a new treaty. This ideal treaty has power generation, flood prevention, and ecosystem function as its three primary purposes, mirroring the purposes which currently drive U.S. dam operation.²⁵² The "equitable sharing" of benefits would be based only on "downstream power benefits"—not the expansive set of all benefits that Canada advocates.²⁵³ Furthermore, the current formula for calculating downstream power benefits would be revised, resulting in lower payments to Canada.²⁵⁴ The U.S. Recommendation does not address compensation to Canada for the use of its storage for flood prevention. Although the U.S. Recommendation does suggest that Canada not be compensated for using its storage for ecosystem purposes as "the health of the Columbia river ecosystem should be a shared benefit and cost of the United States and Canada," a separate provision notes that implementation of ecosystem-based functions in the treaty should be compatible with rebalancing the entitlement and reducing U.S. power costs.²⁵⁵ The structure of the U.S. Recommendation reflects the relatively weak bargaining position of the United States as a downstream state. Any bargaining pressure the United

The ongoing impacts to the Canadian Columbia Basin to meet Treaty requirements should be acknowledged and compensated for. The level of benefits to the Province, which is currently solely in the form of the Canadian Entitlement, does not account for the full range of benefits in the United States (U.S.) or the impacts in British Columbia.

Id. at 2; see also Shurts, *supra* note 11, at 238 ("[T]he United States may seek to include some consideration of effects on U.S. fish and wildlife and other environmental qualities into treaty principles and operations . . . to obtain a change of this nature in treaty operations, the new arrangement will also have to deliver benefits to British Columbia, in part in the form of non-power benefits and most likely also in the form of a new infusion of power benefits or direct monetary compensation or both.").

²⁵² See *supra* Part III.B.1.

²⁵³ U.S. RECOMMENDATION, *supra* note 239, at 2.

²⁵⁴ The current formula calculates the Canadian Entitlement as the value of half of the power that would be generated under a hypothetical scenario in which river flows are managed to maximize power generation. Columbia River Treaty, *supra* note 13, art. VII. In reality, the power generated is significantly less, because ecosystem considerations significantly influence U.S. hydroelectric facility operations. *Hearing, supra* note 136, at 31 (statement of R. Scott Corwin, Executive Director, Public Power Council, Portland, Oregon). In some years, it is estimated that the Canadian entitlement exceeds the value of hydropower actually generated by the system. *Id.*

²⁵⁵ See U.S. RECOMMENDATION, *supra* note 239, at 3.

States exerts in the negotiations will have to come from some other aspect of the U.S.–Canada relationship.

A foundational issue for the discussions of the treaty's purposes is the existence of the Canadian dams in the first place. The U.S. position assumes their current and continued existence as part of a background condition.²⁵⁶ This assumption exists because the mere existence of the Canadian dams provides benefits to the United States: downstream flood risks are reduced by even uncoordinated operation of Canadian dams.²⁵⁷ By assuming the existence of the Canadian dams, the US position seeks to not account for the benefit in any equitable sharing of benefits that results. A British Columbia policy document responds to this assumption, subtly reminding that the continued existence of the dams is not guaranteed by noting that “all dams require significant capital investment and maintenance which can be significantly higher than the initial capital cost of the project” and listing low power generation, high cost of upgrades, and licensing changes as reasons that “might lead to different operations or physical configurations than are currently modeled.”²⁵⁸ Furthermore, the obligation for called upon flood control after 2024 “only extends for the life of the treaty dams and there is no requirement for Canada to maintain the same amount of storage.”²⁵⁹ While the likelihood of dismantling any of the major Canadian dams may be unlikely,²⁶⁰ the capacity and structure of the Canadian storage system and its upkeep costs are issues that a new treaty will have to address.

The U.S. Recommendation and the B.C. Decision demonstrate the extent to which the interests of the treaty parties diverge. The United States seeks to negotiate a new treaty that includes an ecosystem function in order to lessen the cost of extensive domestic environmental obligations. Canada seeks to use the bargaining power flowing from its upstream position and the current treaty to secure a more equitable distribution of the impacts of river use. The gulf between these positions will be bridged in negotiations—negotiations that should be based on universally accepted notions of

²⁵⁶ The U.S. Recommendation suggests that the Canadian Entitlement should be calculated and based on the additional power generation that results from coordinated operation of U.S. and Canadian dams as compared with a base position of U.S. and Canadian dams operating in an uncoordinated manner, rather than the true background condition of no Canadian dams at all. *Id.* at 3–4.

²⁵⁷ Canada's use of the Arrow (also known as Hugh Keenleyside), Mica, and Duncan Dams for power generation provides a measure of flood control, referred to in that document as “power drafts.” WHITE PAPER, *supra* note 131, at 44–45.

²⁵⁸ B.C. MINISTRY OF ENERGY & MINES, *supra* note 21, at 10.

²⁵⁹ *Id.*; accord B.C. DECISION, *supra* note 239, at 3 (“Current and future operating conditions of Canadian Columbia River Basin dams and reservoirs are subject to provincial and federal licensing including Water Use Plans, where they exist and consideration of aboriginal rights under the Canadian Constitution.”).

²⁶⁰ Aside from the difficulties inherent in decommissioning large dams, BC Hydro is currently constructing a new large hydroelectric dam on the nearby Peace River, suggesting that decisions reducing hydroelectric capacity are unlikely. See Vaugh Palmer, *Tensions Crack Near Site C Dam Causes Political Tension, Too*, VANCOUVER SUN (Feb. 27, 2017), <https://perma.cc/6Q8S-ZGQJ> (“The plan is to begin filling the reservoir in 2022 and begin generating power in 2024.”).

environmental law and the general rule of international law of equitable and reasonable use.

VI. A MODERN COLUMBIA RIVER TREATY

A. An Ecosystem Function Should be Included in a Modernized Treaty

The Columbia River should be managed in a way that considers environmental values. Environmental problems in the basin include ecosystem degradation, particularly as related to anadromous fish populations; risk of destructive flooding; problems caused by reservoirs such as mudflats, lost land, and recreational value; and pollution or water quality issues caused by other uses of the river, such as agriculture.²⁶¹ These problems harm the livelihoods of people living near the river. Ecosystem science shows that the importance of freshwater ecosystems extends beyond immediate impacts on people—that in fact, freshwater ecosystems are essential to human development because they support other biological processes and natural resources upon which human society depends.²⁶² The status quo of the Columbia Basin threatens the assumption the basin will continue to be a safe place for prosperous human development.²⁶³

In addition to the factual reasons, there are legal justifications for managing the Columbia River in an environmentally-sensitive manner. The principles of intergenerational equity and sustainable development, accepted by the United States and Canada, require that the natural resources of the river be developed and used in a way that reflects more than the urgent needs of the current owners of the resources.²⁶⁴ The general rule of international law of equitable and reasonable use includes ecosystem protection as inherent in the fair use of international rivers—and the United States has applied this rule in other domestic and international contexts.²⁶⁵ Finally, there may be an independent norm of international law that the ecosystem of international rivers should be protected for their own sake.²⁶⁶

²⁶¹ See *supra* Part II.C.

²⁶² See ROCKSTRÖM ET AL., *supra* note 51, at 3.

²⁶³ For a drastic example of the threat to human livability in the Columbia Basin, consider nuclear waste from Hanford Site that may someday contaminate the river. Nicholas K. Geranos, *State's Congressional Delegation Urges Trump to Fund Hanford Work*, SEATTLE TIMES (Jan. 10, 2017), <https://perma.cc/5EK9-CYJN>. Other direct threats include dust storms. See CODY, *supra* note 32, at 85, 96. Second-order effects include the economic harm to communities dependent on the river. See *supra* Part II.C.

²⁶⁴ *Rio Declaration on Environment and Development*, *supra* note 60 (both the United States and Canada were participants at the Conference).

²⁶⁵ See *Kansas v. Colorado*, 206 U.S. 46, 117–18 (1907) (applying principle of “equitable apportionment” to an interstate dispute over the Colorado River); Great Lakes Water Quality Protocol of 2012, Can.-U.S., Sept. 7, 2012, art. 2 (“The purpose of this Agreement is to restore and maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes.”), *amending* Great Lakes Water Quality Agreement, Can.-U.S., Nov. 22, 1978, 30 U.S.T. 1383 (as amended Oct. 16, 1983 and Nov. 18, 1987).

²⁶⁶ See *supra* Part IV.E.

Environmental facts and legal practice both indicate that the environment of the Columbia River should be relevant to its management.

Accordingly, much of the governance of the river does consider environmental issues. In the United States, the ESA and Clean Water Act impose environmental standards that must be met, and state laws regulate riverside development.²⁶⁷ In Canada, similar protections exist. For example, British Columbia's Water Protection Act²⁶⁸ regulates development affecting watercourses, imposing procedural and substantive requirements that protect water environments.²⁶⁹ Furthermore, agreements between the United States and Canada coordinate Columbia River operations to facilitate domestic environmental objectives.²⁷⁰ However, the current Columbia River Treaty is an exception to this environmentally-conscious river governance. The treaty's expansive scope mandates that major parts of the Columbia River infrastructure be operated in ways that cause environmental harm and impede the parties' efforts to achieve domestic environmental objectives.

Therefore, a new treaty should be negotiated. The 2024 expiration of Canadian flood control obligations creates an incentive for the parties to re-examine the international governance of the river, and this opportunity should be used to include an ecosystem function as a primary purpose of the treaty. Doing so will improve the Columbia Basin as a place to live and update the governance of this major international river so that it is consistent with sustainable development principles and the domestic environmental practices of the parties.

1. An Environmental Flow Requirement Should be the Core of the Ecosystem Function

The ecosystem function of the treaty should be implemented primarily through the use of an environmental flow requirement. Environmental flows will enable the treaty to facilitate, rather than impede, domestic efforts to use the river to create environmental benefits.

Implementing environmental flows will not be overly burdensome on the parties to the treaty because it will fit within the current scope of the treaty and the water allocation obligations it imposes will be flexible. Although the environmental issues facing the Columbia River are multifaceted with many causes, the ecosystem function of the treaty will be much narrower in scope. The current treaty operates to coordinate the

²⁶⁷ See *supra* Part III.B.1.

²⁶⁸ Water Protection Act, R.S.B.C. 1996, c 484 (2016) (Can.).

²⁶⁹ See *id.* arts. 2, 4, 5.

²⁷⁰ Columbia River Non-Treaty Storage Agreement, *supra* note 102, at 2 (defining the relationship between the United States and Canada regarding water and electricity that comes from the Columbia River). In addition to the long-term agreement, "the U.S. and Canada have developed Treaty supplemental operating agreements within the operating year to provide additional flow augmentation for U.S. fisheries in exchange for trout spawning and whitefish protection downstream of Arrow in Canada." ADMINISTRATOR'S DECISION RECORD, *supra* note 99, at 1-2.

storage and release of water at various dams and reservoirs.²⁷¹ Using dams to decrease the risk of floods has flattened the river's hydrograph.²⁷² The concept of environmental flows will fit within the existing operations of the treaty's institutions: flood prevention, power generation, and environmental flows are all enacted through water allocation decisions.²⁷³ In other words, advancing the ecological function through environmental flows does not require the treaty's institutions to address a different type of practical outcome; environmental flows will be primarily a procedural mechanism that alters the outcome of existing water allocation decisions, it will not require other types of substantive environmental impacts, such as wetland restoration work.²⁷⁴ The ecological objectives of an environmental flow requirement are a subjective societal judgment, not a scientific absolute.²⁷⁵ Thus, the environmental flows requirement will consider the entire context of the Columbia Basin, including the demands of hydropower, flood protection, other uses, and social values.²⁷⁶ They will be determined on an ongoing basis, integrated into the existing process for setting releases from the dams.²⁷⁷ Although they are complex, environmental flows are quantifiable and measurable, and can be implemented through existing monitoring and regulator regimes. By imposing an ecological function through the mechanism of environmental flows, the parties will address environmental

²⁷¹ Columbia River Treaty, *supra* note 13, art. IV.

²⁷² See Peery, *supra* note 22, at 141 fig.2.

²⁷³ See McIntyre, *Protection of Freshwater Ecosystems*, *supra* note 235, at 90 (describing environmental flows as "a methodological approach that incorporates environmental concerns into the process of allocating water rights among different users" (internal quotation omitted)). This limited approach is consistent with the ecological function envisioned by the United States Entity in its recommendation. See *Hearing*, *supra* note 136, at 20 (2013) (statement of Brigadier General John Kem, Commander, United States Army Corps of Engineers, Northwestern Division, Portland, Oregon) ("We're not going to add our Endangered Species Act requirements, per se, into a treaty with Canada."). At the same hearing, opponents of the inclusion of an ecosystem function argued that it would be vague and create poorly defined obligations. See, e.g., *id.* at 6 (statement of Rep. Rick Larsen (D-Wash.)) ("We should not offer a blank check to ill-defined 'ecosystem' measures without being completely clear about the specific goals, legal responsibilities and scientific backing for such measures."). Implementing the ecosystem function through an environmental flow requirement creates a mechanism for defining and limiting legal obligations.

²⁷⁴ See N. LeRoy Poff & John H. Matthews, *Environmental Flows in the Anthropocene: Past Progress and Future Prospects*, 5 CURRENT OPINION ENVTL. SUSTAINABILITY 1, 1 (2013) ("The overriding objective of e-flows is to modify the magnitude and timing of flow releases from water infrastructure (e.g. dams) to restore natural or normative flow regimes that benefit downstream river reaches and their riparian ecosystems." (footnotes omitted)).

²⁷⁵ See Megan Dyson et al., *Getting Started, in FLOW: THE ESSENTIALS OF ENVIRONMENTAL FLOWS* 13, 19–20 (Megan Dyson et al. eds., 2d ed. 2008), <https://perma.cc/2RRZ-C2FZ>.

²⁷⁶ *Id.* at 19.

²⁷⁷ This contrasts with the procedure established in the *Indus Waters Kishenganga Arbitration*, which gave each party the right to re-examine the minimum flow amount beginning seven years after the decision. See *Indus Waters Kishenganga Arbitration* (Pak. v. India), PCA Case Repository No. 2011-01, Final Award, ¶ 119 (Perm. Ct. Arb. Dec. 20, 2013). Here, no minimum flow is set—rather, now-existing releases from dams will continue, but the level of these releases will be determined with reference to ecological objectives in addition to power generation and flood control.

issues in a flexible manner fitted to the current scope of the treaty and avoid expansive new environmental obligations.

Environmental flows would support U.S. efforts to improve salmon runs. Currently, juvenile salmon's need for certain flow and water temperatures can only be accommodated by using reservoirs in the United States and Canadian storage available under the Non-Treaty Storage Agreement.²⁷⁸ Storage available under this system is 4.3 to 5.3 maf—far less than the storage controlled under treaty terms.²⁷⁹ The BiOp for listed salmon populations noted the importance of storage space in Canada being available to “release[] water to benefit U.S. fisheries.”²⁸⁰ An environmental flow provision in the treaty would allow this purpose to be served by Canadian storage. Furthermore, environmental flows would serve ecological purposes other than salmon recovery, depending upon what makes sense within the context of the river and the objectives set by the governing bodies.

Environmental flows, however, are not a panacea to all environmental issues facing the Columbia River.²⁸¹ If an environmental problem beyond the scope of environmental flows requires international attention, the treaty's institutions should serve as an ad hoc forum to address the problem. The domestic environmental programs of Canada and the United States should continue to be the primary means of addressing most of these other environmental issues within the basin. For example, the harm that occurs around Canadian reservoirs subject to large fluctuations would likely not be ameliorated by environmental flows, and so would remain primarily a concern of Canada alone.²⁸² Therefore, the ecosystem function of the modernized treaty would extend beyond environmental flows, but only to the extent that the treaty institutions have the legal mandate to discuss other international environmental problems.

²⁷⁸ *Reservoir Operations*, W. COAST REGION, NAT'L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, <https://perma.cc/BT9E-2V36> (last visited Feb. 25, 2017) (providing information about summer flow management volumes in United States and Canada).

²⁷⁹ *Id.*; Canadian storage under the treaty is 15.5 maf. Columbia River Treaty, *supra* note 13, art. II(1).

²⁸⁰ NW. REGION, NAT'L OCEANIC & ATMOSPHERIC ADMIN FISHERIES, F/NWR/2005/05883, ENDANGERED SPECIES ACT SECTION 7(A)(2) CONSULTATION BIOLOGICAL OPINION AND MAGNUSON-STEVENS FISHERIES CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION: CONSULTATION ON REMAND FOR OPERATION OF THE FEDERAL COLUMBIA RIVER POWER SYSTEM, 11 BUREAU OF RECLAMATION PROJECTS IN THE COLUMBIA BASIN AND ESA SECTION 10(A)(1)(A) PERMIT FOR JUVENILE FISH TRANSPORTATION PROGRAM app. at 11–12 (2008) [hereinafter FCRPS 2008 BiOp].

²⁸¹ *See* Dyson et al., *supra* note 275, at 22 (“Adequate environmental flows are not the only characteristic of a healthy river system.”).

²⁸² Those harms are caused by the fluctuation in reservoir levels, which is an effect of regulating draft and flow levels in the rest of the system. *See id.* at 20–22. Although an environmental flow regime would likely affect reservoir levels, maintaining consistent reservoir levels would not be an objective of the regime. Rather, reservoirs would continue to be a means by which the river flow is manipulated.

2. Salmon Conservation Should Remain a Concern Primarily of the United States

The legal status of salmon under the ESA is a major source of environmental obligations in the United States.²⁸³ As efforts to support salmon over the past decades demonstrate, the existence of a healthy salmon population is dependent on many environmental conditions, only some of which are related to environmental flows.²⁸⁴ Many measures that improve the survival of threatened species are entirely domestic and should occur at the expense of the United States.²⁸⁵ The needs of salmon will be a consideration in the environmental flow determination, but other than this, salmon are a domestic environmental issue.

The U.S. Recommendation suggests that passage to the Canadian Columbia River be cleared for salmon by facility improvements at the Grand Coulee and Chief Joseph Dams.²⁸⁶ The return of salmon to the Canadian Columbia is a laudable environmental objective, supported by Columbia Basin Tribes and First Nations,²⁸⁷ but addressed ambiguously in the B.C. Decision.²⁸⁸ This is the sort of environmental issue appropriately addressed in an ad hoc forum convened under the treaty pursuant to its ecosystem function. Restoring salmon passage to Canada should not directly be addressed in a modernized treaty.

B. The Primary Purposes of the Treaty Should Be Balanced Under the Equitable and Reasonable Use Framework

A treaty containing three primary purposes of river governance provides guidance, but does not entirely determine how dams should be operated, because in many respect the three purposes are not compatible.²⁸⁹ Furthermore, the U.S. Recommendation and the B.C. Decision reveal

²⁸³ See *supra* Part III.B.

²⁸⁴ NAT'L OCEANIC & ATMOSPHERIC ADMIN. FISHERIES, EXECUTIVE SUMMARY OF THE FCRPS 2008 BIOLOGICAL OPINION 10 (2008), <https://perma.cc/CJ3A-A4N9> ("The salmon and steelhead in the Columbia River Basin have been negatively affected for more than a century by many factors, including urbanization, the introduction of exotic species, overfishing, development in the floodplains, diversions, dams, mining, farming, ranching, logging, hatcheries, predation, ocean conditions and the loss of habitat.").

²⁸⁵ For example, habitat restoration, predation management, and hatcheries operations are all actions to benefit salmon that occur entirely within the United States. *Id.* at 16.

²⁸⁶ U.S. RECOMMENDATION, *supra* note 239, at 5–6.

²⁸⁷ See *generally* COLUMBIA BASIN TRIBES & FIRST NATIONS, FISH PASSAGE & REINTRODUCTION INTO THE U.S. & CANADIAN UPPER COLUMBIA BASIN 2, 19 (2015), <https://perma.cc/Q5ZA-48NK> (discussing the importance of salmon passage and reintroduction programs into the upper Columbia Basin for Columbia Basin Tribes and First Nations).

²⁸⁸ B.C. DECISION, *supra* note 239, at 3 ("British Columbia's perspective is that the management of anadromous salmon population is the responsibility of the Government of Canada and that restoration of fish habitat, if feasible, should be the responsibility of each country regarding their respective infrastructure.").

²⁸⁹ The current tension in the operation of the system demonstrates this. See Shurts, *supra* note 11, at 217–19 (noting the incompatibility between both flood control and power generation purposes, and equitable treatment for fish and wildlife conditions).

significant disagreements between the parties on how the benefits and burden of the river's uses should be shared. Canada seeks an increase in compensation from the United States to fairly account for "the full range of benefits in the United States [and] the impacts in British Columbia"²⁹⁰ while the United States seeks to lower its payments to Canada by changing the measurement of downstream power benefits.²⁹¹

The parties should resolve these disagreements by applying the principle of equitable and reasonable use to the three primary uses: flood risk management, power generation, and the ecosystem function. The result of the analysis will be a value-laden, ongoing process to allocate water to the three purposes that is flexible and responsive to changing conditions. Equitable and reasonable use analysis requires consideration of all relevant factors.²⁹² Significant relevant factors in the Columbia Basin include: 1) the presence of large downstream populations who are dependent on the river, compared with the relative scarcity of similar upstream populations;²⁹³ 2) the equity of existing uses and the existence of alternatives to current uses, such as alternate sources of electricity generation²⁹⁴ and habitat restoration instead of dam operation changes to benefit salmon;²⁹⁵ 3) flooding of traditional tribal sites, such as fishing spots and historic settlements;²⁹⁶ and 4) the Canadian Entitlement.²⁹⁷ The interplay of all of these factors is complex, but the final result may be predicted in broad terms.

1. Flood Protection Must Be Maintained

Downstream populations are completely dependent on the treaty's control of flood risk—under a new treaty, flood risk must be maintained at pre-2024 levels. The impetus for the 1961 treaty was flood prevention, and it is estimated that the flood prevention benefits of the treaty are around \$100–

²⁹⁰ See B.C. DECISION, *supra* note 239, at 2.

²⁹¹ U.S. RECOMMENDATION, *supra* note 239, at 4; *Hearing*, *supra* note 136, at 31 (statement of Mr. Corwin).

²⁹² See *supra* Part IV.B.

²⁹³ See INDEP. SCI. ADVISORY BD., *supra* note 37, at 7 (listing the Columbia Basin population size as the highest in Oregon, followed by Washington, Idaho, British Columbia, and Montana).

²⁹⁴ Hundreds of wind turbines have been built in the Columbia River Gorge in recent years, providing almost 15% of BPA's overall power generation capacity, compared with 69% provided by hydro (the remainder is composed of gas, coal and nuclear sources). *Generation Capacity Within the BPA Balancing Authority Area, by Type*, BONNEVILLE POWER ADMIN., <https://perma.cc/2BSQ-RU8M> (last visited Feb. 25, 2017).

²⁹⁵ The Biological Opinion lists seventy-three measures that mitigate the adverse impact of dams' operation on fish; of those measures, many do not involve dam operations or environmental flows. FCRPS 2008 BiOP, *supra* note 280, app.

²⁹⁶ See Barbara Cosens et al., *Introduction to Parts I, II, III*, in TRANSBOUNDARY RIVER GOVERNANCE, *supra* note 2, at 1, 3.

²⁹⁷ See *Hearing*, *supra* note 136, at 3 (statement of Rep. Doc Hastings (R-Wash.), Chairman, H. Comm. on Nat. Res.) ("[T]he priorities we need to address are, in fact, the entitlement and flood control."). Estimates of the value of the Canadian entitlement range from \$250 million to \$350 million per year. *Id.* at 39 (statement of Rick Crinklaw, Gen. Manager, Lane Electric Cooperative, Eugene, Oregon).

\$200 million each year.²⁹⁸ In addition, development around the river since 1961 has relied upon a constant level of flood protection, and that level should be maintained in a new treaty.²⁹⁹ The dependence of downstream populations and the potential for devastating floods justify flood protection as the paramount purpose of the treaty.

2. *Alternative Uses May Require Removal of Some Dams*

There are hundreds of major dams on the Columbia River and its tributaries.³⁰⁰ This physically imposing infrastructure provides flood protection, irrigation, allows for transportation, and generates electricity—about 40% of all U.S. hydroelectric power.³⁰¹ In these ways, dams constitute an essential use of the river.

However, as existing uses, dams are not privileged in the equitable and reasonable use analysis over possible alternative uses.³⁰² Furthermore, dams conflict with environmental uses of the river, such as the survival of anadromous fish populations.³⁰³ Under reasonable and equitable use analysis, all main stem Columbia River dams should remain in place as they provide essential flood protection and power generation. Their operations may be modified to accommodate the environmental flow requirements. However, there are thousands of dams on tributaries to the Columbia whose existence may no longer be justified. Many small dams were built a century ago to provide local hydroelectric power—in the context of a national electric grid and alternative sources of power, that purpose of these dams has been lost.³⁰⁴ Several of these outdated dams have already been removed and others, including major dams on the Snake River, have been identified as potentially worthy of removal.³⁰⁵ All dams should be justified under the

²⁹⁸ B.C. MINISTRY OF ENERGY & MINES, *supra* note 21, at 4–5.

²⁹⁹ SANDFORD ET AL., *supra* note 8, at 93 (arguing that, under a new treaty, “[f]lood control is more valuable than ever” in part because “as development in the region has progressed and large areas of flood plain have become occupied, potential damage from basin-wide floods has increased correspondingly”).

³⁰⁰ Peery, *supra* note 22, at 140.

³⁰¹ *Id.*; *The Columbia River Basin Provides More Than 40% of Total U.S. Hydroelectric Generation*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (June 27, 2014), <https://perma.cc/44JD-9V34>.

³⁰² See *supra* notes 178–182 and accompanying text.

³⁰³ See *supra* Part III.B.1.

³⁰⁴ See DENISE HOFFERT-HAY, OR. WATERSHED ENHANCEMENT BD., SMALL DAM REMOVAL IN OREGON: A GUIDE FOR PROJECT MANAGERS 1 (2008).

³⁰⁵ For example, in 2011, the 125-foot-tall hydroelectric Condit Dam on the White Salmon River, a Washington State tributary of the Columbia, was breached and removed by its owner, electrical utility PacifiCorp. Dameon Pesanti, *Condit Dam: Life After the Breach*, COLUMBIAN (Oct. 23, 2016), <https://perma.cc/6Z5H-QMLA>. The owner determined that removing the dam at a cost of \$35 million was cheaper than performing the required upgrades to make it passable to fish. *Condit Dam Breached by PacifiCorp Explosion; White Salmon River Recovery Begins*, OREGONIAN (Oct. 26, 2011), <https://perma.cc/LJ8H-ASD9>. In 2016, the United States District Court for the District of Oregon suggested that breaching one of four dams on the Snake river may be necessary to comply with NEPA and the Endangered Species Act. See *Nat'l Wildlife Fed. v. Nat'l Marine Fisheries Serv.*, 184 F. Supp. 3d 861, 942 (D. Or. 2016).

equitable and reasonable use analysis; the process must include consideration of the significant costs associated with their upkeep and removal as well as the significant benefits that many dams provide. The emergence of alternative sources for some of those benefits and the increased importance of environmental considerations, means that the continued existence of some dams may no longer be justified.

3. Indigenous Practices Justify Use Decisions

The Columbia River, its tributaries, and its salmon defined the culture of many of the tribes that live in the Pacific Northwest.³⁰⁶ The building of dams was “devastating” for tribes, in many cases eliminating salmon entirely from diets, and flooding living areas, cemeteries, and meeting areas.³⁰⁷ Some places had been home to tribal people for thousands of years—Celilo Falls, a fishing and trading site, had been continuously inhabited for an estimated twelve thousand years.³⁰⁸ The falls and fishing site were submerged beneath the reservoir behind the Dalles Dam in 1957.³⁰⁹ The Columbia River Treaty was negotiated and designed without input from tribes or consideration of their interests.³¹⁰ Decades have passed since dams flooded tribal sites and blocked access to salmon, but the tribes’ historical practices are relevant to considerations of equitable use, separate from any current economic and social needs of the tribes.³¹¹ Under the principle of equitable and reasonable utilization, indigenous practice itself “may constitute a direct basis for the allocation of water to a State.”³¹²

4. Canadian Entitlement Should Be Equitable in Light of all Relevant Factors

Under a new treaty, the United States should still make payments to Canada to correct the unbalanced distribution of costs and benefits in the current system of uses of the Columbia River. Canada incurs costs from the presence and operation of dams on its territory that mostly create benefits in the United States. For example, the treaty’s flood prevention benefits to the United States are valued at \$100–\$200 million per year,³¹³ Canadian reservoirs are drained to keep U.S. reservoirs full, allowing, for example, high-efficiency power production at the Grand Coulee Dam and agricultural

³⁰⁶ Pearson, *supra* note 29, at 70.

³⁰⁷ *Id.* at 73.

³⁰⁸ *Id.* at 72.

³⁰⁹ Joe Rojas-Burke, *Sonar Shows Celilo Falls are Intact*, OREGONIAN (last updated Jan. 24, 2011), <https://perma.cc/W987-LD6C> (“‘Someday those dams will be gone,’ Pitt said. ‘When that day comes the falls will return. Indians will be waiting.’”).

³¹⁰ Pearson, *supra* note 29, at 79–80.

³¹¹ See Ximena Fuentes, *The Criteria for the Equitable Utilization of International Rivers*, 67 BRITISH Y.B. INT’L L. 337, 377–78 (1996). Whether a state has an obligation to maintain traditional access to water in a domestic context is a question beyond the scope of this paper. Fuentes asserts that there is ground under international human rights law to “assert that States are under a legal obligation to maintain traditional uses of natural resources.” *Id.* at 377.

³¹² *Id.*

³¹³ B.C. MINISTRY OF ENERGY & MINES, *supra* note 21, at 5.

irrigation in eastern Washington;³¹⁴ and under the ecological function, water will be stored in Canada to be released for the benefit of U.S. fish.³¹⁵ The Canadian Entitlement should be based in the same rule of equitable and reasonable use that informs the existence of other uses and benefits of the river.³¹⁶

The amount of the entitlement should not represent a comprehensive balancing of all benefits and harms connected to the treaty. Rather, the entitlement should represent an equitable sharing of the benefits resulting from the three purposes of the treaty. This requires consideration of the facts that there is a larger population and more dependence on the river in the United States, and that some environmental effects of the treaty benefit nature itself rather than a state.³¹⁷ However, to be equitable, the entitlement should compensate for the major harms the treaty causes in Canada. It should also transfer to Canada a portion of the benefits related to the three treaty purposes that occur in the United States. Currently, the Canadian entitlement is calculated as a portion of hydroelectric production.³¹⁸ This should continue, but the formula for calculating it should be adjusted to reflect actual, not ideal, power generation. Canada should also receive partial payments for flood protection and ecosystem benefits accruing in the United States. As those benefits are to some extent required by Canada's obligation to avoid significant transboundary harm under the rule of equitable and reasonable use, the entitlement need not compensate for the full value of those benefits. U.S. benefits from other uses of the river, such as agricultural production, should not be considered at all. Negotiation of the Canadian entitlement will be difficult, but it is an essential component of the treaty and should result in equitably sharing the benefits created by the treaty.

The United States and Canada should seize the opportunity presented by the expiration of Canadian flood obligations in 2024 and craft a modern Columbia River treaty that includes an ecological function. Doing so will allow the international management of the Columbia River to be consistent with the fundamental principle of sustainable development. The function will largely consist of a provision for environmental flows, which will

³¹⁴ The Grand Coulee is constructed in a manner that allows maximization of power generation by keeping the reservoir full; in times of low flow, the reservoir level is maintained with water from Canadian dams. *See id.* at 6 (“The low generation value dams like Hugh Keenleyside [located in Canada] are drafted before the high generation value dams like Grand Coulee.”). The Columbia Basin Project irrigates a large part of central Washington. John Harrison, *Columbia Basin Project*, NW. POWER & CONSERVATION COUNCIL (Oct. 31, 2008) <https://perma.cc/RTZ9-PB64>.

³¹⁵ *See* B.C. MINISTRY OF ENERGY & MINES, *supra* note 21, at 6–7 (“[F]lows from Canada enables fisheries managers in the United States to better plan [operations that benefit Columbia River salmon].”).

³¹⁶ International Law Association commentary, citing the Columbia River Treaty, mentions that payment between the parties is an appropriate means to “balance the equities.” *Draft Articles*, *supra* note 182, at 105 n.244.

³¹⁷ Determining what constitutes equitable and reasonable use requires consideration of all relevant factors and circumstances. Watercourses Convention, *supra* note 151, art. 6.

³¹⁸ Columbia River Treaty, *supra* note 13, art. V.

coexist within the existing flow management operations of the treaty. The majority of Columbia River-related environmental regulation will continue to occur at the domestic level, following domestic priorities. If an issue requires international cooperation or attention, the ecological function of the treaty will also serve to provide an ad hoc forum for the parties to discuss the issue.

An ecological function will conflict to some extent with the existing purposes of the treaty, power generation and flood prevention. To resolve this conflict and determine the appropriate allocation of water between uses, the general rule of equitable and reasonable use should be applied. Negotiators will have to consider all relevant factors, which will include changes in the region since the construction of the existing dam system, and the implications of those changes on the equity of dam use. It is likely that the impact of some dams will be found to not be equitable, requiring those dams to either be operated differently or removed. The issue of the equitable sharing of the downstream benefits that accrue in the United States as a result of Canadian dams should also be addressed under the equitable and reasonable use framework. A likely result is that the current Canadian Entitlement will be increased in order for Canada to receive a fair share of the benefits created by the treaty.

VII. CONCLUSION

The time has come for an agreement between Canada and the United States that addresses the environment of the Columbia River. Each nation has individually recognized the importance of the environment of the river through domestic environmental legislation. This importance will increase in the coming decades as climate change and human impacts on the earth increase pressure on freshwater systems to provide the ecological services necessary for safe human development. Sustainable development of the river will continue to be important for ensuring that human impacts on the river are responsible to the current and future generations. Each country's domestic environmental regulations protect the river and highlight the treaty's failure to consider environmental outcomes at all.

Against this factual background of environmental harm, international environmental law presents a framework for governing international watercourses: equitable and reasonable use. Equitable and reasonable use is a process for fairly allocating water between conflicting uses in different countries. This general rule draws on the environmental principles of sustainable development and intergenerational equity by including environmental considerations among the factors relevant to use decisions. A modern treaty for the Columbia River should include an ecosystem function and apply the principle of equitable and reasonable use to resolve conflicts between flood prevention, power generation, and ecosystem function.

The two parties have prepared for 2024 by publishing official recommendations for how they should proceed. These documents reveal a large gulf between the parties. Canada would like to see a more expansive

treaty that recognizes the full extent of downstream benefits in the United States and negative impacts in Canada in calculating a fair share of the river's uses and benefits that are owed to Canada. The B.C. Decision creates pressure to reach this outcome by recommending that no new treaty be finalized between the parties, an outcome that the United States seeks to avoid. In contrast, the U.S. Recommendation reveals that the United States sees a need for a new treaty to maintain pre-2024 flood protection levels and to provide coordination that will assist the spawning of salmon in the lower river. The U.S. Recommendation optimistically expresses a hope that a treaty accomplishing these objectives can also include a reduction in the United States' annual payment to Canada. Such an outcome would not be consistent with equitable and reasonable use and would likely only result if other aspects of the U.S.–Canada relationship are brought to bear.

The Columbia River Treaty was signed in 1961. Its authors created a framework for international river governance and benefits sharing that has largely been successful. However, their inclusion of a *de facto* expiration date of 2024 is also welcome, as it provides an opportunity for this generation to create a new agreement that reflects our knowledge that healthy river ecosystems are essential for sustainable development. The new treaty should be forward looking and ensure that the Columbia River remains healthy and beneficial for generations to come.