

August 2016

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Recommended Citation

Stephanie M. Smith, *The Damming of Nature: How China is Expanding Its Dam Infrastructure and Potential Negative Downstream Effects on Fisheries of the Yaluzangbu-Brahmaputra River*, 9 Golden Gate U. Envtl. L.J. 269 (2016).
<http://digitalcommons.law.ggu.edu/gguelj/vol9/iss2/9>

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THE DAMMING OF NATURE: HOW CHINA IS EXPANDING ITS DAM INFRASTRUCTURE AND POTENTIAL NEGATIVE DOWNSTREAM EFFECTS ON FISHERIES OF THE YALUZANGBU- BRAHMAPUTRA RIVER

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*When protected, rivers serve as visible symbols of the care we take as temporary inhabitants and full-time stewards of a living, profoundly beautiful heritage of nature.*¹

I. BACKGROUND

A. YALUZANGBU-BRAHMAPUTRA RIVER

The Brahmaputra River originates in Tibet and flows eastward through southern Tibet.² At its easternmost point, it makes a U-turn at the Sumatran Point, or Great Bend, before it enters India's easternmost

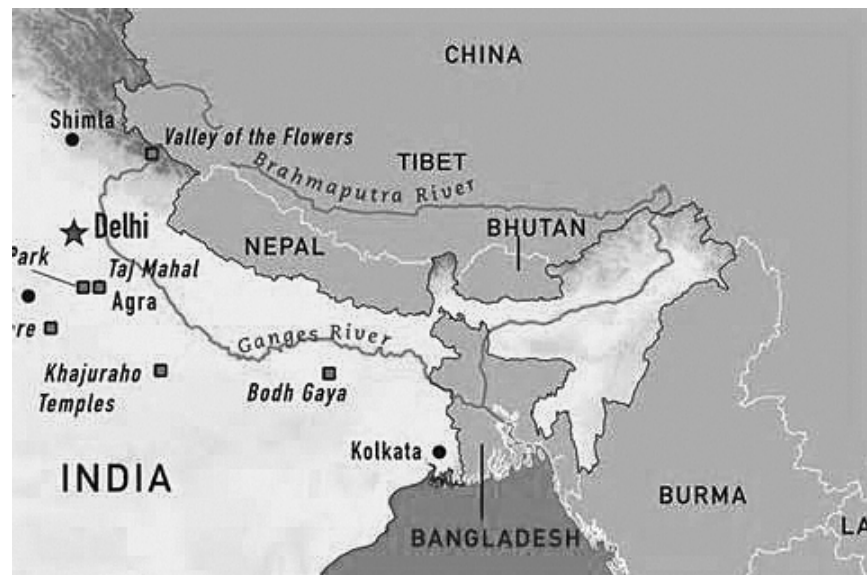
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¹ John Echeverria et al., *RIVERS AT RISK: THE CONCERNED CITIZEN'S GUIDE TO HYDROPOWER* 3 (Island Press 1989).

² Deryck O. Lodrick, *Brahmaputra River, River, Asia*, <http://www.britannica.com/place/Brahmaputra-River> (last visited Feb. 19, 2016).

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state, Arunachal Pradesh, where it is known as the Siang River.³ It then flows through Assam as the Brahmaputra and through Bangladesh as the Jamuna.⁴ In Bangladesh, the river is joined by the Ganges and Meghna, and together forms the world's largest delta before emptying into the Bay of Bengal.⁵



B. “RUN-OF-RIVER” DAM EFFECTS

China has approximately 22,000 large-scale dams⁶, currently the highest number within any one country in the world.⁷ The Zangmu Hydropower Project is a series of six run-of-river dams located in the autonomous region of Tibet.⁸ “Run-of-river” dams operate such that water flows through a series of turbines, following the river’s natural flow, in

³ *Id.*

⁴ *Id.*

⁵ *Id.*

⁶ Large-scale dams are defined as those that produce more than 100 megawatts and usually feed into a large electricity grid, *Hydro Dams for Large-Scale Electricity Supply*, CLIMATETECHWIKI, A CLEAN TECHNOLOGY PLATFORM, http://www.climatetechwiki.org/technology/hydro_large (last visited Feb. 19, 2016).

⁷ UNITED NATIONS ENVIRONMENT PROGRAMME DAMS AND DEVELOPMENT PROJECT, WORLD COMMISSION ON DAMS, <http://www.unep.org/dams/WCD/>. *see also* Patrick McCully, SILENCED RIVERS, THE ECOLOGY AND POLITICS OF LARGE DAMS 67 (enlarged & updated ed. 2001).

⁸ Sudha Ramachandran, *Water Wars: China, India, and the Great Dam Rush*, THE DIPLOMAT (April 3, 2015), <http://thediplomat.com/2015/04/water-wars-china-india-and-the-great-dam-rush/> (last visited Feb. 20, 2016).

order to generate electricity.⁹ While they tend to have less damaging consequences than other types of dams, run-of-river dams are far from environmentally acceptable.¹⁰ Ramaswamy Iyer, former secretary of Water Resources with the Government of India notes:

A break in the river between the point of diversion to the turbines and the point of return of the waters to the river . . . can be very long, upwards of 10 km in many cases, even 100 km in some cases; and there would be a series of such breaks in the river in the event of a cascade of projects.¹¹

The Zangmu Hydropower Project is in itself a series of dams along the Brahmaputra River, meaning these dams will create the necessary breaks in the river that will lead to the type of destruction mentioned by Ramaswamy Iyer. Furthermore, the turbines needed to generate electricity operate intermittently in these projects, “which means that the waters are held back in ponds and released when the turbines need to operate, resulting in huge diurnal variations¹² – from 0 percent to 400 percent in a day – in downstream flows . . . no aquatic life or riparian population can cope with that order of diurnal variation.”¹³ Additionally, flow alterations of this breadth and depth have numerous ecological consequences. Rapid level fluctuations speed up erosion downstream and can wash away riverbank trees, shrubs, and grasses that provide food and shelter for riparian life.¹⁴ Without the riparian vegetation to hold it in place, the bank erodes even faster. For example, the six hydro-reservoirs on the La Grande River have submerged about 83,000 kilometers of natural shorelines with their fringing woods and shrubs; the shores of the reservoirs, meanwhile, are broad, lifeless banks of mud, rock, and dead trees.¹⁵

Dam proponents have sought to downplay the impact of planned dams by claiming that they will be run-of-river. Officials, for example,

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Id.*

¹² The diurnal cycle is defined as a significant component of stream-flow variation and can be used to understand the dominant physical processes adding water to or removing water from a given river basin at a given time; Jessica D. Lundquist, *Diurnal Cycles in River Discharge: A Key to Understanding Snowmelt, Evapotranspiration, and Infiltration*, SCRIPPS INSTITUTE OF OCEANOGRAPHY, <http://tenaya.ucsd.edu/~jessica/AMS2002des.pdf>.

¹³ Ramachandran, *supra* note 8.

¹⁴ Patrick McCully, *Silenced Rivers, THE ECOLOGY AND POLITICS OF LARGE DAMS* 35 (enlarged & updated ed. 2001).

¹⁵ S. McCutcheon, *Electric Rivers: The Story of the James Bay Project* 98 (Black Rose Books, 1991).

have repeatedly described Thailand's Pak Mun Dam¹⁶ as a run-of-river project; however, for much of the time the dam's gates remain closed and it operates as a storage dam, differing from what officials had originally claimed the dam to be.¹⁷ Despite years of protests from its builders and funders that it would have minimal impacts on the river, the operation of the Pak Mun dam managed, within a couple of years, to destroy one of the country's richest freshwater fisheries.¹⁸

C. RIVERINE AND FISHERY IMPACTS

The main environmental impact of dams is such that the dam changes the flow of the river from an upstream river valley to a reservoir.¹⁹ Additionally, there are downstream changes to the morphology of the riverbed, banks, delta, estuary, and coastline due to altered sediment load.²⁰ There are changes in the downstream water quality including river temperature, nutrient load, dissolved gases, heavy metals, and minerals.²¹ There is a reduction of biodiversity due to the blocking of movement for various organisms and the accumulation of the above changes.²²

Alterations in river flows due to dams, and the diversions that follow, are a major cause of the decline of fishery health.²³ About 80 percent of the world's fish catch comes from continental shelves²⁴ and this is important because rivers supply many of the organisms found in the waters around the coast of countries that are not landlocked.²⁵ For example, the destruction caused by the river diversion of the Aral Sea in Central Asia may be categorized as the worst ecological disaster in history and as a result, the area is now known as the Akum Desert.²⁶ Historically, evaporation from the sea was matched by inflows of water from the Amu

¹⁶ INTERNATIONAL RIVERS ORGANIZATION, <https://www.internationalrivers.org/campaigns/pak-mun-dam-0> (last visited Feb. 19, 2016).

¹⁷ McCully, *supra* note 14, at 30.

¹⁸ *Id.*

¹⁹ McCully, *supra* note 14, at 30.

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

²³ *Id.*

²⁴ According to the UN Convention on the Law of the Sea, the legal definition of a continental shelf is such that every nation has a continental shelf extending no more than 200 nautical miles from the nation's coastline. NATIONAL GEOGRAPHIC, <http://www.education.nationalgeographic.org/encyclopedia/continental-shelf/> (last visited Feb. 19, 2016).

²⁵ M.A. Rozengurt, *Alteration of Freshwater Inflows*, in R.H. Stroud (ed.), *STEMMING THE TIDE OF COASTAL FISH HABITAT LOSS* 73, Proceedings of a Symposium on Conservation of Coastal Fish Habitat, Baltimore, MD, 7-9 March 1991 (National Coalition for Marine Conservation 1992).

²⁶ McCully, *supra* note 14, at 44.

Darya and Syr Darya rivers.²⁷ Since the 1960s, with the building of extensive networks of dams and canals, the flow of water into the sea has been eliminated.²⁸ A fishing industry that supported approximately 60,000 workers, who relied on the river, came to a halt in 1982.²⁹ By the early 1990s, 20 of the 24 fish species once caught in the river had disappeared entirely, the delta forests had died, and only 30 out of 70 species of mammals remained.³⁰

Substantial loss in downstream fishery production as a result of dam construction is reported around the world.³¹ Fisheries provide an important livelihood function among rural populations in the developing world, and this is certainly applicable to communities surrounding the Brahmaputra River in China and India.³² For example, the partial closing of the river channel by the Porto Primavera dam in Brazil blocked fish migration and diminished upstream fish catch by 80 percent, affecting livelihoods.³³ The Pak Mun Case Study reports a drastic decline in upstream fish catch once the dam had effectively blocked fish migration from the Mekong River upstream into tributaries of the Mun River watershed.³⁴

Migratory fish such as the endangered pabda, mrigal, and other marine life such as the endangered Susu Dolphin³⁵ on the Brahmaputra will have the same experience over the course of the Zangmu Dam Project's life.³⁶ The most significant impact of dams is the fragmentation and isolation of the upstream and downstream population's marine species, thus cutting off migrations central to fishery health.³⁷ While some lake fish species may thrive from the creation of reservoirs, this is usually not anticipated and the overall impact of dams on local fisheries and ecosystems is damaging, to say the least.³⁸

²⁷ *Id.*

²⁸ *Id.*

²⁹ *Id.*

³⁰ V.M. Kotlyakov, *The Aral Sea Basin: A Critical Environmental Zone*, ENVIRONMENT (January/February 1991); W.T. Davoren, *How the Silk Road Turned into a Cotton Highway*, SURVIVING TOGETHER (Fall/Winter 1992); D. Hinrichsen, *Requiem for a Dying Sea*, PEOPLE & THE PLANET, Vol. 4, No. 2, (1995).

³¹ WORLD COMMISSION ON DAMS, *supra* note 7, at 84.

³² *Id.*

³³ *Id.*

³⁴ *Id.*

³⁵ The main threat to the Ganges River dolphin (Susu) is the loss of habitat due to the creation of dam projects along the Ganges-Brahmaputra-Meghna River system, WORLD WILDLIFE FUND, *Ganges River Dolphin*, http://wwf.panda.org/what_we_do/endangered_species/cetaceans/about/river_dolphins/ganges_river_dolphin/ (last visited Feb. 19, 2016).

³⁶ McCully, *supra* note 14, at 44; see also Deryck O. Lodrick, *Brahmaputra River, River, Asia*, <http://www.britannica.com/place/Brahmaputra-River> (last visited Feb. 19, 2016).

³⁷ McCully, *supra* note 14, at 30.

³⁸ *Id.* at 31.

D. FLOODPLAIN CONTROL

It is generally recognized by biologists that dams and other flood control schemes are the most destructive of the many abuses causing the disappearance of riverine and riparian species. Ecologist Peter Bayley terms the “flood pulse advantage³⁹” as the main reason for the astonishing diversity and productivity of rivers – on a per unit basis the diversity of fauna in rivers is 65 times greater than in the seas.⁴⁰ At least 20 percent of the world’s 9,000 recognized freshwater fish species have become extinct, threatened, or endangered in recent times, due to the rapid expansion of dam construction and infrastructure around the world.⁴¹

II. THE PROBLEM

In light of the critical need to shift from fossil fuels as the primary source of energy, China continues to plan⁴² expansive hydropower generation projects on the Yaluzangbu-Brahmaputra River, one of the few remaining clean and biologically diverse river basin ecosystems⁴³ in China. In March 2011, the Chinese National People’s Congress approved the Twelfth Five-Year Plan (Plan) for national development with specific themes and targets within the economic and social arenas.⁴⁴ The Plan has a specific focus on “higher quality growth,” which is defined in the Plan as addressing the issues of renewable energy and sustainability.⁴⁵ Specifically, the Plan addresses issues of pollution, intensive energy use, and resource depletion, with a heightened focus on reducing energy use by decreasing the use of non-fossil fuels by 2020.⁴⁶ The Plan targets seven industries that it intends to address or improve over the course of the

³⁹ Defined as the amount by which fish-yield per unit mean water area is increased by a natural, predictable flood pulse. Arguably, increasing multispecies fish yield by restoring the natural hydrological regime is consistent with increasing production of other trophic levels and with restoration from ecological viewpoints. P.B. Bayley, *The Flood Pulse Advantage and the Restoration of River-Floodplain Systems*. REGULATED RIVERS: RESEARCH & MANAGEMENT, April/June 1991, Vol. 6, Issue 2, at 75-86, <http://onlinelibrary.wiley.com/doi/10.1002/rrt.3450060203/abstract>.

⁴⁰ McCully, *supra* note 14, at 41.

⁴¹ J.N. Abramovitz, *Aquatic Species Disappearing*, in LESTER R. BROWN, ET. AL, VITAL SIGNS 1996: THE TRENDS THAT ARE SHAPING OUR FUTURE 124, (L. Starke ed., 1996).

⁴² *China Approves Construction of Three More Dams on Brahmaputra*, NDTV, Dec, 4, 2015, <http://www.ndtv.com/india-news/china-approves-3-more-dams-on-brahmaputra-1250816>

⁴³ INTERNATIONAL RIVERS ORGANIZATION, *supra* note 17.

⁴⁴ *China’s 12th Five-Year Plan: Overview*, KPMG China (Mar. 2011), <http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Publicationseries/5-years-plan/Documents/China-12th-Five-Year-Plan-Overview-201104.pdf> [hereinafter *China’s 12th Five-Year Plan*].

⁴⁵ *Id.*

⁴⁶ *Id.*

Plan's life.⁴⁷ The Plan targets new energy industries first, and energy conservation and environmental protection second.⁴⁸ The proposed new sources of energy in the Plan do not include hydropower, but they do include nuclear, wind, and solar.⁴⁹

In opposition to the referenced sources of renewable and sustainable energy within the Plan, China's Premier Li Keying announced that China would build more dams.⁵⁰ This speech reinstated his commitment to unleashing the biggest dam building spree in history, with the intent to decrease fossil fuel consumption and carbon emissions.⁵¹ However, the use of dams does not simply offer an alternate source of energy for a country's energy demands, but rather, the destruction of entire downstream river ecosystems. This destruction includes erosion of river embankments and floor,⁵² destruction of sensitive fish populations,⁵³ extinction and ecosystem collapse,⁵⁴ and obliteration of entire delta regions.⁵⁵ Additionally, this destruction leads to displacement of indigenous human populations⁵⁶ that represent the beginning of humanity and life that has relied on rivers since the beginning of time.

III. INTERNATIONAL PRINCIPLES AND THE "UPSTREAM DILEMMA"

International law is founded upon the principles of state sovereignty and the duty to cooperate. Upstream riparian nations, such as China, are both advantaged and disadvantaged by their hydro-geographic situation.⁵⁷ Headwaters within a country's territory offer considerable leverage in developing the water resources to meet national needs.⁵⁸ However, given the interdependence of the international community, and the international legal obligation to cooperate, upstream states face the challenge

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ David Stanway, *China Falling Behind on 2020 Hydro Goals as Premier Urges New Dam Building*, REUTERS (Mar. 10, 2014, 5:02 AM), <http://www.reuters.com/article/2014/03/10/china-parliament-hydropower-idUSL3N0M70VN20140310> (lasted visited Feb. 20, 2016).

⁵¹ Stanway, *supra* note 50.

⁵² McCully, *supra* note 14, at 33.

⁵³ *Id.* at 45-46.

⁵⁴ *Id.* at 43.

⁵⁵ *Id.* at 35.

⁵⁶ WORLD COMMISSION ON DAMS, *supra* note 7, at 110; *see also* McCully, *supra* note 15, at 67.

⁵⁷ Christina Leb, COOPERATION IN THE LAW OF TRANSBOUNDARY WATER RESOURCES (2015); *see also* Christina Leb, *One step at a time: international law and the duty to cooperate in the management of shared water resources*, WATER INTERNATIONAL 21-32 (2015).

⁵⁸ *Id.*

of taking into account their own domestic needs and those of riparian neighbors.⁵⁹ This is known as the “upstream dilemma.”⁶⁰

The harnessing of hydropower as the primary new source of energy for a country the size and breadth of China should reflect the basic international principle of cooperation to work effectively and sustainably. The potential for significant and irreversible damage to fisheries on the Brahmaputra is apparent, and India has as much a right to the resources within the river as China.

A. CHINA’S SOVEREIGNTY BALANCED WITH EQUITABLE UTILIZATION

In light of the need to cooperate, China is a sovereign nation and every sovereign nation should enjoy the right to fully utilize the resources within its borders.⁶¹ However, no country can operate without some deference to the countries that it shares life-sustaining resources with. The concept of equitable utilization addresses this issue. Equitable utilization is the doctrine addressing apportionment, or allocation, of water between states sharing an international watercourse.⁶² This includes the fundamental requirement of international law that a state’s use of an international watercourse be both equitable and reasonable.⁶³ This standard addresses both the quantity of water involved and what the state in question does with the water.⁶⁴

The United Nations Watercourse Convention of 1997 (UNWC) codified these international principles and provides a customary legal foundation for cooperation.⁶⁵ The basic principles of the UNWC reflect “customary international law,”⁶⁶ thus the legal effects and relevance go beyond the 35 parties to the convention, and extend to all nations. The UNWC has become a reference treaty for judicial and arbitral tribunals in all international water disputes and its basic principles are binding on all nations as a reflection of customary international law.

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ Stephen C. McCaffrey, *THE LAW OF INTERNATIONAL WATERCOURSE* 385 (2d ed., 2007).

⁶² *Id.*

⁶³ *Id.*

⁶⁴ *Id.*

⁶⁵ The UNWC formally went into force on the Seventh of August, 2014 when Vietnam became the thirty-fifth contracting state, almost 50 years from the initial introduction of the treaty. (*See United Nations Watercourse Convention Enters Into Force*, UN WATERCOURSES CONVENTION (Aug. 18, 2014), <http://www.unwatercoursesconvention.org/news/united-nations-watercourses-convention-enters-into-force/>).

⁶⁶ Malcolm N. Shaw, *INTERNATIONAL LAW* 80 (5th ed., 2003); Cornell University School of Law, *Customary International Law*, LEGAL INFORMATION INSTITUTE, https://www.law.cornell.edu/wex/customary_international_law (last visited Feb. 20, 2016) (“customary international law results from a general and consistent practice of states that they follow from a sense of legal obligation”).

While China voted against the UN Resolution that adopted the UNWC, closer examination reveals that China endorsed the fundamental principles of the convention – equitable and reasonable use, the duty to cooperate, and the peaceful settlement of transboundary water disputes.⁶⁷ Riparian nations are entitled and obliged to use their transboundary waters in a way that is equitable and reasonable, taking into account the needs across the basin.⁶⁸

B. THE UNEP GUIDELINES OF EQUITABLE UTILIZATION & THE NO-HARM RULE

In addition to the concept of equitable utilization, the no-harm rule is another international environmental concept of equal importance. The no-harm rule, as presented in United Nations' Environment Programme (UNEP) Guidelines on Shared Natural Resources ("UNEP Guidelines"), is defined as a "soft law" instrument.⁶⁹ Soft law is the concept of quasi-legal instruments which do not have legally binding force, or whose force is somewhat weaker than binding or traditional law.⁷⁰

Principle 1 of the UNEP Guidelines is consistent with the concept of equitable utilization of shared natural resources where states cooperate with a view to controlling, preventing, reducing, or eliminating adverse environmental effects which may result from the utilization of shared resources.⁷¹ Under this principle, theoretically, China has a duty to cooperate with those countries with which it shares natural resources. This includes downstream countries such as India, who receive natural resources as a result of the natural downstream course of the Yaluzangbu-Brahmaputra River and the resources within it.

Principle 3 specifies that it is necessary for each State to avoid, however possible, the adverse environmental effects beyond its jurisdiction of its utilization of shared natural resources so as to protect the environment, especially when such utilization might cause damage to the utilization of the resources by another sharing State and/or threaten the

⁶⁷ Patricia Wouters, *The Yin and Yang of International Water Law: China's Transboundary Water Practice and the Changing Contours of State Sovereignty*, REV. OF EUR., COMP. & INT'L ENVTL. L., Apr. 2014, at 67.

⁶⁸ Patricia Wouters, et al., *Editors' Introduction*, WATER INT'L, 2015, at 1, 2.

⁶⁹ McCaffrey, *supra* note 61, at 426.

⁷⁰ *Soft Law & Legal Definition*, USLEGAL.COM, <http://definitions.uslegal.com/s/soft-law/> (last visited Feb. 19, 2016).

⁷¹ UNITED NATIONS ENVIRONMENT PROGRAMME, ENVIRONMENTAL LAW GUIDELINES AND PRINCIPLES ON SHARED NATURAL RESOURCES, http://www.unep.org/training/programmes/Instructor%20Version/Part_2/Activities/Interest_Groups/Decision-Making/Supplemental/Enviro_Law_Guidelines_Principles_rev2.pdf.

shared resources conservation.⁷² Under this principle, the fisheries of the Brahmaputra are a shared natural resource in which those states that share it are called to avoid those harmful environmental effects that would occur by the construction of dams upstream.

The UNEP embraced the challenge of ensuring that key messages of the World Commission on Dams report are effectively disseminated and thus established the Dams and Development Project (DDP).⁷³ The UNEP was identified as an independent and neutral body to coordinate any subsequent actions which was considered an important step in moving the process to an inter-governmental arena. The UNEP also allows for a balance of global policy formation and international dialogues.⁷⁴ These dialogues occur through an inclusive multi-stakeholder approach known as the Dams and Development Forum (DDF), which assists in the implementation of DDP's activities.⁷⁵ Countries with major dam building programs, including China, have agreed to join the DDF to participate in the debate.⁷⁶

Since China has agreed to join the DDF, there should be an international community debate under the DDF to address the environmental impacts of dams and address China's plan to build even more dams in the future.⁷⁷ Since DDF is a subpart of DDP and thus under the umbrella of the UNEP, China should also be held to the international norms that are accepted as part of the UNEP Guidelines' principles. This would include overutilization of shared natural resources and mitigating the already ongoing harmful effects as a result of newly operational dams such as the Zangmu Hydropower Project.

While China is entitled to use the rivers within its territory, under the UNEP Guidelines, it is not entitled to use the rivers in such a manner that will harm downstream States. Downstream states are so concerned for their future access to the resources of the Brahmaputra that the leader of Assam, India, issued a cry for help as the six-unit Zangmu Hydropower Project began operations on October 13, 2015.⁷⁸ The leader of Assam, as well as other interested parties in India, should be allowed to voice their concerns in the DDF. In this meeting, the parties can address

⁷² *Id.*

⁷³ WORLD COMMISSION ON DAMS, *supra* note 7.

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ Indo-Asian News Service, *China Approves Construction of 3 More Dams on Brahmaputra*, NDTV, (Dec. 4, 2015), <http://www.ndtv.com/india-news/china-approves-3-more-dams-on-brahmaputra-1250816>.

⁷⁸ *Assam CM Concerned Over China's Dam on Brahmaputra*, NORTHEAST TODAY (Oct. 15, 2015), <http://www.northeasttoday.in/assam-cm-concerned-over-chinas-dam-on-brahmaputra/>.

realistic downstream effects of the new dam project in Tibet and begin to address mitigation efforts.

IV. CHINA'S CONSTITUTION AND ITS IMPLICATIONS

China has a section of its Constitution entitled Fisheries Law of the People's Republic of China.⁷⁹ Chapter IV within this section, entitled Increase and Protection of Fishery Resources, sets out the law for which fishery resources should be handled.⁸⁰ Article 32 states, "Where sluices or dams are to be built on the migration routes of fish, shrimp or crabs which will seriously impair the fishery resources, the construction units shall build fish-pass facilities or adopt other remedial measures.⁸¹" Additionally, Article 33 states, "for water bodies that are used for fisheries and that also serve the purposes of water storage, regulation and irrigation, the competent department concerned shall fix the lowest water level required for fisheries.⁸²"

Currently, there is no indication that China has any remedial plan to deal with the effects that the Zangmu Hydropower Project will have on fisheries upstream or downstream from the dams. The only plan that addresses the conversion from being dependent on fossil fuels to other sources of renewable energy does not address the potential impact of the Zangmu Hydropower Project as China's new main source of energy.⁸³ The Brahmaputra is a lifeline for the Southeast Asian region and the impacts on the fisheries from construction of dams has been well documented in the wide array of prior dam projects on other international rivers. For example, although there has not been any substantial studies on the effects of dams on fisheries alone, the migratory fish hilsa was deprived of about 60 percent of its previous spawning areas on the Indus by Pakistan's Gulam Mohammed Dam,⁸⁴ while the Stanley Dam wiped out the hilsa from the Cauvery River in South India.⁸⁵

It is presumed that fishery law in China exists to protect its fisheries from the harmful impacts of dams. While the Zangmu Hydropower Project is a run-of-river dam, it is not clear if this is a truthful statement as

⁷⁹ Yú fǎzé de rénmin dàhánmínguó zhōngguó (鱼法则的人民大韩民国中国) [Fisheries Law of the People's Republic of China] (promulgated by the President of China, Jan. 20, 1986, effective July 1, 1986) 1986 STANDING COMM. OF THE NAT'L PEOPLE'S CONG. GAZ. (China), http://www.npc.gov.cn/englishnpc/Law/2007-12/12/content_1383934.htm.

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*

⁸³ China's 12th Five-Year Plan, *supra* note 44.

⁸⁴ Stephen J.M. Blaber, TROPICAL ESTUARINE FISHES: ECOLOGY, EXPLORATION AND CONSERVATION 260 (2000).

⁸⁵ McCully, *supra* note 14, at 43.

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China has consistently pacified those who ask questions China is not willing to answer.⁸⁶ Moreover, the Zangmu Hydropower Project is located in Tibet where general access is routinely denied,⁸⁷ and thus an in-person assessment of the actual specifics of the dam is indefinitely unavailable. It is not entirely clear that a significant amount of the other 22,000 large scale dams in China are of the same run-of-river structure.⁸⁸ It is also unclear if there are any ways to hold China accountable to the laws of its own country, unless pressure comes from the international community to address China's lack of meaningful utilization of its own law.

V. TREATIES AND AGREEMENTS BETWEEN CHINA AND INDIA

China's approach to international law also influences its trans-boundary waters practice.⁸⁹ China's international relations continue to be developed around the concepts of the "Five Principles of Peaceful Co-existence."⁹⁰ The Five Principles include: (1) mutual respect for each other's territorial integrity and sovereignty; (2) mutual non-aggression; (3) mutual non-interference with the internal affairs of the other party; (4) equality and mutual benefit; and (5) peaceful coexistence.⁹¹ These principles guide China's foreign policy and resonate with the fundamental principles of contemporary international water law.⁹²

A. DHAKA DECLARATION ON WATER SECURITY

In 2010, water experts from China, India, Bangladesh, and Nepal met to discuss the importance of shared information, collaboration, and open dialogue between the member states involving the Himalayan River

⁸⁶ O.P. Modi, Opinion, *Beware of Chinese Motive*, DAILYEXCELSIOR (June 12, 2015), <http://www.dailyexcelsior.com/beware-of-chinese-motives/>.

⁸⁷ *Tibet Profile – Timeline*, BBC NEWS (Nov. 13, 2014), <http://www.bbc.com/news/world-asia-pacific-17046222>.

⁸⁸ Charlton Lewis, *China's Great Dam Boom: A Major Assault on its Rivers*, YALE ENVIRONMENT 360 (Nov. 4, 2013), http://e360.yale.edu/feature/chinas_great_dam_boom_an_assault_on_its_river_systems/2706/#.Un4qK-hFnIo.twitter

⁸⁹ Wouters, et al., *supra* note 68.

⁹⁰ The Five Principles of Peaceful Coexistence were included in the preamble to the "Agreement (with exchange of notes) on trade and intercourse between Tibet Region of China and India," which was signed at Peking on 29 April 1954 (entered into force on June 3, 1954), United Nations Treaty Series, vol. 299, United Nations, pp. 57–81 <http://treaties.un.org/doc/publication/unts/volume%20299/v299.pdf/>.

⁹¹ Wouters, et al., *supra* note 68, at 3.

⁹² *Id.*

Basin.⁹³ This agreement between member states reiterates the understanding that each member state has for the importance of shared data, the consequences of climate change, and the need to defend equally the interest of downstream nations.⁹⁴ This declaration supports the need for a multilateral treaty or binding agreement that would go beyond the involvement of China and India and include all riparian nations who have a stake in the outcome of changes on the Brahmaputra River.

B. MEMORANDUM OF UNDERSTANDING

In an effort to come to an agreement addressing the water concerns of India, the Ministry of Water Resources of China and India came to an agreement in October 2013 with the signing of a Memorandum of Understanding (MOU) on Strengthening Cooperation on Transboundary Rivers.⁹⁵ This MOU supports the agreement that China will give India data of the Yaluzangbu-Brahmaputra River during the annual flood season, between May 15 and October 15.⁹⁶

This is the only bilateral agreement between the two countries on the issue of sharing data with respect to the Yaluzangbu-Brahmaputra River and there is no dispute resolution clause within the rather scant agreement.⁹⁷ While this is a good effort on its face, it is not meaningful unless supplemental information is available to India, and India is also allowed physical access to the dam to assess the actual depth and breadth of the dam project. Since the dam project is located in Tibet,⁹⁸ and Tibet is a restricted area,⁹⁹ it is not likely that India will be able to actually see the dam. Rather it will need to rely solely upon the documentation provided by China. This is insufficient in light of the major impact of the Zangmu Hydropower Project on India.

⁹³ DHAKA DECLARATION ON WATER SECURITY, <http://www.bipss.org.bd/images/pdf/dhakadeclaration.pdf>.

⁹⁴ *Id.*

⁹⁵ Memorandum of Understanding between the Ministry of Water Resources, the Republic of India and the Ministry of Water Resources, the People's Republic of China on Strengthening Cooperation on Trans-border Rivers, MINISTRY OF EXTERNAL AFFAIRS, GOV'T OF INDIA (Oct. 23, 2013) <http://www.mea.gov.in/bilateral-documents.htm?dtl/22368/Memorandum+of+Understanding+between+the+Ministry+of+Water+Resources+the+Republic+of+India+and+the+Ministry+of+Water+Resources+the+Peoples+Republic+of+China+on+Strengthening+Cooperation>.

⁹⁶ *Id.*

⁹⁷ *Id.*

⁹⁸ Ramachandran, *supra* note 8.

⁹⁹ *Tibet Profile – Timeline*, BBC NEWS (Nov. 13, 2014), <http://www.bbc.com/news/world-asia-pacific-17046222>.

C. NETWORK OF AQUACULTURE CENTRE IN ASIA-PACIFIC

Established in 1988 and amended in 2003, The Network of Aquaculture Centre in Asia Pacific (NACA) is an intergovernmental organization established to promote rural development through sustainable aquaculture.¹⁰⁰ The intended ultimate beneficiaries are farmers and rural communities who benefit from collaborative research, development, and support under the NACA intergovernmental structure.¹⁰¹ Members of NACA include Bangladesh, India, China, and most of Southeast Asia.¹⁰²

Article 4 of NACA describes the methods of facilitating the achievement of NACA objectives.¹⁰³ The most pertinent part being subsection (c), which establishes a regional information system to provide appropriate information for development planning, research, and training.¹⁰⁴ This is significant because those nations involved in this environmental issue also happen to be parties to this organization. Nations such as India and Bangladesh should utilize NACA to call for a better means of obtaining information about the Brahmaputra and the resources they depend upon for life.

Article 7, Section 2 of NACA describes the rights and obligations of members, stating that members have the obligation to provide reasonable information requested and to collaborate in the fulfillment of the objectives and functions of NACA.¹⁰⁵ Again, China would be obligated to provide reasonable information on the specific requests of India or any riparian nation within this issue.¹⁰⁶ Reasonable information would likely include more than just information on the water levels upstream during the rainy season of the year.

Article 15 of NACA allows juridical personality and such legal capacity as may be necessary for the fulfillment of the NACA's objectives and functions.¹⁰⁷ Article 20 allows for dispute resolution in an arbitral tribunal in accordance with the rules of the United Nations Commission on International Trade Law (UNCITRAL).¹⁰⁸

While China has agreed to share its water levels and flood data with India, water and flood data are not the end-all of the appropriate category

¹⁰⁰ NETWORK OF AQUACULTURE CENTRE IN ASIA-PACIFIC, <http://library.enaca.org/PDF/NACA-GC14-FINAL.pdf>.

¹⁰¹ *Id.*

¹⁰² *Id.*

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ DHAKA DECLARATION ON WATER SECURITY, *supra* note 93.

¹⁰⁸ *Id.*

of information described in the NACA agreement.¹⁰⁹ The intent and duration of access for downstream nations should not be unduly restricted because an upstream nation has sovereignty over the waters that flow within its borders. China is the upstream state, however downstream nations still depend on the current flow of the Brahmaputra for their livelihoods. On this token, India and other downstream nations should be given all appropriate and necessary information they need in order to prepare for changes in water flow that would affect fisheries and, ultimately, access to sources of food they are dependent upon. Since India and other Southeast Asian countries affected by this issue are also members of NACA, those countries can bring forth a dispute within Article 15 and Article 20 to address and rectify the issues before them.¹¹⁰

In the interest of keeping peaceful relations in the future and diluting the problem before it is unmanageable, India should request more information under the obligations of Article 7, Section 2.¹¹¹ A legal case should not be the first instance of interaction because it is better to have a non-confrontational dialogue that is rooted in neutral understanding and cooperation. Since the two countries do have a Memorandum of Understanding, China and India have means of communicating with one another and have agreements that could address concerns, if they are utilized. In the last instance, India can bring a legal case against China for noncompliance with NACA obligations within its arbitral tribunal in accordance with the rules of UNCITRAL.¹¹²

VI. SUPPORTING THE NEED FOR CHINA TO MEDIATE ENVIRONMENTAL DAMAGES

Dispute settlement in China translates into diplomatic exchanges, negotiations, and consultations.¹¹³ While some observers attribute this to a general unwillingness to engage, this approach fails to acknowledge historical and traditions approaches to law and disputes in China.¹¹⁴ Xiuli Han provides an overview on specific hydropower projects, in the context of China's Twelfth Five-Year Plan, and notes the use of arbitration as the primary option for dispute resolution in China's bilateral in-

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² *Id.*

¹¹³ Wouters, et al., *supra* note 68.

¹¹⁴ *Id.*

vestment treaties, focusing on this as an avenue for peaceful settlement of transboundary water investment-related disputes.¹¹⁵

A. IMPLICATIONS OF THE INTERNATIONAL COURT OF JUSTICE

The International Court of Justice (ICJ) can hear a case if the States in a dispute are members of the United Nations, if the States involved have an agreement to submit the dispute to the Court, or if there is a jurisdictional clause within an already agreed upon treaty.¹¹⁶ The ICJ's role is contentious in this sense but it is also able to provide advisory proceedings.¹¹⁷ This may be a unique avenue for the situation involving the Brahmaputra River because concerned and specialized agencies and authorized UN organs can give opinions on legal questions brought before the ICJ.¹¹⁸ While there is no measure of formal accountability, as it exists in the ICJ,¹¹⁹ opening the dialogue with China on its own projects and bringing in those stakeholders¹²⁰ who will be adversely affected in the future is the best way to begin the conversation to address the issues.

One path for relief could be for India to seek the advice of the ICJ. Another path would be for the international community of stakeholders to rise and challenge the actions of China, which has been a historically important and vital avenue for changing the harmful actions of others. The only way to retain the ICJ to settle the dispute would be through mutual agreement of all parties involved to accept its jurisdiction.¹²¹ Alternatively, agencies or UN organs knowledgeable and concerned can bring forth legal questions for the ICJ, in which case, an avenue of cooperation can be addressed that may not otherwise be addressable.

In 2010, the ICJ issued a judgment on the *Pulp Mills* case.¹²² Argentina alleged that Uruguay violated its obligations and rules under international law when Uruguay unilaterally authorized construction of two pulp mills on the River Uruguay, which forms the boundary between the two countries. This case introduced concerns over the qualification of the

¹¹⁵ X. Han, *Approaches to investment in Chinese transboundary waters*, WATER INTERNATIONAL, 71–86 (2015).

¹¹⁶ “Basis of the court’s jurisdiction” defined in accordance with the International Court of Justice, <http://www.icj-cij.org/jurisdiction/index.php?p1=5&p2=1&p3=2>

¹¹⁷ *Id.*

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ WORLD COMMISSION ON DAMS, *supra* note 7, at 110-11.

¹²¹ International Court of Justice, *supra* note 118.

¹²² *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment, I.C.J. Reports 2010, p. 14, International Court of Justice, Reports of Judgements, Advisory Opinions and Orders, <http://www.icj-cij.org/docket/files/135/15877.pdf>.

international court to address complex scientific and environmental disputes and proposed the creation of an environmental court at the international level.¹²³ Most importantly, none of the four parties to the disputes were parties to the United Nations' Water Convention at the time.¹²⁴

Similar to the *Pulp Mills* case, even though China and India have not signed or ratified this convention, recognition of the international principle of equitable utilization in rulings within the ICJ supports international accountability for actions within the scope of the UNWC principles.

VII. A CALL FOR EQUITABLE SOURCES OF ENERGY FOR CHINA'S ENERGY NEEDS

Dams have had massive negative impacts on nature. Often, their benefits have been exaggerated and those benefits could have been produced by other less destructive and more equitable means.¹²⁵ The actual impact of dams is now becoming more widely understood through persistent activism and a better dissemination of information on the subject. While dams may have once been thought the answer to a growing energy crisis dependent on fossil fuels, information on the destructive impacts of dams is now more widely available.

Unfortunately, fossil fuels are paving the destructive course of climate change.¹²⁶ While China is using hydropower as the means to wean itself off of fossil fuels, reduce its pollution and in turn lessen global climate change, the price for rivers is much too destructive of a trade off. Rivers are the "arteries of the earth,"¹²⁷ and like the human body, their destruction will lead to the inevitable collapse of ecosystems, creating an unfortunate cascade of events throughout nature.

Pressure from the international community is a slow process but it may be the only way to address environmental concerns. While the ICJ could provide relief, it can only do so if India and China submit to its jurisdiction, which may be unrealistic. China has the largest number of dams in the world and this is not a fact to be taken lightly.¹²⁸ While China is not legally accountable under any substantive treaties, there is an international community of stakeholders whose voice can be a catalyst

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ McCully, *supra* note 15, at XV.

¹²⁶ *Climate Change: Basic Information*, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, <http://www3.epa.gov/climatechange/basics/>.

¹²⁷ McCully, *supra* note 15, at 33.

¹²⁸ Lewis, *supra* note 88.

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for change.¹²⁹ Water is the most valuable resource on earth. It is worthwhile to address the issues of the Brahmaputra now instead of waiting for an environmental disaster involving fisheries and the water that sustains both them and life itself.

¹²⁹ WORLD COMMISSION ON DAMS, *supra* note 7, at 110-11.