EMERGING CHALLENGES TO INDUS WATERS TREATY
Issues of compliance & transboundary impacts of Indian hydroprojects on the Western Rivers

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…Fierce competition over fresh water may well become a source of conflict and wars in the future.

— Kofi Annan, March 2001

…But the water problems of our world need not be only a cause of tension; they can also be a catalyst for cooperation…If we work together, a secure and sustainable water future can be ours.[1]

— Kofi Annan, February 2002

Introduction

Water is becoming an existential issue for Pakistan. The country is facing a grim situation regarding its fast depleting fresh water resources. For Pakistan, primarily an agrarian country, water becomes the most important of all the natural resources to be secured and managed. Being a single-basin country Pakistan relies heavily on the Indus basin water to meet its domestic, agricultural and industrial needs. The growing population and rising temperature is adding pressure on the growing water demands.

Water emerged as a major fault line between Pakistan and India as the partition of British India in 1947 divided the Indus basin system. India emerged as an upper riparian with control over the canal headworks that supplied water to vast lands which became part of Pakistan, now a lower riparian. After protracted negotiations, mediated

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by the World Bank, India and Pakistan signed the Indus Waters Treaty (IWT) in 1960 that divided the rivers of the Indus basin system between the two countries. India gained full control over the three Eastern rivers — the Ravi, the Beas and the Sutlej — while Pakistan was given exclusive rights on the western rivers, i.e. the Indus, the Jhelum and the Chenab. The Treaty is often cited as a model settling water sharing conflict in an international river basin. It has survived major wars and many ups and downs in their bilateral relations.

In the past decade or so, India started building a number of hydroelectric projects on the western rivers that has set off alarm bells in the water-insecure Pakistan which strongly feels that the Indian projects do not follow the criteria specified in the IWT and that unlimited proliferation of dams and diversion of water would badly disturb flow of the western rivers into Pakistan. Dispute had arisen over the construction of the Salal dam (1978) which was settled amicably; but controversy on the Wullar Barrage/Tulbul Navigation project and Kishanganga hydroelectric dams remains unsettled. The Baglihar dam issue was settled by recourse to Neutral Expert as provided in dispute resolution mechanism in the Treaty. The filling of the Baglihar dam in 2008, however, came as a rude shock to Pakistan as dramatic reduction of water flow in the Chenab in the sowing season adversely affected the farmers in Pakistani Punjab. Many more projects are in the pipeline. This has sparked debate in Pakistan that India is "stealing" Pakistan's water, while the Indian media and officials argue that India is not violating the IWT and only utilizing the amount of water allocated to it under the Treaty. India also blames Pakistan for its water woes that India says are emanating from poor management of water resources. Both India and Pakistan are facing intra-state conflicts over water sharing, but the paper will limit its scope to the issues relating to interstate water sharing between the two countries.

The main argument is that Pakistan's vulnerability to the transboundary impacts of India's ambitious hydro projects on the Western rivers goes unrecognized and underappreciated in India. It is not only violation of the spirit of the IWT but also ignoring the huge transboundary impacts on hydrology and ecology of the rivers

assigned to Pakistan under the IWT. Given the growing water stress on the Indus water system, it is in the interest of both countries to observe the letter and spirit of the Treaty and take steps to ensure effective functioning of the Indus water regime. These may include ensuring transparency in sharing of flow data through installation of telemetry system, timely data sharing over new Indian projects, joint watershed management and joint commissioning of environmental studies, cooperation in ensuring quality of water bodies, strengthening the functioning of the Indus Waters Commission by expanding its scope and mandate and internal management of water resources and sharing of best practices.

The paper explores the drivers of the current water discourse in Pakistan and India. It examines how Pakistan's rights over the western rivers as specified in the Treaty have been violated by India. It analyzes the potential impact of the Indian projects on the natural and ecological flow of western rivers into Pakistan. Finally, it looks into the ways and means to bridge the trust deficit in the implementation of the IWT and adopting of certain cooperative measures that could strengthen the shared Indus water regime by addressing the adverse effects of climate change and environmental degradation on the Indus basin rivers system.

1. How important are the Indus basin rivers in the economy and life of the people of Pakistan and India and how water stress is shaping discourse on water in the two countries?
2. What are Pakistan's rights under the Indus Waters Treaty, especially on the western rivers of the Indus basin?
3. Is India violating the provisions of the IWT while constructing hydropower projects on the western rivers? How Indian projects affect the flow of the western rivers into Pakistan and what are their transboundary impacts?
4. What can be done to ensure better functioning of the Treaty; bridging trust deficit in the implementation of the Treaty and averting growing threat of "water war" between India and Pakistan?

Theoretical debate on ‘water wars’ and ‘water cooperation’

Fresh water resources are extremely limited in supply — only 2.79 per cent of the global water resources on the earth, of which 0.03 per cent are available for human use.[2] The fast growing world population — by about 80 million a year — is exerting increasing pressure on freshwater demands of about 64 billion cubic metres a year.[3] Besides, overpopulation, hyper-urbanization, and climatic anomalies are compounding the problems associated with water scarcity. Since water security directly impacts human security, it is a potential source of conflict. There are more than 263 transboundary river basins around the world and hundreds of transboundary aquifers on which over 3 billion people depend.[4]

The relationship between water and security is quite pronounced and acknowledged by all from international political leaders to hydrologists to climatologists. In 1991, UN secretary general Boutros Boutros-Ghali observed that the "next war will be fought over water, not politics".[5] In 1995, Ismail Serageldin, the first chairperson of the Global Water Partnership warned: “If wars of this century were fought over oil, the wars of the next century will be fought over water — unless we change our approach to managing this precious and vital resource.”[6] Kofi Aanan highlighted this concern in 2001, while Ban Ki-moon, the current UN secretary general, reinforced the concern. In January 2008, addressing the World Economic Forum at Davos, he cautioned: A shortage of water resources could spell increased conflicts in the future. Population growth will make the problem worse. So will climate change. As the global economy grows so will its thirst. Many more conflicts lie just over the horizon."[7] Ban Ki-moon also forcefully pointed out that the ongoing Darfur crisis "grew at least in part from desertification, ecological degradation, and a scarcity of resources, foremost among them water."[8]

With rising global water scarcity, a fierce competition over access and control over water resources characterizes the debate on relationship between freshwater resources and international cooperation and conflict. Evan Vlachos views water

conflicts as a "part of a continuum that begins from concerns exemplifying generalized unrest and general debates about water systems; over confrontations reflecting noticeable controversies, cleavages in public opinion and attitudes; to conflicts representing extreme confrontations, clearly defined parties-at-interest, and noticeable constellations of stakeholders; to finally *crises* involving open defiance of civil authority, protests, counter-movements, resistance to proposed water structures, even violence and social upheavals."[9] Such a typology of severity of controversies and conflicts is also exemplified in river basins as flashpoints in the case of rivers forming a shared boundary; when human action triggers disruption (such as dams); in the case of power asymmetries (water hegemony) ; or, in the case of extreme hydrological events (such as droughts or floods).[10] Significantly, the future sources of conflict will be more diverse stemming from combinations of internal and external considerations and of broader conditions of environmental change.

The literature on conflict over water resources between the riparians underscores that water has potential for violent and social conflict but what is less clear is at what level this conflict will take place. With growing concerns that climate change would undermine water resources and engender more and more water conflict, many water experts, hydrologists and climatologists have evaluated the risks of prospective water wars with reference to historical evidence. The debate is more around whether violent hydro conflicts are manifestation of "resource war" or a "management issue" that can be resolved through cooperation, as the water rationale demands. Aaron Wolf, of Oregon State University, argues, on the basis of data covering 124 countries and 122 of the world's 265 international river basins, that a direct causal relationship between water scarcity and international insecurity or war is based on anecdotal and rather selective evidence.[11] *The Transboundary Freshwater Dispute Database* (TFDD) created by scholars at Oregon State University provides a comprehensive inventory of all international water-related events from 1948-2005, involving 6,400 cases of water-related conflict.[12] The data provides insight into relationship between fresh water resources and international cooperation and conflict. Based on this research Wolf

concludes that cooperation outweighed confrontation. International violent conflict is rarely if ever caused by, or focused on, water resources. Historically, formal and informal international political institutions managing water have adapted to increased scarcity without resorting to war to secure water supplies. Instead cooperation, through multiple means, somehow emerges between states. In fact, in the period between 1946 and 1999, riparians in transboundary basins signed 157 international freshwater treaties.[13] His work is often cited to tone down the alarmist view of hydro conflicts and highlight international cooperation between the riparians. Here the Indus Waters Treaty is the best example of enduring stability over water-sharing between India and Pakistan.

There are others who view water as a strategic resource that has to be protected and valued. Peter H. Gleick, at the Pacific Institute for Studies in Development, Environment and Security, puts more emphasis on the empirical evidence that shows conflict potential of the water-sharing issues between the riparians in the basins even where they have entered into formal cooperative agreements. Gleick maintains a conflict chronology database detailing 203 incidents stretching way back to 3000 BC.[14] He identifies six categories or types of conflicts, some of them overlapping, that form basis of conflict.[15] They are:

- Control of Water Resources: (state and non-state actors): where water supplies or access to water is at the root of tensions.
- Military Tool (state actors): where water resources or water systems themselves are used by a nation or state, as a weapon during a military action.
- Political Tool (state and non-state actors): where water resources, or water systems themselves, are used by a nation, state, or non-state actor for a political goal.
- Terrorism (non-state actors): where water resources, or water systems, are either targets or tools of violence or coercion by non-state actors.

- Military Target: (state actors): where water resource systems are direct targets of military actions by nations or states.
- Development Disputes: (state and non-state actors): where water resources or water systems are a major source of contention and dispute in the context of economic and social development.

Control over water resources; use of water as a political tool, its relationship with socio-economic development and threat of terrorists/nonstate actors using it both as a target or a tool are quite relevant to the India-Pakistan context.

Further, experts on transboundary water resources identify two key variables that define the likelihood and intensity of water conflict in a given river basin. The first is the amount and rate of physical or institutional change in the water system covered. The second is the strength of the cooperative institutions linking the riparians.[16] Global warming will place unprecedented pressure on both and becomes very relevant when it comes to hydropolitics in the Indus basin.

Drivers of current water discourse in Pakistan and India

Water resources of Pakistan

Pakistan is one of the world's driest countries, with an average rainfall of under 240 mm a year. The country's water resources consist mainly of rainfall, rivers, glaciers and ground water. The population and economy are heavily dependent on an annual influx into the Indus river system (including the Indus, Jhelum, Chenab, Ravi, Beas, and Sutlej rivers) of about 180 billion cubic metres of water flowing mainly through India and heavily depends on glacier melt in the western Himalayas.[17]

Various national and international reports on Pakistan's water situation indicate that the country is fast moving from water-stressed to water-scarce. *Pakistan Strategic Country Environmental Assessment Report, 2006,* says water availability per person has drastically fallen from about 5,000 cubic meters in 1947 to 1,100 cubic metres. It projects that water availability will hit below 700 cm per capita by 2025.[18] The World

Bank in its report (2005) observed: “Pakistan is already one of the most water-stressed countries in the world, a situation which is going to degrade into outright water scarcity.”[19] In 2007, the Asian Development Bank (ADB) report stated that Pakistan is “nearly at water scarcity threshold of 1,000 cubic meters/person/year.”[20] *The Economic Survey of Pakistan (2009-10)* puts the per capita availability of water in the country at 1066m 3/person.[21] This clearly shows that Pakistan has become a water-scarce country.

The gap between water supply and demand is widening. In 2004, Pakistan’s water shortfall was 11 MAF which is expected to go up to 31 MAF by 2025. This increasing gap has led to severe water shortage in almost all sectors. Data projecting Pakistan’s water needs in the year 2025 tells a sobering story. By that year, according to one study, Pakistan’s total water availability will have barely changed from the current availability of 236 billion cubic metres (bcm). Yet Pakistan’s total water demand in 2025 is projected to be about 338 bcm—suggesting a gap of 100 bcm.[22] In fact, the 100 bcm gap will comprise almost two-thirds of the entire Indus River system’s current annual average flow. Currently Pakistan's water requirement in the Indus Water system is 139.54 MAF while availability is 135.60 MAF, a gap of 3.94 MAF. The system losses are placed at 15.19 MAF.[23]

Pakistan’s agricultural performance is closely linked with the supply of irrigation water which uses 93 per cent of its rivers water. The agricultural sector plays a key role in Pakistan’s economy. It is the largest sector, accounting for over 21 per cent of the gross domestic product (GDP), and remains by far the largest employee, absorbing 45 per cent of the country’s labour force. Nearly 62% of the country’s population resides in rural areas, and is directly or indirectly linked with agriculture for their livelihood.[24] Further, Pakistan has very little water storage capacity, barely storing 30 days of water in the Indus basin, while India can store for 120-220 days, Egypt up to 700 days and the US for 900 days. In 1960, Pakistan signed the Indus Waters Treaty with India which gives it exclusive rights to the three western rivers — Indus, Jhelum and Chenab. The average runoff of the western rivers is 140 MAF.

Water resources of India

India is a semi-arid country. It is relatively in a better position than Pakistan due to its proximity to Tibet, Kashmir and Himalaya's water resources which make it practically upper riparian in the Indus, Ganges-Brahmaputra and Meghna basins, all forming part of the main Himalayan river systems. Besides, India has the Deccan rivers — the Godavari, the Krishna, the Cauvery, and the Mahanadi; coastal rivers and rivers of the inland drainage basin. India also plans to build a big river-linking-project that includes diversion of vast quantities of water from the Ganges and the Brahmaputra through transfer of water from “surplus river basins” to “deficit river basins” in the country. The proposed project has become a source of tension between India and the upstream Nepal and the downstream Bangladesh which would be adversely affected by the diversion.

India's overall per capita water availability has also declined from over 5,000 cubic metres in 1950 to 1,800 cubic metres in 2005. It may reach the threshold level of 1,000 cubic metres per capita in 2025.[25] The dominant perception in India is that "the growth of population, pace of urbanisation and economic development will accentuate the pressure of increasing demand on a finite resource, and that the answer lies in large supply-side projects and long-distance water transfers."[26]

In India, the basic driver for hydropower is the growing demand for electricity which mainly comes from the need to meet the power demands of the 9-per cent-plus annual growth rate of the economy. Overall for the country, peak power demand in the year 2007-08 was 108,886 MW, while the peak power demand met was 90,793 MW; there was a shortfall of 18,093 MW or 16.6 per cent of peak demand. Although there is a strong push for large hydro projects in India, the fact is that 89 per cent of its large projects generate power below the designed capacity.[27]

Water Resources and Usage by India & Pakistan

	Precipitation (mm/year)	Total renewable water resources per capita (m3/year) a		Dependency ratio b %	Proportion of renewable water resources withdrawn c %
	Long-term Avg	1990	2006		
India	1,100	2,205	1,647	34	34
Pakistan	500	1,994	1,400	76	75

a: the sum of internal and external renewable water resources. It corresponds to the maximum theoretical yearly amount of water actually available for a country at a given moment.
b: water resources originating from outside the national territory, relative to total water resources
c: water used for all purposes.
Source: Based on data provided in Michael Renner, "Water Challenges in Central-South Asia," Peacebuilding Centre, *Noref Policy Brief*, No. 4, December 2009, p.2.

Water discourse in India and Pakistan heats up

The growing water stress in Pakistan and India is shaping discourse on water between the two countries. The increase in water stress in the two countries since the early 1990s has also put strain on the IWT. This debate is mainly driven by the growing demand, decreasing availability of fresh water resources and degree of their dependence on the transboundary water resources. Water scarcity is often measured using Falkenmark's Water Stress Index (WSI) which divides the volume of available water resources for each country by its population. If the resulting average amount of water available per inhabitant falls short of a certain threshold value (1700 m3 per year) the country is considered to be "water stressed", if falling short of 1,000 m3 per person per year, it is considered "water scarce" and finally, if falling short of 500 m3 per person per year, it is considered "water poor."[28] Going by this Water Stress Index India has become a "water stressed" country while Pakistan a "water scarce" country.

In March 2009, a group of more than 20 different UN bodies warned that, since water has become the latest cause stoking tensions between India and Pakistan, the world may be perilously close to its first water war. The report observed that "water is linked to the crises of climate change, energy and food supplies and prices, and troubled financial markets."…."Unless their links with water are addressed and

water crises around the world are resolved, other crises may intensify and local water crises may worsen, converging into a global water crisis and leading to political insecurity and conflict at various levels."[29] As such water has become a geopolitical issue in the ongoing hostility and rivalry and distrust between the two countries

Pakistan: In Pakistan a passionate debate was sparked by an array of ongoing controversial Indian projects including the Wullar Barrage, Baglihar and Kishenganga dams and on the rivers allocated to Pakistan. The growing water scarcity, Pakistan's heavy dependence on supply of fresh waters from the western rivers, vulnerability to increasing number of Indian projects and apprehensions as lower riparian underlie the heated water discourse in the country that cuts across political parties/leaders, officials, farmer groups, media and public at large. The very fact that Pakistan's water crisis has been politicized along the issue of water distribution between the provinces and Kalabagh dam sharpens its sense of vulnerability to the fallout of Indian projects on the preservation, substance and development of the Indus basin irrigation system in the country.

The government and political leadership in Pakistan have been quite vocal in expressing their concerns regarding Indian projects, especially on the Jhelum and Chenab rivers. In October 2008, shortly after filling of the Baglihar dam that caused reduction in Chenab's waters into Pakistan, President Asif Ali Zardari asserted that "Pakistan would be paying a very high price for India's move to block Pakistan's water supply from Chenab River." He warned India "not to trade important regional objectives for short-term domestic goals."[30] On 28 January 2009, President Zardari in an article in *the Washington Post* warned: "The water crisis in Pakistan is directly linked to relations with India. Resolution could prevent an environmental catastrophe in South Asia, but failure to do so could fuel the fires of discontent that may lead to extremism and terrorism."[31]

On 3 January, 2010, the Planning Commission Deputy Chairman, Sardar Assef Ahmad Ali, speaking at a seminar on the "Improvement on Energy Sector", organised by the Institute of Electrical and Electronics Engineers, Pakistan (IEEEP), stated India

would have to stop stealing Pakistan's water as the latter would not hesitate to wage war with New Delhi if it did not stop doing so.[32] He however said sabotaging the Indus Basin Waters Treaty would only lead to more pains and open a Pandora's box for the region, already facing political and diplomatic instability.[33] On 3 November 2008, PML-Q chief and former premier Chaudhry Shujaat Hussain said the water crisis between Pakistan and India could become more serious than terrorism and result in a war.[34] The Chief Minister of Punjab, Mian Shahbaz Sharif, stated that the water issue had become a serious problem between India and Pakistan.[35] Earlier, Pakistan's minister for education and former head of the ISI, Javed Ashraf, had warned the Senate in 2005 that the country could go to war with India over the Baglihar controversy.[36]

The Chairman, Indus Waters Treaty Council, Hafiz Zahoor-ul-Hassan Dahr, has warned that Pakistan could become another Somalia and Ethiopia.[37] He said the Indian projects were aimed at controlling the waters of the Chenab, Jhelum and Indus rivers, were illegal and a clear violation of the Indus Waters Treaty. He said India had seized 70 per cent water of the Chenab and the Jhelum as a result of which over 0.9 million acres of land, being irrigated through the Marala Headworks, was now presenting the view of Thar and Cholistan deserts.[38] On 3 January 2010, the chief of Pakistan Muttahida Kisan Mahaz, Ayub Mayo, said due to the negligence of Pakistani leaders, India had damaged the irrigation system of Pakistan by stealing water in violation of the treaties. He said a huge impending crisis threatened the water and agricultural sectors of Pakistan.[39]

The dominant perception in the mass media in Pakistan also shares the view that its rights to western rivers are undermined by Indian violations of IWT. Majid Nizami, chief editor of a group of newspapers, observed that the water dispute with India could trigger a war. "Pakistan can become a desert within the next 10 to 15 years. We should show upright posture or otherwise prepare for a nuclear war."[40] However a series of articles on 'Water is life' was published by *The News* under the "Aman ki Asha" campaign which tried to initiate a dispassionate analysis on the water issue.[41]

The Water dispute with India has also emerged on the radar of religious militants in Pakistan. Extremist organizations like Jamaat-ud-Dawa (JuD) have tried to use it to invoke anti-India emotions in general public. Pakistan's banned 'jihadi' publications like *Jarrar* (a publication of Jamaat-ud-Dawa), *Zarb-e-Momin* (a publication of Al-Rasheed Trust) and *Al-Qalam* (a publication of Jaish-e-Muhammad) have started highlighting this issue as "water terrorism." These organisations have devoted a portion of their publications to highlight the Indo-Pakistan water issue, urging people to get ready for jihad against India over water. JuD has become quite active over the past couple of months in holding public rallies and delivering anti-Indian speeches on water issue across Pakistan. Hafiz Saeed, founder of the banned Lashkar-e-Taiba (LeT) and chief of JuD, has been publicly "threatening" India to stop "water terrorism."[42] The militant leaders are portraying a picture that Pakistan and India are headed for a war on this issue, and India has decided to turn Pakistan into a desert by cutting its water sources and violating the Indus Waters Treaty.

Nevertheless, the dominant opinion in Pakistan favours preserving the Indus Waters Treaty. Pakistan wants that India should fully implement the provisions of the Treaty in letter and spirit.

Water discourse in India

In India the narrative on the water issue with Pakistan is largely controlled by their foreign office and security establishment. John Briscoe quoted an Indian journalist colleague: "when it comes to Kashmir — and the Indus Treaty is considered an integral part of Kashmir — the ministry of external affairs instructs newspapers on what they can and cannot say, and often tells them explicitly what it is they are to say."[43] Briscoe says: "I never saw a report which gave Indian readers a factual description of the enormous vulnerability of Pakistan, of the way in which India had socked it to Pakistan when filling Baglihar."[44] Consequently Pakistan's great vulnerability and legitimate concern find no space in India's water discourse.

India's narrative on water dispute with Pakistan is that reduced flow of water into Pakistan from time to time is not the result of any violation of the IWT by India or

any action on its part to divert river flows or to use more than assigned share of water from the Western Rivers. Instead, water flows in the rivers depended on melting of snow and quantum of rainfall. Further, any drop in the flow is also because of the overall pattern of receding glaciers and climate change.[45] Further, Indian official sources and the media attribute Islamabad's water woes to "mismanagement of water resources", "less storage facilities" and a "huge 38 MAF of waters flowing every year un-utilised" into the Arabian Sea. They also argue, since rivers flowing in (Pakistani) northern Punjab don't provide adequate waters to lower riparian, thereby, Pakistan "attempts to divert attention from growing discontent in Sindh and Balochistan over denial of their share of Indus waters." Also as the "population in Punjab increases, the demand for irrigation also increases."[46] As a corollary, India wants Pakistan to look inwards to address its water issues and improve its water management.[47]

The Indian view was clearly made out by the High Commissioner Sharat Sabharwal in his speech at a function organized by Karachi Council on Foreign Relations (KCFR) and Pakistan-India Citizens Friendship Forum (PICFF). He described allegations against India as "preposterous" as India never hindered water flows into Pakistan even during the 1965 and 1971 wars. He contended that "apprehensions, misconceptions, misinformation and allegations pertaining to India …characterize the debate on water scarcity in Pakistan."[48] Sabharwal said, the Treaty permitted the limited use of water from the Western rivers of the Indus system by India and that this entitlement had not been fully used to date. As against the storage entitlement of 3.6 MAF, India had built no storage so far. Of the 1.34 million acres permitted for irrigation, only 0.792 million acres was being irrigated. "We have exploited only a fraction of the hydroelectric potential available to us on these rivers." Out of a total potential of 18,653 MW, projects worth 2,324 MW have been commissioned and those for 659 MW are under construction. [49] Sabharwal said that New Delhi had no "storage and diversion canals network" to withhold Pakistan's share of water, and all claims to the contrary were baseless allegations.[50] He also urged Pakistan to adopt better water management and avoid wastage of water in time of

increasing scarcity. The Indian envoy said that much of the water infrastructure in Pakistan was in a state of disrepair and water loss between canal heads and farms was around 30 per cent. Similarly, on 4 March 2010, External Affairs Minister S M Krishna told the Rajya Sabha, Pakistan's charge that India had denied its neighbour the share of water are "completely baseless." He contended: "The government is in full compliance with the treaty. All issues regarding implementation of the treaty should be resolved through the existing mechanisms under the IWT."[51]

The Indian media is reinforcing the official standpoint. *The Tribune* wrote that Pakistan wanted "to divert public attention from the recurring water scarcity in many parts due to mismanagement of its resources," and "escape criticism for giving preferential treatment to north Punjab by depriving water to some states and for its failure to build and maintain adequate storages to meet shortages."[52] Arvind Gupta, an Indian analyst, contends that the "water issue is being used to divert attention from 26/11 and the larger issue of terrorism, which India regards as the main issue between India and Pakistan."[53] *The Final Settlement*, published by the Mumbai-based Strategic Foresight Group of the International Centre for Peace Initiatives, argued that water could be the cause of future conflict between the two countries and that the Treaty offered only a very frail defence against heightened conflict over river resources between India and Pakistan, and that it was only a matter of time before water war became a virtually unavoidable feature of the region's political environment.[54]

Indian analysts like official circles and the media contend that Pakistan is acting as a spoilsport in delaying and stalling progress in the completion of the India's projects. It is stated that about 27 Indian projects on the western rivers have been questioned by Pakistan.[55] India believes that the provision for Neutral Expert should be the last option and not recourse for each and every project that India proposes. The reference does cost time, money and efforts, in terms of delaying the project, thereby increasing the cost of not only construction, but also related expenditure, in not making use of the hydro potential.[56]

The issue of water has also been politicized in IHK. Voices have been raised in IHK against Delhi over having “surrendered the state's water rights to Pakistan” under IWT. There is a perception in IHK that all the three rivers, which were flowing through its territory, were surrendered to Pakistan, while all the rights over rivers flowing through (the Indian) Punjab were retained. The IHK assembly also passed a resolution on 3 March 2003 asking New Delhi to reconsider the IWT to safeguard the interests of the state.[57] The fact remains that non-consumptive rights that India has over the western rivers are meant to safeguard the requirements of the IHK.

During the past decade or so, serious doubts have emerged over the viability of the IWT. During “Operation Parakram” following an attack on the Indian Parliament in December 2001, India vocally considered pulling out of the treaty as one of the steps of hitting back at Pakistan for its alleged support to terrorist outfits targeting India and in turn Pakistan stated that it would be prepared to use nuclear weapons over a water crisis. A. G. Noorani, a noted Indian lawyer, stated that amongst other punitive measures, India had weighed the option of stopping waters to Pakistan by abrogating the IWT. But, the Legal Entity Division put its foot down arguing that the IWT could not be abrogated unilaterally as it was guaranteed by the World Bank and other global powers. He said, under international law "water cannot be used as a weapon."[58]

In the wake of the Mumbai attacks in November 2008, voices were raised again in India to scrap the treaty. M. S. Menon strongly advocated abrogation of the IWT. "There is one option which can hurt Pakistan most — that of announcing India’s intent to withdraw from the IWT... If India walks out, the collapse of this Pakistan-biased treaty would trigger serious problems of water shortages there since India would then be having the option to divert and use its equitable share of Indus waters, which was denied all along due to the existing treaty provisions.[59] He argued that "the option available to us is by justifying India’s right to withdraw from the treaty citing Pakistan’s non-compliance with the UN Security Council’s Resolution 1373” on denial of sanctuaries and support to terrorists."[60] He also supported diversion possibilities of water from the western to the eastern rivers to augment the flows on the Indian side. He

pointed out that there was a possibility of diverting the Indus at a point upstream of the Stakna hydropower project to a tributary of the Sutlej through a tunnel. Similarly, the Chenab waters could be diverted from the river Chandra, a tributary of the Chenab, to a tributary of the Beas and from the Chenab main at Marlu to a tributary of the Ravi through tunnels. A possibility also exists for constructing large dams on the Jhelum to facilitate the diversion of waters to the Chenab and to the Ravi.[61] Lt-Gen (retd) Ranjit Singh advocated “revocation” of the IWT. “This is one weapon which needs to be exercised. Pakistan cannot expect us to abide by treaties when it does everything to break up India by using militant groups as an extension of its foreign policy towards India.”[62] Another Indian analyst "foresee[s] India's growing bargaining position with Pakistan vis-a-vis the Treaty. In such a situation and given Pakistan's vulnerability, India as the upper riparian has the advantage of being able to condition possible trade-offs. Water could thus become a vital strategic tool. One possibility could be to push Pakistan to accept the current Line of Control [in Kashmir] or warn Islamabad to rein in terror and to crack down on Islamist forces. In return one could expect India to concede — as a political gesture — some technical changes in its water projects."[63]

The treaty does not explicitly provide for an exit option or a mechanism to withdraw from the agreements.

Indus Basin and Indus Waters Treaty (IWT) 1960

The Indus River rises in the Tibetan plateau in the vicinity of Lake Mansarovar. It flows in Tibet for about 200 miles before it enters Ladakh, (part of Kashmir under Indian control) and then flows on towards Gilgit in Pakistan. Flowing through the North in a southerly direction along the entire length of Pakistan, it falls into the Arabian Sea near Pakistan’s port city of Karachi. With a total length of 3,200 km (1,988 miles), the river’s estimated annual flow is approximately 207 billion m3. The Indus river feeds ecosystems of temperate forests, plains and arid countryside. Its five major tributaries are the Jhelum, the Chenab, the Ravi, the Beas and the Sutlej (also having origin in Tibetan plateau). Another two tributaries of the Indus, the Kabul and the Kurram, rise in Afghanistan. Most of the Indus basin lies in Pakistan and India,

with about 13 per cent of the total catchment area of the basin situated in Tibet and Afghanistan.[64] The Indus drainage basin area is shared by Afghanistan, Pakistan, India and China.

Co-riparian states in the Indus River Basin

Basin Name	Total area of basin (sq. km)	Country name	Area of country in basin (sq. km)	Per cent area of country in basin (%)
Indus	1,138,800	Pakistan	597,700	52.48
		India	381,600	33.51
		China	76,200	6.69
		Afghanistan	72,100	6.33
		Chinese control, claimed by India	9,600	0.84
		Indian control, claimed by China	1,600	0.14
		Nepal	10	0.00

Source: ASIA: International River Basin register: The Transboundary Freshwater Dispute Database *(updated August 2002)* <http://www.transboundarywaters.orst.edu/publications/register/tables/IRB_asia.html>.

With the basin's population of 215.8 million, the annual per capita water availability of only 1,329 m3, is much below the threshold of 1,700 m3 and is lowest when compared to GBM (3473) and Helmand (2589) basins in the region.[65] Further, the quantum of water flowing in the Indus and its tributaries varies widely from year to year, depending on snowfall in the Himalayan and Karakoram ranges and rainfall in the catchment areas.[66] Superfloods occur approximately once every five years, which has raised the average flow to 140 million acre feet (MAF) over the past 30 years. In the remaining four years, average water availability has been 135.60 MAF.

Western Rivers Annual Flows

Maximum flow in 1977-78 172.10 MAF	172.10 MAF
Minimum flow in 2001-02 97.13 MAF	97.13 MAF
Annual average flow 1978-2008 140.00 MAF 1998-2008 128.52 MAF	 140.00 MAF 128.52 MAF
"4 out of 5 years" annual average flow 1978-2008 135.60 MAF 1998-2008 123.00 MAF	 135.60 MAF 123.00 MAF

Note: MAF=Million Acre Feet

Source: Estimated from data obtained from government of Pakistan, Water and Power Development Authority, Lahore. Cited in Kaiser Bengali, "Water Management under Constraints:

The Need for a Paradigm Shift", in Michael Kugelman, Robert M. Hathaway, ed, Running on Empty: Pakistan's Water Crisis", Woodrow Wilson International Center for Scholars, 2009. Washington, D.C. www.wilsoncenter.org p. 47.

The Indus River system is the largest contiguous irrigation system in the world with a command area of 20 million hectares and an annual irrigation capacity of over 12 million hectares.[67] Irrigation in the Indus River basin dates back centuries; by the late 1940s the irrigation works along the river were the most extensive in the world. These irrigation projects had been developed over the years under one political authority that of British India, and any water conflict could be resolved by executive order. The Government of India Act of 1935, however, put water under provincial jurisdiction, and some disputes did begin to crop up at the sites of the more extensive works, notably between the provinces of Punjab and Sind.[68]

After partition of the subcontinent in 1947, the dispute became an international issue as the boundaries drawn by Sir Cyril Radcliffe split the Indus River system. Most of the water-rich headwaters went to India, and Pakistan was left as the water-short lower riparian. Further, important irrigation headworks at Ferozepure on the Sutlej and Madhupur on the Ravi, which served as source of two irrigation canals and fed about 1.7 million acres in Western Punjab (Pakistan), were awarded to Eastern Punjab

(India). This gave India physical capacity to shut off water supplies to Pakistan. Heightened political tensions, population displacements, and unresolved territorial issues, only exacerbated hostilities over the water dispute. Against this backdrop, the chief engineers of Pakistan and India met and signed a "Standstill Agreement," on 20 December 1947, providing water allocations at two points in the Indus basin irrigation system until 31 March 1948.[69] On 1 April, India discontinued water supplies from the Ferozpur headworks to the Dipalpur Canal and to the main branches of the Upper Bari Doab Canal. The shut-off, timed with the sowing of the wheat crop, affected 1.7 million acres of cultivable land in Pakistan, threatening the loss of about one million tons of wheat output. The wheat crop was saved only after Pakistan accepted, under duress, India's terms for the resumption of water flow.[70] Under the new agreement, signed on 4 May 1948 in New Delhi, India assured Pakistan that it would not withdraw water delivery without allowing time for Pakistan to develop alternative sources. India, however, continued to claim proprietary rights over all the waters in the eastern rivers and argued that Pakistan's by agreeing to pay for water under the Standstill Agreement of 1947 had recognized India's proprietary rights. Pakistan, on the other hand, contended that payments to India were only to cover operation and maintenance costs not payment for water that belonged to Pakistan by right of prior allocation.[71]

Against this backdrop of dispute over water rights, in 1951, David E. Lilienthal, former chairman of the Tennessee Valley Authority, visited India and Pakistan. Following his visit Lilienthal wrote an article in which he made a number of recommendations, suggesting, among other things, that the Indus Basin be treated, exploited, and developed as a single unit.[72] Although India and Pakistan rejected his proposal as impractical, it opened an avenue for negotiations. It prompted Eugene Black, President of the World Bank, to offer WB good offices to India and Pakistan to help in resolving the dispute, which both countries accepted in 1952. This was followed by intense and protracted negotiations, with World Bank actively floating ideas and proposals to break the deadlocks, culminating in the Indus Waters Treaty, signed in 1960. Initially, Black outlined "essential principles" — that water resources of the Indus

Basin should be managed cooperatively; and that problems of the basin should be solved on a functional and not on a political plane, without reference to past negotiations and past claims.[73] Both sides accepted Black's initiative but could not agree on a common development plan for the basin. Thereafter, the Bank suggested that each side submit its own plan. Both sides did submit plans on 6 October 1953, each of which mostly agreed on the supplies available for irrigation, but varied extremely on how these supplies should be allocated.

Following a stalemate emerging out of this disagreement, on 5 February 1954, the Bank came up with its own proposal, abandoning the strategy of integrated development in favour of one of "quantitative division of waters between the two countries, leaving each of the two countries free to carry out its own development independently of other, and in accordance with its own plan."[74] The bank proposal called for the entire flow of the Eastern Rivers — the Sutlej, the Beas and the Ravi — to be allocated to India, and full use of the Western Rivers — the Indus, the Jhelum and the Chenab, all in Jammu and Kashmir — to be allocated to Pakistan which was accepted by both sides.

Indus Waters Treaty regime

The Indus Waters Treaty governs transboundary water rights and obligations of India and Pakistan in relation to each other. It assigned full use of waters of the Indus, Jhelum and Chenab rivers to Pakistan, with minor exceptions, for existing uses in Kashmir. This gave Pakistan 75 per cent of the waters of the Indus Basin system and allowed India, under carefully specified conditions, to tap the considerable hydropower potential of the three Western rivers, before they entered Pakistan.[75]

IWT has normative as well as functional values as it contains, in addition to the substantive rules regarding the regime of the Indus system of rivers, provisions for the implementation of an administrative and institutional mechanism and the management of the basin resources.[76] With its preamble, twelve articles and eight annexures (including appendices dealing with technical issues) the Treaty attempts to deal

comprehensively with the issues of water allocation and the flow of water in the Indus basin, and mechanisms to deal with disputes.

The principles of water sharing

Before the IWT Pakistan emphasized “historical uses” while India as an upper riparian claimed “absolute rights” on the Indus Basin system. The treaty tried to find a solution that was not driven by legal principles, but instead by principles of water engineering and economics. There were conflicting principles put on the table, India invoking the principle of “equitable utilization”— the favourite of International Law Association — while Pakistan stressing “no appreciable harm” — the favourite of International Law Commission.[77] The Treaty instead of dividing the waters of the rivers, divided the six rivers comprising the Indus river system between the two parties which gave them independent control and regulation of supplies within their own territories. However, each country was allowed certain uses in the rivers allocated to the other, subject to certain qualifications contained in separate annexures in the Treaty. Under the Treaty:

- All the waters of the Eastern Rivers shall be available for the unrestricted use of India (Article II). Pakistan was permitted by way of exception to take water for domestic use, non-consumptive use and certain limited agricultural use.[78] Annexure B gives details of agricultural use of 45,500 acres from tributaries of river Ravi- Basantar, Bein, Tarnah and Ujh.
- Pakistan shall receive "unrestricted use of all waters of Western Rivers" which India is “under obligation to let flow", Article III (1) and shall not permit any interference with these waters, except for the following uses, restricted as in paragraph 5 of the Annexure C, in case of each of the rivers. These included: domestic use; non-consumptive use; agricultural use (limited, set out in Annexure C); generation of hydroelectric power (Annexure D); and storage works (limited).[79]

The use by India of the waters of the Western Rivers allocated to Pakistan was extensively discussed in the lengthy and complex negotiations and agreement was reached on some qualified uses for agriculture, hydropower and storage.[80] Annexure C which provides details of agricultural uses by India on the western rivers allows it to use 1.3 MAF for irrigation purposes. This implies that India can irrigate crop area of 13,43,477 acres using waters of western rivers. So far it has been irrigating only 7,92,426 acres.[81]

Agricultural Use by India on the Western Rivers (figures in acres)

River	Eff. Date	Add Area	Total	From Flow	2008-09
Indus	42,179	70,000	112,179	112,179	51,175
Jhelum	517,909	400,000	917,909	667,909	631,604
Chenab	82,389	231,000	313,389	157,389	109,647
Total	642,477	701,000	1,343,477	937,477	792,426

Source: Indus Water Commission.

India has right to utilize 3.6 MAF for storage projects, including general storage, power storage and flood storage. Further, India is allowed to construct run-of-river hydroelectric plants on the Western Rivers and all the technical parameters for each river are specified in Annexure D. Annexure E defines the limits of various storages of water by India on the Western Rivers.

India's entitlement of storage on the Western Rivers (MAF)

River system	General Storage	Power Storage	Flood Storage
Indus	0.25	0.15	Nil
Jhelum (Excluding Jhelum Main)	0.50	0.25	0.75
Jhelum Main	Nil	Nil	As in Paragraph 9, Annexure E
Chenab (Excluding Chenab Main)	0.50	0.60	Nil
Chenab Main	Nil	0.60	Nil

Source: Indus Water Commission.

In addition, Article IV (2) clearly stipulated that any non-consumptive use made by each party would not "materially change... the flow in any channel to the prejudice of the uses on that channel by the other party." The flood protection or flood control scheme by each party was "to avoid, as far as practicable, any material damage to the other party, and any such scheme carried out by India on the western rivers shall not involve any use of water or any storage in addition to that provided under Article III."[82] Article IV (6) reinforced that each party will "maintain the natural channels of the rivers... and will avoid, as far as practicable, any obstruction to the flow in these channels likely to cause material damage to the other party".

The treaty allowed for a *transitional period* of 10 to 13 years during which India was to limit its withdrawals for agricultural use, to limit its abstractions for storage, and to make deliveries to Pakistan from the Eastern Rivers.[83] During this period, Pakistan constructed a system of replacement works consisting of two dams, six barrages, and nine link canals to transfer 14 MAF of water from the Western Rivers.[84] Canals and the dams were to compensate for seasonal fluctuations in supplies of water and provide the irrigation of additional areas in Pakistan. The World Bank set up an Indus Development Fund with a billion dollars to which India contributed $174 million. After the completion of replacement works, each country acquired independent control in the operation of its supplies.

Principles of cooperation

The Treaty lays down principles of cooperation in Articles VI and VII which relate to "exchange of data" and "future cooperation," respectively. This is intended to ensure optimum development of the rivers, and cooperation and collaboration between the two countries. The data regarding the daily flow in and utilization of the waters of the rivers is to be exchanged regularly. This includes, a) daily gauge and discharge data relating to flow of the rivers at all observation sites; b) daily extractions for or releases from reservoirs; c) daily withdrawals at the heads of all canals operated by government or any other agency thereof, including link canals; d) daily escapages from all canals, including link canals; and e) daily deliveries from link canals.[85] This data is to be

transmitted on monthly basis by each party to the other, but if such data is "necessary for operational purposes", it shall be "supplied daily or at less frequent intervals, as may be requested."[86] In addition, any party can "request the supply of any data relating to the hydrology of the rivers, or to canal or reservoir operation connected with the rivers, or to any provision of this Treaty."[87] This Article has faced a number of problems in interpretation and implementation which will be discussed in the next section.

Article VII on future cooperation clearly says that both parties did "recognize that they have a common interest in the optimum development of the rivers" and they declared their intent "to cooperate by mutual agreement, to the fullest possible extent."[88] This included:

- Installation of hydrologic observation stations or meteorological observation stations, on request and agreement on payment of costs.
- Carrying out drainage works as may be required by either party subject to payment of costs.
- Cooperation, by mutual agreement, in undertaking engineering works.[89]

There has not been any worthwhile cooperation in the areas identified in this clause of the Treaty.

Article VII (2) further specified cooperation and exchange of information regarding planned engineering works on any of the rivers. The arrangements in each case were left to the parties. It stipulated:

"If either party plans to construct any engineering work which would cause interference with the waters of any of the rivers and which, in its opinion, would affect the other party materially, it shall notify the other party of its plans and shall supply such data relating to the work as may be available and as would enable the other party to inform itself of the nature, magnitude and effect of the work."

"If a work would cause interference with the waters of any of the rivers but would not, in the opinion of the party planning it, affect the other party materially,

nevertheless the party planning the work shall, on request, supply the other party with such data regarding the nature, magnitude and effect, if any, of the work as may be available."[90]

This clause has faced a number of problems in terms of its interpretation and implementation which will be discussed in the next section. Besides, there is provision in the Treaty that the parties would avoid polluting the waters of the Indus system of rivers.[91]

Dispute resolution mechanism in the Treaty

A unique feature of the Treaty is that it is the only international water treaty co-signed by a third party, the World Bank, which also brokered the Treaty. The Treaty provides a comprehensive multilayered framework of dispute resolution both bilaterally and through international arbitration. Article IX of the Treaty provides for different dispute resolution mechanisms including a) Indo-Pakistani Permanent Indus Waters Commission Article IX (1) ; b) two Governments – IX (3) & (4) ; c) Neutral Expert (NE) – IX (2)(a) and d) Court of Arbitration – IX (5).

The Permanent Indus Commission (PIC) established under Article VIII of the Treaty has two Commissioners appointed by their respective governments and serve as the regular channel of communication on all matters relating to the implementation of the Treaty. The main task of the PIC is to "establish and maintain cooperative arrangements for the implementation of the Treaty", to promote cooperation between the parties in the development of the waters of the rivers"; resolve questions concerning the interpretation of application of the treaty and to make tours of inspection.[92] Dispute resolution is one of the several functions of PIC which is defined in the provisions of Article IX of the Treaty which deals with the settlement of differences and disputes.

Disagreements between the parties on the interpretation of the provisions of the Treaty are classified into three categories: "questions" are examined by the Permanent Indus Commission; "differences" by a neutral expert; and "disputes" by a court of arbitration.[93] If the "question" is not resolved by the PIC, it becomes a "difference" and is referred to a neutral expert, whose decision on all matters within their

competence is “final and binding”. If the “difference” does not fall within the mandate of the NE,[94] or if the NE rules that the “difference” should be treated as a “dispute”, then a Court of Arbitration[95] would be established. The role of the World Bank remains more procedural, in the appointment of an NE and establishment of a Court of Arbitration.

Revision of the treaty provisions

Although none of the parties can pull out of the treaty unilaterally there are provisions in the Treaty that it may from time to time be modified by a duly ratified treaty concluded for that purpose between the two Governments. (Article XII)

Indian projects on Western Rivers, issues of compliance with IWT and transboundary impacts

Although IWT allows India to tap hydropower potential of the Chenab and the Jhelum before these rivers enter Pakistan, it is subjected to the qualification that this use for hydropower is not going to affect either the quantity of water reaching Pakistan or to interfere with the natural timing of those flows.[96] Divergences have occurred over the question whether various Indian projects, either planned or under constructions on the Western Rivers, are in compliance with certain hardwired provisions of the Treaty which are meant to protect Pakistan's water rights in the downstream.

Pakistan’s dispute with India over the construction of an array of hydroelectric projects on the Chenab and the Jhelum is turning into a source of serious tension between the two countries. In 2003, then prime minister A. B. Vajpayee launched India’s “50,000 MW initiative.” The initiative fast-tracked hydropower development by taking up timebound preparation of the Preliminary Feasibility Reports (PFRs) of 162 new hydroelectric schemes totalling around 50,000 MW.[97] India plans to build this much capacity by 2017 and then in next 10 years it wants to add another 67,000 MW of hydropower.[98] According to chief minister of IHK, Omer Abdullah, the estimated hydel potential of IHK is about 20,000 MW of which only 10 per cent is tapped so far.[99] India plans to develop about 8,000 MW in IHK.

Prolonged controversy over the construction of dams on the Chenab such as Salal, Dul Hasti and Baglihar hydel power projects has left a trail of bitterness and suspicions. India has constructed three big and eight small dams on Chenab river, in addition to 24 other projects that are in the pipeline. Those constructed and in operation include Salal I&II with installed capacity of 690 MW, Baglihar I & II 450 MW each and Dul Hasti I & II, 780 MW. Besides, the major power projects planned on the Chenab are Sawalkot hydroelectric plant I&II, with installed capacity of 1,200 MW; Bursar I&II, 1,020 MW; Pakwal Dul I&IIm, 1,000 MW; Seli, 715 MW, Raltle I&II, 560 MW; Karwar, 520 MW, Kiru, 600 MW; Gypsa I&II, 395, Kirthi I&II, 300 each; Naunat, 400 MW; Shamnot, 370 MW; Barinium, 240 MW; Ans, 200 MW; Raoli, 150 MW, and Bichari, 104 MW.[(100)] According to district Doda (IHK) website, eight hydropower projects with a total capacity of 5,320 MW have already been identified along Chenab's track in IHK.[(101)]

India's major hydropower projects on Chenab River

Name of the Project	Location	Installed capacity	Status	Live pondage/af
Salal I&II	45 miles u/s Marala Barrage in Riasi in Udhampur (Jammu)	690 MW	In operation	230,000 (full pondage level)
Baglihar-I	On the Chenab main, 147 km u/s Marala headworks	450 MW	In operation	26,400 a/f
Dul Hasti I & II	Near Kishtwar (Jammu) on the Chenab	780 MW	In operation	7,605.5
Sawalkot I&II	Upstream Salal	1,200 MW	Under investigation	Not available
Bursar I &II	Hanzal, Doda district (Jammu)	1,020 MW	Under investigation	Not available
Pakwal Dul I&II	Doda district (Jammu)	1,000 MW	Under investigation	Not available
Seli	Chenab river	715 MW	Under investigation	Not available

Raltle I&II	Drabshalla, Kishtwar (Jammu) on the Chenab	560 MW	Under investigation	Not available
Karwar	Kishtwar tehsil, Doda district (Jammu)	520 MW	Under investigation	Not available
Kiru	Upstream Dul Hasti, Doda district (Jammu)	600 MW	proposed	Not available
Kirthi I&II	The Chenab river	600 MW	Under investigation	Not available
Gypsa I&II	On Bhaga river, a tributary of the Chenab	395 MW	Under investigation	Not available
Naunat	Chenab river	400 MW	Under investigation	Not available
Shamnot	On Bhut Nala, the Chenab	370 MW	Under investigation	Not available
Barinium	Chenab river	240 MW	Under investigation	Not available
Ans	Ans river, a tributary of the Chenab	200 MW	Under investigation	Not available
Raoli	Chenab river	150 MW	Under investigation	Not available
Bichari	On Mohu Mangat Nala, Chenab river	104 MW	Under investigation	Not available

Source: Based on data provided by Indus Water Commission.

On River Jhelum, India has constructed 13 hydel projects including Uri I &II with installed capacity of 480 MW, lower Jhelum 105 MW, and Upper Sind-phase II, 105 MW. It has identified another 74 such projects which include three major and 12 medium to small hydel projects, i.e., multipurpose Ujh storage with power generation capacity of 280 MW, Gangabal storage 100 MW, Sonamarg storage 165 MW and 330 MW Kishanganga hydropower project. The other 12 projects range in capacity between 15 MW to 84 MW.[(102)]

On the Indus river itself India has so far identified 9 hydel projects. The two major ones are the 44-MW Chutak and the 45-MW Nimoo Bazgo projects which are

under construction while a 130-MW plant at Dumkhar is in the pipeline. According to Pakistani Indus Waters Commissioner Syed Jamaat Ali Shah, these projects would block 43 million cubic metres of water from flowing to Pakistan in the Indus.[103] He maintained that Pakistan wanted nothing but honest and fair implementation of the Indus Waters Treaty. If mechanisms and design parameters, defined in the treaty, are not adhered to, it will affect the flow of water to Pakistan.

Issue of compliance with IWT

The major Indian projects that have become controversial from time to time and involved issues around the compliance of IWT include Salal, Wullar Barrage/Tulbul Navigation project, Baglihar, Kishanganga, Dul Hasti, Uri II and Nimoo Bazgo.

Major issues in compliance have so far been of technical nature, regarding the design of each project and interpretation of various clauses of the Treaty in each specific case. While "questions" around design arising out of Salal were settled through bilateral negotiations, Baglihar, for the first time, became an issue of "difference" between the parties and went to the Neutral Expert for determination of technical design issues and now the Kishanganga hydro project has acquired the character of a "dispute" and for the first time in the history of the IWT a court of arbitration would be set up to address the objections raised by Pakistan.

Salal hydroelectric plant

Salal was the first Indian project that became controversial between India and Pakistan in the 1970s but was resolved bilaterally by the two foreign secretaries. With a total installed capacity of 690 MW, the two-stage Salal hydroelectric project, with 345 MW each, is located on the Chenab Main in Tehsil Riasi of Udhampur district in occupied Kashmir; about 72 Km upstream of Marala headworks. India decided to construct the Salal Dam on the Chenab in 1970.

Pakistan objected to the design and storage capacity of the dam. India provided information about the project in 1974. Pakistan raised objections to the design of the dam as it envisaged outlets at the bottom of the dam and 40-foot high gates that created

a water storage more than allowed to India under the Treaty. In 1976, both countries entered into a series of talks to resolve the issue. Pakistan contended that the dam would enable India either to interrupt the flow of the water or to flood the western Punjab, whereas India maintained that it would be impossible to cause flooding without causing much greater damage to its own territory.[104] There were two rounds of intensive talks in 1976. India provided details of the project and showed flexibility by agreeing to alter the design of the dam to remove Pakistani objections.[105] Finally an agreement on the design of the Salal project was signed in April 1978, providing that in order not to prevent the free flow of water to Pakistan the height of the dam would be a little less than 10 metres, instead of 12 metres as originally proposed.[106] The Salal settlement was also facilitated by an atmosphere of trust and confidence which was created by the Simla Agreement. The parties amicably resolved the issue without any outside pressure or mediation. Salal stage I was commissioned in 1987 and stage II in 1995.

Wullar Barrage/Tulbul Navigation project

The Wullar Barrage, which Indian refers to as Tulbul Navigation project, was the second Indian project that became controversial and still remains unresolved.

The proposed barrage is located on the Jhelum in occupied Kashmir, some 30 km north of Srinagar. India wants to build a barrage on the mouth of the Wullar Lake where it meets the Jhelum River in Jammu and Kashmir with a storage capacity of 300,000 acre feet.[107] According to India, the project is aimed at regulating the flow of water in the Jhelum to facilitate navigation between Baramullah and Wullar in Jammu and Kashmir which is permitted in the IWT. The barrage would provide for storage of water and its controlled release would make the Jhelum navigable throughout the year, that is why the Indians refer to it as Tulbul Navigation Lock project.

India did not provide information on the project in time[108] and started unilateral construction on the project in 1984. When Pakistan came to know about it, Islamabad raised objections and requested India to stop work on it. Three years later

India stopped work but has not abandoned the project. In fact some experts argue that with the proposed construction of Kishanganga dam, the project has lost its importance for India.

Pakistan has raised objections on the ground that firstly under IWT India is not allowed to build storage for navigational purposes on the Jhelum main and secondly since several improved communication links, serving as better alternatives to river navigation, have come up in the area; therefore, India has lost the rationale to build the barrage.[109] The Indian position is that, notwithstanding the broad principle in Article 3 of the IWT, it has the technical endorsement to build a barrage on Wullar in the light of the Article 3 para 4 of the Treaty. The said article broadly prohibits all attempts to store or restrict flow of water on the Jhelum, but as an exception allows construction under certain conditions and technical specifications which are enlisted in Annex D and E of the 1960 Treaty. The Indian view is that if they do comply with the conditionalities and technical specifications of Annex D and E to the Treaty, then, they can legally go ahead and build the barrage.[110] This is again contested by Pakistan. According to Pakistan Water and Power Secretary Ashfaq Mehmood the barrage envisaged 32 times more storage capacity against 0.1 million acre feet storage permitted under the IWT.[111] Thus the barrage would convert the natural lake into a man-made storage of 0.324 MAF, instead of 0.01 MAF allowed to India under the Treaty.[112] Thereby the project would "cause interference in the flow of water, which is not permitted under the treaty."[113] The Wullar Lake has been Asia's largest freshwater reservoir and feeds the Jhelum river and fills Pakistan's Mangla Dam.

Bilateral Talks: Pakistan and India have had 13 rounds of talks on the Wullar Barrage, but the issue remains unresolved. It is believed that both sides had reached some understanding in 1991 and a draft agreement was prepared but could not be signed. Pakistan says that there was no draft agreement and the issue still needs discussions on all legal and technical aspects. According to the reported draft understanding exchanged in October 1991 India would have been allowed to keep 6.2 metres of the barrage ungated with a crest level of 1574.90m (5167 ft), and would also

forego the storage capacity of 300,000 acre feet. In return, the water level in the barrage would have been allowed to attain the full operational level of 5177.90 ft.[114] Now Indians blame Pakistan for tying up the resolution with construction of the proposed 390-MW Kishanganga Hydroelectric project. India is insisting on revival of work on the project while Pakistan has asked India to abandon it. Pakistan had handed over a non-paper to India in February 1994 and made it clear that there could be no agreement with India, allowing it to start construction work on the project.

In August 2007 at the secretaries level talks, both sides agreed to refer the matter to the technocrats and set up a technical-level mechanism to move on the issue. This was the first time that the two sides had agreed on such a mechanism. However, in February 2009, the Indian government initiated extensive consultations among the relevant ministries to revive the Wullar Barrage/Tulbul navigation project.[115]

The Wullar barrage has become a political tool in India's hand to coerce Pakistan. "It is now well known among the water resources management experts that the basic idea behind the Wullar Barrage project is not navigation, but its use as a geostrategic tool to achieve geopolitical goals with Islamabad."[116] Further, the “idea of water transportation on the Jhelum will create a basis for New Delhi’s geopolitical strategists to manufacture arguments for improving navigation on the river and thus necessitate creation of more Wullar barrages which would neither help the people of Kashmir nor help the cause of confidence building and durable peace between New Delhi and Islamabad.”[117] The barrage would also be “useful” in enhancing water intake for the Uri power projects.

Baglihar Hydroelectric Project

Baglihar was the third Indian project that became controversial and the first one that went to the Neutral Expert for determination on technical “questions” raised by Pakistan. The 450-MW Baglihar hydroelectric project is a run-of-the-river project located on the Chenab Main in district Doda about 80 km upstream of Salal dam in occupied Kashmir and about 147 Km upstream of Marala Headworks. The project has

two stages, and both are of 450 MW capacity. The project was conceived in 1982 under the overall development plan of the Chenab Basin. The project was investigated by Central Water Commission and a project report was also prepared in 1984 by Planning and Investigation Organization of Central Water Commission. In 1987, the project was transferred to National Hydroelectric Power Corporation (NHPC). Later, an MoU for the construction of the project was signed with Jayaprakash Industries, the biggest Indian hydropower construction company and two other companies, Siemens and Hydro Vevey. India started construction work on the project in 1999. The proposed dam was a concrete gravity type, with a height of 144.5 metres and a gross storage of 396 million cubic metres of water with a live pondage of 37.5 m cu m (46,570 acre feet). The balance was dead storage for trapping silt.[118]

Pakistan raised six objections to the design of the dam and argued that the project was not in conformity with the IWT. Pakistan objections were related to pondage level, gated spillways, under-sluices, level of intake tunnels, height of gates and elevation of tunnels. Pakistan's main concerns were that submerged gated spillways provided for in the Baglihar design were a violation of the Treaty and that the structure would enable India to control the flow of water to Pakistan's disadvantage. Pakistan feared that the gated structure of the dam would result in a loss of 7000-8000 cusecs of water a day[119] during the Rabi season, equal to a 27 per cent decrease in the Jhelum River. Further, it would give India power to completely stop water for a continuous period of 27 days during December, January and February which would adversely affect agriculture and other requirements at the Marala Headworks. The project could also lead to inundation of the area above Marala Headworks due to the sudden synchronized releases from Dul Hasti, Baglihar and Salal reservoirs.[120] Pakistani experts also feared that India could also weaken Pakistan’s defence by stopping the Chenab flow through the project’s spillways as “two canals emanate from Head Marala, Sialkot, which irrigate central Punjab and are also [constructed from] defence point of view, could be dried as and when New Delhi desires.” Thus, Pakistan has decided to construct Mangla-Head Marala Link Canal to ensure water in the two canals

that originate from Head Marala. The link canal will ensure the availability of water in two defence canals, Upper Chenab and Lower Chenab, and provide irrigation water to the wheat fields of central Punjab.[121]

Experts in Pakistan stated that the dam would deprive Pakistan of 321,000 acre feet of water during the three months of Rabi season and would have far-reaching consequences for agriculture as well. The dam would cause serious setback to wheat production in Punjab, Pakistan's biggest wheat-producing province.[122]

Bilateral talks at PCIW

The Baglihar dam began to be discussed in 1992 when India provided some information about the project to Pakistan. As India did not provide complete information, a lot of time was wasted in correspondence between the Indus water commissioners. By 2000, the issue had entered the arena of intense public debate. Pakistan raised objections and there was exchange of arguments on the design of the plant. Pakistan asked India to stop construction on the project pending resolution. India said it was not under obligation to stop work under the Treaty. On 4 April 2002, Pakistan sent its "questions" to India under Article IX(1).

Pakistan's objections officially communicated to India reflected Islamabad's concerns as:

1. 'The works themselves appeared to be capable of raising artificially the water level beyond the full pondage level specified in the design and would contravene the provisions of Paragraph 8 (a) of Annex D to the Treaty.
2. 'The pondage in the operating pool being 37.722 million cubic metre exceeds twice the pondage of water level.
3. 'The site was suitable for an ungated spillway and, therefore, a gated spillway should not be provided. This was in contravention of Paragraph 8 (e) of Annex D and
4. 'The intake for the turbine had not been located at the highest level as required vide Paragraph 8 (f) of Annex D to the Treaty.'[123]

Reference to the parts of Treaty that Pakistan referred to above find mention in Annexure D paragraph 8 and the relevant sub-paragraphs 8 (a), (c), (e) and (f) read as follows:

1. Except as provided in Paragraph 18, the design of any new Run-of-River Plant shall conform to the following criteria;

- 'The works themselves shall not be capable of raising artificially the water level in the Operating Pool above the Full Pondage Level specified in the design. (a)
- 'The maximum Pondage in the Operating Pool shall not exceed twice the Pondage required for Firm Power. (c)
- 'If the conditions at the site of a Plant make a gated spillway necessary, the bottom level of the gates in normal closed position shall be located at the highest level consistent with sound and economical design and satisfactory construction and operation of the works. (d)
- 'The intakes for the turbines shall be located at the highest level consistent with satisfactory and economical construction and operation of the Plant as a Run-of-River Plant and with customary and accepted practice of design for the designated range of the Plant's operation.'(f)[124]

India argued that Baglihar was not a violation of the IWT and it was a run-of-the-river project. The spillway as part of the dam was for the purpose of smooth supply of water and for maintaining the safety of the dam. The removal of the gates would mean an end of the Baglihar project.[125] The issue at heart is that "even run of the river projects involve structures, and any structure on a river does raise the water level and create a minimal storage. The question then becomes one of the level and acceptability of that storage and a difference of opinion" may arise.[126] Further, India felt that 'if it were to dispense with the low level of water intake, it would have to postpone the commissioning of the powerhouse by at least two months." As for raising the low level spillways to a higher level, that could have allayed Pakistan's fears of downstream

floods, India argued that it would “raise the possibility of silt accumulation in the dam”. On reducing the freeboard in the height of the dam, India maintained that the state government in Jammu and Kashmir had not agreed to it.[127] India also argued that Pakistan's "anxieties about India's acquiring the ability to shut off the flow of water downstream, posing a threat to the economically vital farmlands of Punjab, have no basis in reality."[128]

The controversial aspects of the design of the project were discussed in several meetings of the Permanent Indus Water Commission (PIWC). However, all these meetings as well as exchange of correspondence with India could not resolve the questions raised by Pakistan.[129] In the PCIW meeting held in New Delhi on 28-29 May 2002, Pakistan asked India for on-the-spot inspection of the project as New Delhi had continued with the construction of the gate-structure, which India refused. On which Pakistan gave a three-month notice to India to clear its position or face other options such as Neutral Experts or the International Court of Law. In November 2002, Pakistan's Commissioner for Indus Waters put India on notice to address Pakistan's concerns regarding Baglihar and demanded suspension of construction work on the project site till the matter was resolved. In February 2003 talks collapsed as India refused to discuss Pakistan's questions under Article IX (1), modify the design or stop ongoing work on the project.[130] Pakistan actively started considering going ahead with the appointment of an NE as New Delhi by delaying the resolution of the issue appeared aiming to present Islamabad with a *fait accompli*.

In June 2003, PCIW requested the two governments for the appointment of a Neutral Expert. In July 2003, Pakistan sent two Note Verbale regarding modalities for appointment of NE and bilateral discussion. In response, on 7 August 2003, India sent a Note Verbale to discuss the issue at the government level, under Article IV of the Treaty. In reply, on 18 August 2003, Pakistan in a Note Verbale put forward three conditions. It asked India to suspend all construction work pending amicable and satisfactory resolution of issues; provide onsite inspection by 30 September 2003 and a time-bound resolution of all issues pertaining to project by 31 December 2003.[131] After

a delay of four years, which was a violation of Article VIII (4) (c) and (d) of the IWT,[132] India allowed the on-site inspection by the Pakistani technical experts, which took place in October 2003. The experts found physical and technical evidence that the design of the Baglihar power plant was going on according to the Indian design which was not in conformity with the provisions of the Treaty.[133]

The talks between the two Commissioners did not make any progress throughout 2004 while India went ahead with construction of gate structure and completed it during that period. The first unit was all set to start generating power by 2007. A Water Resources secretary level meeting that took place on 4-5 January 2005 also could not break the deadlock. By this time, the Baglihar project had almost reached near-completion and Pakistan felt if work was not halted, the hydroelectric plant was set to become functional in 2005. Indian experts argue that the Treaty does not provide for the stoppage of construction work thereby India has declined to do so[134] in case of Baglihar and other projects. The only exception is Wullar Barrage.

Neutral expert determination

As several rounds of talks failed, Pakistan decided to refer the issue to the World Bank. On 15 January 2005, Pakistan sent a request to the Bank to appoint a Neutral Expert (NE) stating that a "difference" had arisen between India and Pakistan under Article IX (2) of the Treaty, relating to the design of the Baglihar Project. India termed Pakistan's decision as "premature" and "not justified" saying that differences could have been resolved bilaterally through further technical-level discussions by the two sides. Even after lodging the formal complaint to the World Bank, both the parties remained engaged until the talks broke down on 25 January. This was the first time since the ratification of the IWT that a dispute on the river waters was referred to a Neutral Expert for resolution.

On 12 May 2005, World Bank appointed Raymond Lafitte,[135] as Neutral Expert under the provisions of the Treaty. Pakistan submitted its technical objections that the dam did not conform to criteria (a), (c), (e) and (f) of Paragraph 8 of Annexures D of the Treaty as mentioned above. On 12 February 2007, after 20 months

of engagement with the parties and his team of experts, the NE gave his final decision on the Baglihar difference. The decision consisted of a full comprehensive report and a separate executive summary which was placed on the WB website. In interpreting the Treaty, the NE relied on the rules of the Vienna Convention on the Law of the Treaties which reflect customary international law regarding ordinary methods of treaty interpretation. Significantly, the verdict stated that the IWT "gives a clear indication of the rights and obligations of the parties, and that rights and obligations should be read in the light of new technical norms and new standards as provided by the Treaty."[136] Further, the NE said that "interpretation of the Treaty must be guided by the principle of integration and the principle of effectiveness" which provide for the Treaty to find effect in its whole and to ensure that each of the object(s) and purpose(s) of the Treaty is given fullest weight and effect when interpreting the rights and obligations under the Treaty."[137] (p. 5) the Treaty says, those purposes include attaining the most complete and satisfactory utilization of the waters of the Indus river system, and fixing and delimiting the rights and obligations of each party in relation to the other". The Executive Summary indicated that the "rights and obligations contained in Part 3 of Annexure D must be interpreted so as to allow fulfilling the purposes of the Treaty in "a spirit of goodwill and friendship" taking into account "the best and latest practices in the field of construction and operation of hydraulic plants."[138] This is a very instructive observation and would not only influence the determination of the other disputed projects where "difference" or "dispute" arises such as Kishanganga.

The verdict of the neutral expert on the Baglihar dam dispute was based solely on technical points. The decision dealt with issues contested under the four criteria of paragraph 8 of Annexure D of the Treaty under six headings: (i) maximum design flood, (ii) spillway, gated or ungated, (iii) spillway, level of the gates, (iv) artificial raising of the water level, (v) pondage, and (iv) level of power intake.

Maximum design flood: this related to the calculation of the maximum amount of water which can arrive at the dam. The verdict said: "In view of all the uncertainties of flood analysis, the NE has decided to retain the value proposed by India of 16,500 m3/s

as opposed to 14,900 m3/s proposed by Pakistan, for the peak discharge of the design flood." He underscored that climate change, with the possible associated increase in floods, also encourages a prudent approach.

Spillway, gated or ungated: Pakistan considered that a gated spillway was not necessary and would allow India to manipulate the flow of the river. The NE determined that "in conformity with the state of the art, the conditions at the site of the Baglihar plant, including hydrology, sediment yield, topography, geology and seismicity, require a gated spillway." He stated that the analysis of 13,000 existing spillways in the world shows that 89 % of these structures, having a design discharge higher than 14,000 m3/s are gated. The NE also indicated that an ungated spillway might create a risk of flooding the upstream shores and that an elevation of the dam crest, which would prevent such a risk, would be costly.[139]

Spillway, level of the gates: Pakistan stated that even if gated spillway was assumed necessary, the orifices spillway proposed by India is not located at the highest level consistent with the provisions of the Treaty. Indian position was that the design of the chute spillway, sluice spillway and auxiliary spillway were necessary to ensure safe passing of the design flood and silt near intakes for trouble free operation. The NE determined that the "gated chute spillway on the left wing planned in India's design... is at the highest level consistent with sound and economical design and satisfactory construction and operation of the works."[140] The NE pointed out that the Treaty is "not well developed with respect to its provisions on sediment transport" and "reflects the status of technology on reservoir sedimentation in the 1950s." The NE emphasized the "maintenance" and "sustainability" of the project.

Artificial raising of the water level (Freeboard): Pakistan considered the dam crest elevation proposed by India exaggerated and believed it could be lowered. The NE believed that the dam crest elevation should be set at the lowest elevation compatible with a sound and safe design based on the state of the art. The NE determined that the dam crest elevation fixed in the design submitted by India at el. 844.5 m above sea level (asl), resulting from a freeboard above the Full Pondage level of 4.5 m, is not at

the lowest elevation. The NE fixed the freeboard at 3.0 m above the Full Pondage Level leading a dam elevation at 843.0 m asl.[141]

Pondage: Pakistan argued that the value of the maximum pondage proposed by India exceeded twice the pondage required for firm power. The NE determined that values for maximum pondage stipulated by India, 37.5 M.m as well as by Pakistan, 6.22 M.m were not in conformity with the criteria laid down in the Treaty and fixed it at lower value of 32.56 M.m and the corresponding dead storage at el. 836 m asl, one metre higher than the level of the Indian design.[142]

Level of power intake: Pakistan considered that the power intake was not located at the highest level as required by the Treaty. The NE agreed with this consideration and determined that the intake level should be raised by 3 m and fixed at elevation 821 m asl.[143]

Baglihar dispute resolution involves important lessons for both countries and also for the future interpretation of the IWT. It is important to note that Pakistan seemed to have viewed the difference as largely a legal one, involving the interpretation of the Treaty, while India seemed to have viewed it mainly as an engineering one, regarding hydropower plants.[144] The NE interpreted the rights and obligation of the parties under the Treaty "in the light of new technical norms and new standards". This meant that the Baglihar difference was addressed bearing in mind the technical standards for hydropower plants as they developed in the first decade of the 21st century, and not as perceived and thought of in the 1950s when the Treaty was negotiated. The reference to modern technical standards is particularly clear in the discussion and analysis of the NE of the issue of gated or ungated spillway. Another important consideration that weighed heavily in the decision was of "climate change and its likely effects" which were not present in the 50s. The interpretation of the Treaty is most likely to influence any future interpretation of the Treaty.[145]

Response to the verdict: The verdict got positive response from Indian and Pakistani governments and they highlighted the areas of their respective victory. Pakistani officials underscored that the verdict got them reduction of freeboard by 33 per cent —

from 4.5 m to 3.0 m — raise in the level of power intake by 3 m and reduction in pondage from 37.722 MCM to 32.56 MCM and reduction in the height of the dam from 144.5 metres to 143 metres. Federal Minister for Water and Power Liaquat Ali Jatoi said that three of the four objections raised on the design of the Baglihar hydropower project by Islamabad were accepted by the NE. He said that only on the design of the spillway, Prof Lafitte did not buy Pakistan's point of view.[146] However, he felt that the neutral expert should have gone strictly by the IWT on the design of the spillway and asserted that Islamabad "reserves the right to pursue the matter further in accordance with provisions of the treaty." In fact, Pakistan examined the option of moving the court of arbitration on the issue of the gated spillway which it thought was not strictly in line with the Treaty.[147] The verdict however came under severe criticism in the Pakistani media. Many observers thought that the NE rejected Pakistani objections. The Punjab Water Council (PWC) rejected the verdict and asked the federal government to go into appeal against it. The determinations made by the expert are, however, final and binding.

In India the verdict was hailed as "moral victory."[148] Indian Water Resources Minister Saifuddin Soz said that "India's point of view has been completely upheld."… "The overall design of the dam remains intact." Significantly, he stressed that the verdict would "deeply influence all future interpretation of the Treaty between the two countries."[149]

The filling of Baglihar violated IWT

Although the Pakistani team visited the dam to ascertain that India had incorporated the changes suggested by the NE and expressed its satisfaction, the filling of the dam again roused Pakistani apprehensions about Indian manipulation of the water flow as an upper riparian state. The initial one-time filling of a newly constructed reservoir is governed by specific provisions in the Treaty under which the filling is to be carried out by mutual discussion, failing which India can proceed to do so subject to two conditions: the filling (in the case of projects on the Chenab) must be done during the period from 21 June to 31 August when the monsoon is at its peak; and the flow in

the Chenab Main above Marala Headworks should not fall below 55,000 cusecs at any time. Pakistan asserted that these conditions were not complied with while filling the Baglihar dam. India claims it stopped the water from 19 August to 28 August while Pakistan maintains the stoppage was up to 5 September.[150] As a corollary, water flow from the Chenab River, which is a lifeline for agriculture downstream of Marala Headworks, drastically dropped in the months of September and October with India seizing 200,000 cusecs of water at a time of the ripening of the paddy crop. It damaged the Kharif crops and may also create severe water scarcity for the autumn sowing of wheat. Over ten million acres of arable land were affected in Sialkot, Gujranwala, Sheikhupura, Jhang and Faisalabad districts.[151] According to one estimate, the blockade of the Chenab water incurred a loss of Rs. 37 billion to the national economy.[152]

Pakistan demanded compensation from India for the loss of 0.2 MAF water flow between 19 August and 5 September, when the Baglihar dam was filled. India insisted that it had not violated the treaty and refused to acknowledge Pakistan's right to compensation. Pakistan raised the issue at the highest level. President Zardari raised the issue with Prime Minister Manmohan Singh in New York on 24 September 2008 who assured him that the issue would be resolved in accordance with the provisions of the Treaty. Prime Minister Yusuf Raza Gilani also discussed the issue with the Indian Prime Minister on 24 October 2008 on the sidelines of the Asia-Europe meeting in Beijing, while Security Advisers of both countries discussed it in their meeting in New Delhi on 13 October 2008. It was only following intervention at the highest level that India agreed to physical inspection of the dam (18-25 October 2008). After inspecting the Baglihar dam site Pakistan Indus Commissioner Syed Jamaat Ali Shah observed that the filling of the dam was undertaken in gross violation of the understanding reached between the two Commissions as well as the IWT. Shah pointed out that in the case of the filling of the Salal dam a similar reduction of water had occurred and India compensated it by releasing an equal amount of water through other rivers. The Indian side in response questioned the data provided by Pakistan on the water inflow and

information of water storage at Baglihar. There was discrepancy in the data recorded and shared by the two sides on the input and output of water flow.[153] India contended that scanty rains led to water shortage and that India had not violated any provisions of the treaty.

In June 2010, differences on the initial filling of the Baglihar Dam in 2008 were resolved at a meeting of the PIWC in which "India gave the assurance that it will be careful in future" and Pakistan "accepted that in spirit of cooperation and goodwill." Pakistan's main concern continues to be that the Baglihar project gives India capability to manipulate flow of water to Pakistan's disadvantage. The dam is of such a large size that, India, whenever it wants, can block 7000 to 8000 cusecs of water per day.

Meanwhile, India is working on the second stage of the Baglihar project. On 25 March 2010, Indian Minister for Medical Education, R.S. Chib, informed the Legislative Council that a Project Report of Rs.2,800 crore for construction of Baglihar Hydropower Project stage-II had been prepared and the execution of the power project would be completed by 2014-15.[154]

Kishanganga project

After Baglihar India and Pakistan have got locked in a dispute over the configuration of Kishanganga hydroelectric project and the matter is now going to Court of Arbitration for settlement. The 300-MW Kishanganga Hydroelectric Project is located about 160 kms upstream of Muzaffarabad and involves diversion of the Kishanganga — called Neelum River in Azad Kashmir and Pakistan — to a tributary named Bunar Madumati Nullah of River Jhelum through a 22-km tunnel. Its powerhouse will be constructed near Bunkot and the water will be re-routed into the Jhelum through the Wullar Lake.[155] The proposed site for the dam is near Kanzalwan, a town where the river enters Azad Kashmir. The Neelum is the largest tributary of the Jhelum that originates in occupied Kashmir, crosses the LoC and runs about 150 km in Azad Kashmir before it joins the Jhelum at Domail in Muzaffarabad. The total distance by which the river will be diverted is 100 km. This diversion will change the course of

the Neelum by around 204km[156] before it joins the Jhelum River near Muzaffarabad, the site where Pakistan's Neelum-Jhelum Hydel Project (NJHP) is situated.

Pakistan first received reports about Indian intentions to develop the Kishanganga project in 1988 but India officially confirmed it in June 1994 when it provided information regarding the storage work. Initially Pakistan raised three objections to the project. First, inter-tributary diversions are barred and that water drawn from a given tributary must be returned to the same river. Second, the existing Pakistani uses must be protected as Kishanganga project will deprive it of 27 per cent of river's natural flow, thereby doing damage to its existing 133,000 ha of irrigation in the Neelum valley and a 900-MW Neelum-Jhelum hydropower project initiated downstream by Pakistan. Pakistan maintained that it had already started the Neelum-Jhelum project and invested Rs.71 million in preparatory works.[157] Third, the objection related to certain design features[158] that were not in conformity with the IWT.

India relies on the Treaty provisions that provide inter-tributary diversions. B. G. Verghese quoting the Treaty (Annexure D, Paragraph 15 (iii)) states: "Where a plant is located on a tributary of the Jhelum on which Pakistan has an agricultural use or hydro-electric use, the water released below the plant may be delivered, if necessary, into another tributary but only to the extent that the then existing agricultural use or hydro-electric use by Pakistan on the former tributary would not be adversely affected."[159] Thus, Verghese argues that "inter-tributary diversions in the Jhelum basin are permitted and that only 'the then existing' agricultural and hydro-electric use shall be protected." The issue is far more complex. Pakistan is invoking main Article III (2) of the Treaty that requires India to let flow all the Western rivers to Pakistan and not permit any interference with those waters and Article IV (6) which calls for the maintenance of natural channels. This makes Indian interpretation questionable/untenable. Even Annexure D, talks about protection of Pakistan's rights existing agricultural use or hydro-electric uses. India says that satellite pictures with them showed Pakistan was exaggerating its agricultural usage.

Bilateral Talks at PIWC

In May 2004, amid reservations voiced by Pakistan on the construction of Kishanganga hydroelectric project, India promised to freeze all work at the site for six months and hold a meeting with Pakistan for removing its objections. India told the meeting that it was working on the foundation of the dam and the powerhouse. Pakistan protested and said that construction work should not have begun before removing its objections. The issue was discussed in five meetings of the Commission held from November 2004 to November 2005 but differences over the project remained. Further, India did not supply the data regarding the project, but delayed it on the plea that it was being revised. Pakistan initiated the process for resolution under Article IX (2), (3), (4) and (5) of the Treaty. In May 2005, Pakistan raised six objections of which three related to the design of the dam, two to the diversion of water and one to the power generation scheme. These included the diversion plan, storage capacity, de-silting, power intake and freeboard and the matters relating to its gate structure, height and size level of the project.

The six objections raised by Pakistan are:

1. "Whether India's proposed diversion of the Kishanganga (Neelum) into another tributary, i.e. the Bonar-Madmati Nullah, being one central element of the Kishanganga Plant, breaches the legal obligations India owes Pakistan under the Treaty, as interpreted and applied in accordance with international law, including India's obligations under Article III(2) (let flow all the waters of the Western rivers and not permit any interference with those waters") and Article IV(6) "maintenance of natural channels?"
2. Whether the design of the plant is in conformity with Paragraph 8(a) of Annexure D to the Treaty?
3. Whether the design of the Kishanganga Plant is in conformity with Paragraph 8(c) and Paragraph 8(f) of Annexure D to the Treaty?

4. Whether the design of the plant is in conformity with Paragraph 8(d) of Annexure D to the Treaty?
5. Whether the design of the plant is in conformity with Paragraph 8(e) of Annexure D to the Treaty?
6. Whether under the Treaty, India may deplete or bring the reservoir level of a run-of-the-river plant below dead storage level in any circumstances except in the case of an unforeseen emergency?

Pakistan also accepted an Indian proposal to set 15 July as deadline for resolving the Kishanganga hydropower project issue. The Pakistani side also sought a visit to the project site in Baramulla district. India also sought quantitative technical substantiation of its objections from Pakistan.

India modifies design: In April 2006, India offered to modify the project and submitted a revised plan in June 2006. India modified the project from 'storage work' to 'run-of-the-river' plant. India brought down the storage limits by reducing dam height from 75.48 metre to 35.48 m, but it maintained gated structure and diversion of the Neelum river. In fact, India made changes in the design largely to cut the cost of the project and address some of the environmental concerns of the local population in Gurez Valley that was to be badly affected by the project and was opposing its construction. A report in *The Kashmir Times* said: "An alternative design reducing the dam height from 73 to 37 metres was approved as it has led to cut costs not only on construction but also on rehabilitation of the displaced — Dard Shina tribals inhabiting the landlocked Valley. Though the new design has addressed concerns of the local population, who were up in arms against the project, it has hardly anything to impress Pakistan. India has not addressed the main Pakistani objection of proposed diversion of the Neelum River water to the Jhelum River/Wullar Lake through the Madhumati rivulet."[(160)] India has not provided full data and accurate drawing of the modified design.

After examining the modified design, Pakistan told India that it did not address Pakistan's concerns and was not in conformity with the provisions of the IWT. It asked

New Delhi to review it again and remove the tunnel as Pakistan is also constructing the 969-MW hydropower project on the Neelum. Pakistan argues that it will receive 27 per cent less water due to the diversion of Neelum/Kishanganga river to Wullar Lake. Moreover, the "tunnel would affect the water speed that is reaching the Neelum river, due to which the Neelum-Jhelum Hydropower Project would not be able to generate the required electricity and would virtually be ineffective."[161] It would reduce energy generation at NJHP by about 16 per cent amounting to an annual loss of Rs. 5 billion at the current rates.[162] Pakistan believes that the project will not only impact its hydropower potential but will also adversely affect the agricultural usages in the Neelum valley and Muzaffarabad district. It will also have adverse environmental and ecological impact on the flora and fauna of the region. There will be no flows in the upper reaches of the Neelum for about 8 months each year causing serious environmental and ecological damages in these reaches.[163] The main objections to the design remain regarding excessive freeboard (5 metre); pondage/storage on higher side (7.55 MCM), crest of spillway gates not at the highest level and crest of power intake not at the highest level. According to Pakistan Indus Water Commission, Pakistan wants freeboard reduced to 2 metres and pondage to I MCM.

Since India was relying only on the satellite data to defend the design of the Kishanganga project, in June 2007 Pakistan offered Indian experts to visit the Neelum Valley to ascertain data on water needs of the AJK to redesign the Kishanganga project. A team of joint India-Pakistan Indus Commission verified the agricultural usages across the LoC in August 2008. India, however, rejected Pakistan's usages. Union Minister for Water Resources Prof. Saifuddin Soz commented: “We verified their agricultural usages. They had claimed that over one lakh hectares of land is in agriculture use. But the team found just a [patch of] land under maize cultivation there which will not get affected by the diversion of Kishenganga.”[164]

Meanwhile, India expedited work on the project. In April 2008, Indian Minister of State for Power Jairam Ramesh stated: "now that Pakistan has begun work with the help of a Chinese firm, we have to put the 969 MW project on a fast track". He

described the project as "of strategic importance as it is located on the border."[165] A final meeting of the India-Pakistan Permanent Indus Waters Commission was held at the end of July-August 2008 but there was no progress on the issue which was then referred to both the governments. Pakistan indicated that it could use the option of involving a third party if the issue was not resolved. Pakistan Indus Water Commissioner said since Kishanganga involved both technical and legal issues it could be referred to both the neutral expert as well as the Court of Arbitration as provided in the IWT, unlike Baglihar, which had involved only technical issues.[166]

India accelerated the work on the project despite Pakistan's objections. Indian Ministry of Power sought fresh financial approval from the Indian cabinet as it wanted to complete it before major work was started. Officials attributed increased cost to the higher risk associated with the project due to difficult geology and its proximity to LoC.[167] Announcing the approval Indian Home Minister P. Chidambaram said the project was strategically important and it would help India use its share of water provided by the IWT. He also said the project would create irrigation potential in Baramulla district.[168] Earlier, in April 2006, the Union Minister for Water Resources, Prof Saifuddin Soz, after modification of the project had clearly stated: "We have no irrigation plans from the project."[169] In January 2009, India allocated work to Hindustan Construction Co. — Halcrow Consortium with a construction period of seven years, i.e. completion in 2016. Work on excavation for the powerhouse is under progress. The river diversion tunnel is almost complete. Infrastructure is being improved. India's National Hydroelectric Power Corporation (NHPC) has fast-tracked the project and it will now be completed by 2015, ahead of the January 2016 target.

Standoff & arbitration on Kishanganga

Pakistan held talks with India on Kishanganga Dam for 15 years under the PIWC but India did not remove Pakistan's objection over diversion of the Neelum and continued with the work on the project. On 11 March 2009, the PCIW notified Indian Commissioner about Pakistan's intention to process the case through NE and Court of Arbitration. Pakistan sent two notes verbale to India on 9 April and 17 May 2010 on

the Kishanganga project. In the first note which is about “differences” over technical issues of the project, it informed India of its decision to invoke Article IX of the IWT to seek World Bank arbitration. Islamabad asked New Delhi to decide on its two negotiators for the arbitration process and also inform the World Bank about the need to appoint a neutral expert as the two countries had been unable to resolve the differences within the Permanent Indus Waters Commission. In the second note verbale, Islamabad clearly indicated its intention to go for a Court of Arbitration as provided in the Treaty. The second note is about the disputes relating to water flows.

It is the second time Pakistan is seeking resolution of a dispute through the dispute settlement mechanism contained in the IWT and the first time through the International Court of Arbitration. In the Kishanganga case, both "difference" and "dispute" have come into play. Pakistan has proposed the reference of certain technical issues to NE and has sought legal interpretation on two major parameters concerning the diversion of Kishanganga water for a power project from Court of Arbitration. Pakistan named Bruno Simma, of the International Court of Justice, and Jan Paulsson, Norwegian head of an international law firm, as its arbitrators in the Court of Arbitration. India nominated Peter Tomka, Vice-President of the International Court of Justice at Geneva and Lucius Caflisch, a Swiss international law expert who is a professor at the Graduate Institute of International Studies to represent it in the dispute. Although the two countries have rejected each other’s nominees for the Court of Arbitration, they have decided to set up a panel comprising a chairman, a legal member and an engineer to select the umpires, by drawing lots.[170] The court will consist of six members and a chairman. The Court of Arbitration route is taken only when the issue does not pertain to technicalities and concerns a legal dispute over the interpretation of the Treaty.

Responding to a question whether India could build Kishanganga dam on the pattern approved by World Bank’s neutral expert in the case of Baglihar, Jamaat Ali Shah said every project carried an independent significance and could not be linked to a specific decision. He said the United Nations laws on non-navigational uses of water

say that all old treaties would remain intact. Under these circumstances, the IWT stood intact and could not be interpreted on the basis of experts' decision in a specific case, he explained.[171] Arbitration is a costly affair; besides, it would also create bad blood.

Impact on Neelum-Jhelum Hydropower Project

The Kishanganga project has come in direct conflict with Pakistan's proposed 969-MW Neelum-Jhelum Hydropower Project in Azad Kashmir. Pakistan contends that Kishanganga would reduce flow (pressure) of the Neelum river and thus decrease the power generation capability of the Neelum-Jhelum Hydropower Project by more than 20 per cent or about 100 MW. Pakistan initiated work on the hydro project in 1988. In 2007, Islamabad awarded a $1.5-billion contract to a consortium of China's Gezhouba Water and Power Company and China National Machinery and Equipment Import and Export Corporation to build the 960-MW project in eight years. The completion date of the project is December 2015, a year before the date set for the Kishanganga project. According to Wapda sources, about 15 per cent work has been completed.[172]

Pakistan argues that the completion of feasibility of the Neelum-Jhelum project created a legitimate case to stop India from building storage facility for diverting water. Pakistan's Indus Water Commissioner maintains: "When we planned to use the water of the Jhelum river, it created a right for Pakistan to use the water in a manner prescribed under the treaty." ... "Planned use of water of the Jhelum river is just as good as the term use of water under the treaty."[173] Pakistan says there is no question of stopping the work on the Neelum-Jhelum project. According to Indus Commissioner, Neelum-Jhelum is "way ahead of Kishanganga". He argues, "India sent us its reviewed design in 2006, so we are treating its execution from that date. We have sent to India the design of Neelum-Jhelum project much before that."[174]

There are a number of other India projects that have or had become controversial. These include Dul Hasti, Uri II, Chutak and Nimoo Bazgo.

Dul Hasti dam

The two-stage Dul Hasti hydropower project with an installed capacity of 390 MW is located on the Chenab Main near Kishtwar in district Doda of IHK; about 218 km upstream of Marala Headworks. It is a concrete gravity dam with a height of 60 metres; gross storage of 8643.5 acre feet and operational pool of 7605.5 acre feet. It has low-level gated spillways.[175] It has an underground powerhouse containing three units of 130 MW each. The construction work began in 1989. The project was initiated in 1983 and the 390-MW Dul Hasti hydroelectric project was fully commissioned in February-March 2007. The project has been constructed by the National Hydroelectric Projects Corp (NHPC), a government undertaking. Pakistan believes it is just not a hydroelectric station but a full-fledged dam aimed at storing water for irrigation needs as seen in the case of Baglihar dam. Further, Pakistan feels that with an operational pool of 7605.5 acre feet, it can have an effect of one to two days of stoppage of water at the Marala Headworks during lean months.[176]

Uri-II hydel power project

The 240-MW Uri-II hydel power project is located on the Jhelum in Baramulla district of IHK. The project is planned immediately downstream of Uri-I and will pick up its tail water to make use of the gross head of about 130m available in the course of the river between Uri-I tailrace outlet and a place about 1.25 km downstream of the confluence of Goalta Nullah and the Jhelum river, close to the LoC.[177] It is at 12-14 kms upstream of Chakhoti. The Uri-I project, also located in Baramulla district, was completed in 1997 and is now producing 480 megawatts of electricity. It is a run-of-the-river project with a 93.5m long barrage and a powerhouse containing four units of 120MW each.[178]

In October 2002, Pakistan asked India to supply information about Uri-II Hydroelectric Plant. In July 2004, Pakistan again asked India to provide the said information and the status of construction and sent two reminders in that regard. In March 2005, Pakistan repeated the request. In December 2005, India finally provided

some information about the plant and in April 2006, Pakistan sent its observations to India. Pakistan maintained that the design of the plant does not conform to the criteria (a), (c), (d), (e) and (f) of Annexure E to the Treaty. Pakistan's concerns were mainly on the height, and the gates of the dam besides pondage level and freeboard. India argued that the design of the plant conformed to the criteria laid down in the Treaty. Pakistan asked India not to start work until the issue was resolved.

India did not inform Pakistan and started unilateral construction of the project. In his inspection tour in March 2007, Pakistan Commissioner Jamaat Ali Shah found to his utter surprise that work was going on at the Uri-II project. Shah stated: "What India has done to start work is against ethics and trust. We must respect provisions (of the Treaty) and behave."[179] In June 2007, at the bi-annual joint Indus Commission meeting, Pakistan formally lodged protest at the "unilateral" construction of the Uri-II project. Islamabad demanded full engineering data of the project and asked for discontinuation of construction work until the issue was resolved. Shah emphasized "a time-bound resolution" of the issue as "Pakistan cannot afford to fritter away with time on water issues."[180] Pakistan also made it clear that under the IWT, India could not build a gated structure on the Uri-II hydropower project. Shah pointed out that there was no purpose of constructing gates on the pondage as the Jhelum carries little silt unlike the Chenab.[181]

In June 2007, India rejected Pakistan's demand for stopping work on the Uri-II project while Pakistan threatened to seek World Bank intervention if India did not stop construction work.[182] India remained insistent and did not stop construction on the project. *The Tribune* remarked: "New Delhi believes that there is nothing new in the Pakistani stand and it simply shows that Pakistan has still not understood the spirit of the verdict of a World Bank-appointed neutral expert on Baglihar dam in Jammu and Kashmir."[183] The issue was discussed in the May-June 2009 meetings of the Commission and technical discussions were held on Pakistan's observations. Pakistan had objected to the design of the project, particularly the pondage capacity and the

gates. Some adjustments have been made on Uri II and the construction work has reached its final stage and is set for completion in 2011.

Chutak, Nimoo Bazgo & Dumkhar hydro projects on the Indus

India is currently constructing three hydropower projects on the Indus in the IHK. These include Chutak Dam with a 59- metre height, Nimoo Bazgo with 57-metre height and Dumkhar of 42-meter height. India has surprisingly already earned Carbon Credit (CC) against Chutak and Nimoo projects from the United Nations Framework Convention on Climate Change (UNFCCC) after conducting the Transboundary Environment Impact Assessment (TEIA). These projects are at early to middle stages of construction.

The construction of these dams in Ladakh region to produce 219 MW of electricity is not only a violation of the IWT, it also ignores the fragile environment of the Ladakh region. It is, in fact, geared to meet the demand of the Indian army deployed at the Siachen glacier.[184] The construction on Chutak and Nimoo began in 2005, but Pakistan was not provided its details. On 22 February 2009, Pakistan decided to send its experts to visit the site of the dams to assess for the first time as to whether the ongoing construction is as per the design allowed in the Indus Waters Treaty or not. Pakistan armed forces got alarmed when they came to know the said projects could play havoc with the Northern Areas, if the said dams get collapsed for any reason or malfunction.[185] Further, as under the Treaty, only 0.15 MAF water can be used for hydropower on the Indus River and 0.35 MAF for irrigation. India has built Igo-phey canal and Kurbathang canals for irrigation in Leh and Kargil while a few more canals are under construction in the Ladakh region. With completion of these canals India would lose its right to build any dam on the Indus at all.[186]

Certain adjustments have been made in the design of projects like Uri-II on Jhelum and Chutak hydro plant on the Indus, but “difference” remain on Nimoo hydro project.[187]

The 44-MW Chutak hydroelectric plant is located on Suru river, a tributary of the Indus, 14 km upstream of Kargil district in IHK. The project is being constructed by NHPC. Barrage and powerhouse excavation is completed and concreting is in progress. About 86.54 per cent head race tunnel (HRT) excavation is completed and lining is in progress. Hydromechanical (HM) works were awarded to PES Engineers Private Ltd on 28 July 2008. Pakistan has raised objections and India addressed Pakistan's concerns regarding artificially raising of water level in operating pool by providing opening 4"x4" in solid parapet wall. Since it has no storage in plant (FPL=DSL), it does not affect flow downstream to Pakistan. The project, started in 2006, is under construction and is expected to be completed by February 2011.

Nimoo Bazgo Hydel project 45-MW Nimoo Bazgo Hydel project is a run-of-the-river scheme. It is located on the Indus Main at village Alchi, 70km from Leh district of Ladakh region of IHK and 106 km upstream of LoC. The technical features of the project are a 57- metre high concrete gravity dam; 3 Nos., 3.3m dia, each 63m long penstocks; surface power house with 3 units of 15 MW each, Francis turbine and 35m long Tailpool. The project is being constructed by NHPC. The construction work is in full swing. Dam excavation has been completed and concreting is in progress. Powerhouse excavation and concreting up to crane beam level is completed. Hydromechanical works were awarded to PES Engineers (Pvt) Ltd on 28 July 2008. The project is expected to be completed by August 2010.[188] Pakistan's apprehensions relate to the gross storage capacity of 42,829 acre feet which could give India a storage/manipulatable capacity of 41,612 acre feet that can result in stoppage of water downstream for 14 days.[189]

On 29 March 2010, in a meeting of the Indus Commissioners India handed over construction plans and maps of the Nimoo Bazgo power plant to Pakistan. Pakistan expressed reservations on the Nimoo Bazgo and Chutak power plants and said it feared the Indian projects might obstruct smooth supply of water to Pakistan. The Pakistani side stressed that the current project design of the Nimoo Bazgo "is aimed at maximizing manipulatable water space". India has "designed the entire project on

maximum projected notional figures regarding water and flood flows." It wanted to maximise freeboard (free space above lake level), fix spillways on the lowest possible point and the flushing outlet at the highest point. These factors, if allowed, would give India a massive space to manipulate water flows. Pakistan maintained that India must take actual river flow figures, compute them and adjust the design accordingly so that chances of manipulating water flows could be minimized. India, however, insisted that its design was "within the permissible limits of the treaty and there is no need to change anything."[190]

Pakistan has raised objections on six counts to the Nimoo Bazgo. At the July 2010 meeting of the Indus Commissioners, India expressed its inability to discuss construction of Nimoo Bazgo hydropower project, saying it was not part of the ongoing negotiations. Pakistani side has also not been allowed yet to visit site of this project. India had agreed to provide data of Nimoo Bazgo project. However, no progress on this issue has been made yet.[191]

Dumkhar project, a 42-metre high dam, will generate 130 MW of electricity. The project site is located at about 128 km from Leh on Leh-Khalsi Batalik road. The maximum construction work of the Dumkhar hydroelectricity project had also been completed.

Other upcoming Indian projects

India has given a go-ahead to yet another megaproject, 690-MW Raltle Hydroelectric Power Project, which will be completed by 2016. The Rs. 5,000 crore project will be constructed on the Chenab, after its confluence with Marusudar River, in the Drabshalla area of Kishtwar district, Indian occupied Jammu & Kashmir. Official information about the project had not been provided to Pakistan yet. Pakistan has already taken up this issue with India.[192]

Another megaproject identified on the Chenab is Bursar dam having electricity generation capacity of 1020 MW as per 90 per cent dependable year. It is the biggest ever dam in IHK. It is a storage project in which the flow of water can be 'regulated'

not only to the benefit of this project but all downstream projects, i.e. Pakal Dul, Dul Hasti, Raltle, Baglihar, Sawalkot and Salal hydroelectric projects. Hence, it is stated the potential of all downstream schemes in IHK will be enhanced substantially. The dam site is located near village Hanzal in Doda district of IHK on the Marusudar river which is one of the major right-bank tributaries of the Chenab. The location is quite adjacent to Chamba district of Himachal Pradesh. The storage of Bursar dam is intended to be used for additional power generation during lean-flow months and releasing regulated flow in downstream. It will be a rockfill dam having 252 metre height, which is comparable to any large dams of the world. Another big project is Sawalkot hydro project with a focus on components like dam and tunnel location. The project is proposed to be a run-of-the-river plant on the Chenab, located upstream of the already finished Salal Hydroelectric Power project and downstream of the Baglihar project.[193]

Moreover, India is planning another three major hydropower projects — Kiru, 600 MW; PakDul, 1000 MW, and Kwar 520 MW — on the Chenab river in Doda district. PakDul is a reservoir-based scheme proposed on Marusudar river, the main right-bank tributary of the Chenab in Kishtwar tehsil of Doda district. The project envisages construction of a 167-metre high concrete-face rockfill dam across the Marusudar at village Drangdhuran and an underground powerhouse at a location 2 km upstream of Dul dam, near village Trimuli.[194] Kwar is a run-of-the-river scheme located in a highly mountainous and difficult terrain of Kishtwar. It is a concrete gravity, 109 m high dam with an underground powerhouse. The Kiru hydroelectric project is a run-of-the-river scheme planned 25 km upstream of Dul Hasti hydroelectric project on the Chenab. It is a concrete gravity, 140 m high dam with an underground powerhouse.[195]

If all the projects, which are in the pipeline, get completed, then it would certainly affect the flow of the Western rivers, especially the Chenab and the Jhelum, and would badly hit Pakistan's agricultural economy.

Ravi embankments: The issue of constructions along the Ravi river in India is under discussion and Pakistan will soon inspect the sites. An embankment has been constructed by India near Narowal on the Ravi. Pakistan feels that due to construction of the embankment, flood water would cause havoc in adjoining areas of Pakistan.[196] India built a number of embankments on the Ravi in the year 2001 and Pakistan has since been asking it for permission to inspect them. During the talks, held in July 2010, both parties agreed to carry out joint inspection of several flood structures built on the Indian side of the border along Ravi river.

Cumulative impact of the Indian projects

Many dams that India is building on the Western Rivers are categorized as run-of-the-river projects that would have no downstream impacts. "Technically run-of-the-river projects are projects without any storage or pondage. They use the flow of the water in the natural river course, or sometimes through diversions like canals and tunnels, to generate electricity. They can have many of the typical structures such as dams, weirs, headraces, tailraces, and diversion tunnels."[197] They are also viewed as socially and environmentally benign. The fact of the matter is that this notion is "false". "Many run-of-the-river projects can have serious impacts by disturbing downstream river flows. Some run of the river projects divert the water into tunnels leaving downstream sections dry, and thus cause even more severe impacts downstream."[198] Furthermore, often projects with pondage to store water for meeting daily or weekly peaking needs are wrongly classified as run-of-the-river.

Cumulative impact of live storages

Almost all Indian projects on the Jhelum, the Chenab and the Indus are classified as run-of-the-river projects but they entail serious consequences for downstream both individually and cumulatively. Pakistan fears that cumulative live storage of these projects would have adverse impact both in terms of causing floods and running the Chenab and the Jhelum dry in the lean period when Pakistan need the water most. Bangladesh is already experiencing a similar situation with India especially

regarding the sharing of the Ganges, the Brahmaputra, the Barak and the Teesta, rivers where India has built Farrakha Barrage, the Tipaimukh Dam and Gazoldoba Barrage on the Teesta, causing flooding in the monsoon and drought in dry seasons. Further, Indian River Link Project plans diversion of vast quantities of water from the shared Ganges-Brahmaputra basin to "deficit river basins" in the country which has become a source of friction between India and Bangladesh.

Given Pakistan's concerns the Treaty has hardwired limitations on India's capacity to manipulate the timing of flows. "This was done by limiting the amount of "live storage" (the storage that matters for changing the timing of flows) in each and every hydropower dam that India would construct on the two rivers"[199] over the Chenab and the Jhelum. Limited live storage is the only protection against upstream manipulation of flows by India. This vulnerability was driven home when India chose to fill the Baglihar dam exactly at the time when it would inflict maximum harm on farmers in the downstream Pakistan. With an array of Indian projects on these two western rivers Briscoe observes, "the cumulative live storage will be large, giving India an unquestioned capacity to have major impact on the timing of flows into Pakistan. Using Baglihar as a reference, simple back-of-the-envelope calculations suggest that once it has constructed all of the planned hydropower plants on the Chenab, India will have an ability to effect major damage on Pakistan."[200] First, there is the one-time effect of filling the new dams. If done during the wet season this would have little effect on Pakistan. But if done during the critical low-flow period, there would be a large one-time effect, as was the case when India filled Baglihar. Second, there is the permanent threat which would be a consequence of substantial cumulative live storage which could store about one month's worth of low-season flow on the Chenab." If... India so chose, it could use this cumulative live storage to impose major reductions on water availability in Pakistan during the critical planting season.[201]

The sheer number of the dams/schemes that India is building on three Western rivers is massive, generating fears in Pakistan about their adverse implications for flow of water to Pakistan. India is to build 135 big or small dams, 24 on the Indus, 77 on the

Jhelum and 34 on the Chenab. Pakistan is apprehensive that even with strict compliance with the provisions of the Treaty in each case, India might, taking all the projects together, acquire a measure of control over the waters of the Western rivers and might potentially be able to inflict harm on Pakistan.[202] Pakistan Indus Water Commissioner Jamaat Ali Shah argues, it is logical that India could not build numerous run-of-the-river projects and block water flow at will.[203] India argues that "any efforts to flood Pakistan would mean flooding areas on the Indian side first, to disastrous consequences."[204] Even if one agrees with that argument, that is questionable; the issue of steady flows in lean period is not addressed.

Third, India's mad rush for hydro projects on the Chenab, the Jhelum and the Indus Basin is likely to destroy the rivers' ecological system within India and beyond. The environmental impact is enormous. The Baglihar hydroelectric project is becoming a source of concern in the Doda region of IHK, as rising water in the Chenab is seeping under the hills, turning soil into loose ground. Locals fear plans to expand the project to 900 megawatts could spell disaster for the region, as it might accelerate erosion along the 60-km Batote-Doda stretch — the only road connecting the region with the world.[205] The environmental impact of Kishanganga on both sides of the LoC is being debated a lot. Experts say that it is going to have adverse environmental impact on the Gurez Valley in IHK and the Neelum Valley in AJK. The Kishanganga project when completed will submerge many parts of the beautiful Gurez Valley and displace more than 25,000 Dard Shin people, the natives, from their ancient homeland.[206] Similarly, the diversion of the river would not only affect agricultural usages, but would cause an environmental disaster for the Neelum Valley. Pakistan has asked India to share its environmental impact assessment (EIA) studies on the Kishanganga dam.

Hydrologic viability of Indian projects in IHK

India's main argument for constructing hydro projects is power generation which has been frequently questioned. The South Asia Network on Dams, Rivers and People (SANDRP) has raised questions about the hydrologic viability of the Baglihar

and Uri II hydropower plants. About the 900-MW Baglihar, it stated in 2005: "How many days in a year it can generate power at that rate? It will require 860 cumecs of water, but Chenab flow reduces much below that in winter. In fact flow in Chenab reduces up to 50 cumecs. The authorities have not made public the hydrologic data or the projected power generation from the project."[207] It adds that experience of the existing 690-MW Salal on the Chenab and the 480-MW Uri on the adjoining Jhelum basin shows that these projects in fact generate much less power in winter when need for power is maximum in J&K. In both Chenab and Jhelum basins in India the figures provided by the Central Electricity Authority show a downward trend in power generation compared to the installed capacity. The operating hydropower projects in Jhelum basin — 736.6 MW — include Mohara, Gandarbal, Uri, Lower Jhelum and Upper Sindh while operating power projects in Chenab basin include Baglihar, Dul Hasti , Chenani and Thirot, and all show a downward trend line.[208] These two basins are the main focus of huge hydropower development currently and in future.

Another issue that questions the viability of so many projects is siltation. SANDRP observes, the Chenab is known for being highly silt laden and there are frequent landslides that increase the siltation rates. "Construction of so many maga projects on the same river (Salal existing, Baglihar, then under construction now Phase I completed, Dul Hasti, also completed, and Sawalkot, seriously considered) is also adding up to the silt load of the river." The tunnelling experience at Baglihar showed that "rock quality at Baglihar site ranges from poor to very poor to extremely poor. The huge silt load of the river means that the projects' useful life will be very low."[209] This would certainly have far-reaching adverse impacts on the ecology of the Chenab and the Jhelum which will affect the flow of these rivers downstream.

Cooperation on Indus Basin: Way forward

The IWT despite all its weaknesses has worked well and survived three wars and spells of high tensions between India and Pakistan. The Indus Waters Commission remained engaged even when the political ties between the two countries were extremely bad. The fact however, remains that despite IWT, India continues to be an

upper riparian in the Indus basin and being a lower riparian Pakistan has several legitimate concerns regarding effective implementation of the Treaty by India, especially regarding the limited non-consumptive rights that India has over the Western rivers. There are four areas of concern: The first relates to the issue of timely data sharing and transparency in data sharing, particularly because the upper reaches of all of the rivers lie in Indian-controlled territory, giving it greater scope for control of the entire Indus river system. Two, delays in communication of information relating to the construction works of Indian projects, inadequate supply of engineering data and construction beyond what is stipulated in the Treaty. Three, the growing water scarcity in the two countries and emergence of new hydrological and ecological realities in the Indus basin caused by climate change that remain unsubstantiated is creating lot of distrust between the two countries. Fourth, the institution of PIWC that was created to sort out the differences over sharing of the Indus waters bilaterally is losing its vitality due to its limited scope, changes in the Indus basin and non-cooperative attitude of upper-riparian India in addressing lower-riparian Pakistan's genuine concerns in time. This is forcing Pakistan to resort to the provisions of NE and Court of Arbitration which is not only a costly affair but adds to the existing distrust between the two riparians.

India and Pakistan need to take substantive measures within the scope of the Treaty and outside it through mutual agreement so as to remove mutual distrust and address operational difficulties in terms of effective functioning and interpretation of the Treaty, recognizing and responding to change in the shared rivers system. India should appreciate Pakistan's dependence and vulnerabilities on the Western rivers and should go for smaller hydel projects on these rivers that are more eco-friendly and address Pakistan's legitimate fears about India's control to manipulate the flow of these rivers. Further, sources of growing water stress in the two countries should be addressed through efficient water management in each country. Some of the steps required include timely data sharing through installation of telemetry system; transparency in data sharing regarding the construction of new Indian projects; joint watershed management

and joint commissioning of environmental studies; cooperation in ensuring quality of water bodies; strengthening the functioning of the Indus Waters Commission by expanding its scope and mandate and internal management of water resources plus sharing best practices in efficient utilization of water.

Timely Data sharing through installation of telemetry system: As a downstream country Pakistan cannot be denied its right to know the gauge level and regular inflow and outflow figures from hydro projects in India. Without these figures, Pakistan cannot ascertain if India is adhering to the IWT stipulations. There is a strong perception and genuine fear within Pakistan that India is not sharing all information that it could (in good faith) and it should (under the IWT obligations). Jamaat Ali Shah has repeatedly stated that India did not always give six-month advance notice on any change in outflow despite its obligation under the Treaty.[210] This can be addressed by India within the parameters of the Treaty.

Further, timing of flows is very important for Pakistan because agriculture in the Pakistani plains depends not only on how much water comes, but also that it comes in critical periods during the planting season. Thereby, Pakistan has repeatedly sought river real time data exchange from India to ascertain the actual flow of western rivers at their source but the latter had cold-shouldered the request. The issue of installing telemetry monitoring systems on Western rivers for getting real-time data of flows is under discussion between the two countries. Pakistan demands satellite telemetry in the Indus water system for real-time hydrology data on rivers it shares with India. Further, India is still not willing to transmit the inflow and water level data of the Bhakra and Pong dams on the Sutlej and Beas rivers to Pakistan.

The issue of installing telemetry system at various locations on the western rivers, including the Indus, the Jhelum and the Chenab in IHK, was discussed in the July 2010 talks of the Commission. Pakistan has presented a proposal installing telemetry system in order to get real-time river flow data. That can remove mistrust between the two countries about sharing information on the flow of rivers.[211] Pakistan has made some headway in getting India to agree to setting up such system. Both sides

have agreed in principle to put in place a telemetry system on the Indus to record and transfer real-time data for the benefit of both countries. Modalities in this regard will be worked out. India maintains that it has to take its states (provinces) on board because they control water flows and would be providing space for installation of the equipment. Funds needed for installing and running the system is also a matter that would be decided in consultation with the states.[212]

The issue has also been taken up in the track II discussions between the Pakistani and Indian water experts and a consensus is emerging on the installation of telemetry system on the western rivers. The Delhi-based Centre for Dialogue and Reconciliation (CDR) has organized two such rounds of dialogue between the water experts. At one such meeting that took place in May 2010, the Indians agreed to install the telemetry system to ensure transparency over water flows prevent any sort of controversy. In July 2010, CDR and the "Aman Ki Asha" campaigners jointly organized a seminar on "Water is Life," which stressed that both sides needed to share data and information on the Indus River to counter misperceptions. The delegates urged both governments to share data, ensure transparency and make the information public. They suggested that there could be a joint study of the factors responsible for the reported reduced flows in the Western rivers and proposed joint monitoring of flows at strategic points.[213] India should communicate data of all the existing gauge and discharge stations including the data of flow at the newly constructed, under-construction and planned plants and works. It would not only be in line with the provisions of the Treaty but would also build trust between the parties.

Transparency in data-sharing over new Indian projects

Analysis of controversies on the Indian projects on the western rivers clearly establishes that Pakistan's concerns are multiplied due to lack of timely and adequate data sharing which has greatly politicized the water issue and deepened distrust between the two countries. Inadequate data supply to Pakistan by India on newly developed projects like the Wullar Barrage, Baglihar, Dul Hasti, Uri-II and Kishanganga, Chutak,

and Nimoo Bazgo hydroelectric plants deepened Pakistani apprehensions. Delayed and incomplete information and engineering details constrains Pakistan's ability to review and adjudge compatibility of India projects with design criteria provided for in the Treaty.[214] Further, provision of such information is essential for Pakistan to ensure that run-of-the-river plants are being operated in accordance with the Treaty. Islamabad strongly believes New Delhi has not been fulfilling its obligations stipulated in the IWT such as communicating details of new projects six months before their commencement, diversion for storage and farm purposes from western rivers and providing details about ancillary projects.[215]

Another related major concern in Pakistan is that India does not stop work on a project where technical parameters have become controversial between the two countries on the plea that there is no such provision in the Treaty. Thus, for Pakistan its objections become meaningless if the project is already completed in the protracted discussion period as India uses dragging tactics which make its designed construction a *fait accompli*. This is certainly against the provisions of the Treaty that lays down technical parameters for Indian projects so as they should not interfere with the flow of water into Pakistan. In a statement Jamaat Ali Shah pointed out that "the provisions of the Treaty imply that any objections must be resolved. If India goes on constructing and we go on objecting without resolution in a time-bound manner, then both the letter and spirit of the treaty are negated."[216] In a non-paper submitted to India in February 2010 at a foreign secretaries meeting, Pakistan had called upon India to submit full and timely information about new power plants and irrigation works on these rivers and has asked India that the construction of projects on the western rivers should be undertaken only after objections are amicably resolved. If India supplies timely information on the design of its projects on western rivers before starting work on them, it would allay Pakistan's apprehensions regarding their incompatibility with the Treaty and transboundary impacts on the Pakistani side.

Joint watershed management & joint commissioning of environmental studies: The growing scarcity in water resources in the Indus basin calls for increased water

cooperation between India and Pakistan, especially in the area of watershed management.

It is generally agreed that reduced flows of water in the rivers is related to ecological changes in the region. Seasonal flow not only in the Chenab but the Jhelum and the Indus also has been depleting year after year for reasons ranging from global warming to deforestation and shrinking of mountain glaciers feeding these rivers. The seasonal level of water has been showing a constant fall year after year.[217]

The Treaty was signed in 1960, in a totally different set of political, economic, demographic and ecological environment. There has been a phenomenal change in all of these areas which needs to be recognized and addressed by both sides. The melting of the Himalayan glaciers is a phenomenon that clearly deserves greater study and closer monitoring. The IWT conceived over four decades ago does not provide for unforeseen shortfall while prescribing the level of flow during autumn when irrigation is of critical importance to farmers in Pakistan's Punjab province.[218] It also indirectly questions India's limited water rights on the western rivers. The basin watershed area is already overburdened due to environmental degradation in both parts of Kashmir. Massive deforestation has decreased the annual water yield. This has caused less snow accumulation in the mountain area. In 1979 the snow-covered area in the watershed was 4,725 sq km that is 64.92 per cent of the total water yield. It has now been reduced to 2,900 sq km. This shows a 40 per cent reduction in snow during the last 25 years.[219] Both sides have common interest in addressing the issue.

The issue has also figured in Track II dialogue. With watershed management, the ecology of the areas from where the rivers originate would improve which would help in improving water flows in the Chenab and the Jhelum. Islamabad has suggested joint watershed management and joint commissioning of environmental studies that would address emerging concerns arising from reduced flows. Pakistan has also drawn attention to “additional concerns,” such as deforestation and pollution.[220] Keeping in view the changing dynamics of the Indus rivers system, experts in India and Pakistan are already talking about Indus II. It is high time that India and Pakistan adopted a

collaborative approach by initiating a joint study of Himalayan glaciers and transboundary Environmental Impact Assessments for the Indian projects on the western rivers. The recent cloudburst in Ladakh causing flash floods in Gilgit only reinforces the need for joint watershed management in the Indus basin system. The issue can be discussed under IWT Article VII's relevant clause regarding future cooperation in which both parties have recognized having "common interest" in the "optimum development of the rivers". It should be pointed out that since 1960 no project has been submitted under this provision.

Cooperation in ensuring quality of water bodies: There has been no cooperation to maintain water quality in the shared rivers that has resulted in the pollution of many tributaries of the Indus system. Recently, the quality of water issue has figured in India-Pakistan discussion in the PIWC. Pakistan has raised the issue of polluted water inflows from India and has asked India to stop contamination of water in the Hadiara nullah that flows near Lahore and brings the industrial waste to Pakistan and pollutes the Ravi and Kasur drains. The issue of Baramulla waste polluting Jhelum river has also been brought to the notice of the Indian side. Scientific analysis of drains' water and the Jhelum river has proved high level of pollution. India has agreed to conduct joint inspection to measure pollution levels in the Jhelum river, Hudiara drain and Kasur drain. Both countries have decided to conduct a joint survey to monitor river pollution.[221] The Treaty under Article IV (9) provides that each party should "prevent" "undue pollution of the waters of the rivers" and take measures to ensure that before any sewage or industrial waste is allowed to flow into the rivers, it will be treated". This would greatly help in maintaining the health of the shared water bodies.

Strengthening the functioning of the Indus Water Commission by expanding its scope and mandate: Due to growing water scarcity in the two countries and ecological stress in the Indus basin, the institution of Indus Water Commission that had worked remarkably well in the past has come under a lot of strain. The main task of the Commission is to maintain a co-operative arrangement for the implementation of the Treaty; promote co-operation between the parties in the development of the waters of

the rivers; meet regularly to review implementation of the Treaty; make every effort to settle promptly any question arising between the parties; and undertake tours of inspection of the rivers to ascertain facts. There is need to expand the scope and mandate of the Commission regarding co-operation in harnessing the Indus waters. There is need to form a Indus Water Consultative Group comprising India, Pakistan and international water experts that would provide input on supply capacity of the Indus basin taking into account issues like climatic changes and environmental degradation. The group can conduct joint studies on the impact of climate change on Himalayan glaciers, joint watershed management and joint studies on environmental impact assessments of the hydro projects, especially on the lower riparian. It can also thrash out a joint watershed management strategy for the catchment areas of western rivers. India also wants to expand the scope of the Commission to allow consultation with experts before taking disputes and differences to outside agencies. Indian High Commissioner to Pakistan Sharat Sabharwal has suggested that the Commission could function as a 'consultative dispute avoidance body' and solicit opinions regarding technology from national and international experts. The Commission could then work towards the implementation of these suggestions.[222] There is also realization at the Commission level that its role needs to be in line with the current realities or else it will loose its relevance. The meeting of the Indus Water Commission, held in New Delhi in June 2010 has decided to strengthen the working of the commission by setting up a body to oversee it.[223]

Internal management of water resources & sharing of best practices: The issue of internal water resources management becomes very important given the fact that physical separation of the Indus tributaries has hampered the possibilities of efficient integrated basin management. In view of growing water scarcity, it is the responsibility of both states to ensure internal water resources management by following the principles of Integrated Water Resources Management (IWRM) and share best practices in water conservation techniques in agricultural, industrial and domestic uses. There is a need for a paradigm shift in water management from technocratic approach that looks

almost exclusively towards engineering solutions to a socio-centric approach which lays emphasis on indigenous physical and human resource management and is more resource-efficient and ecology friendly.(224) India and Pakistan have their own set of internal water conflicts which can be mitigated following IWRM approach. This will help in reducing stress on the Indus rivers system.

Conclusion

The Indus Waters Treaty is coming under stress due to both growing water scarcity in India and Pakistan and ecological threat to the Indus basin rivers system. This has led to an intense water debate in India and Pakistan in which hawks on both sides are talking about water wars and abrogation of the Treaty. The fact is that the Treaty was signed as a permanent solution to the water sharing problem between the two countries when water was in abundance in the Indus system. Given the climate changes underway, water insecurity in the basin has heightened, resulting in politicization of the water issue between the two countries. The growing water stress has coincided with India's ambitious plan to construct a large number of large hydropower plants, especially on the Chenab and Jhelum rivers. The fact that India has not been forthcoming in sharing information and engineering details regarding these projects as required in the Treaty has aroused Pakistan’s apprehension. The projects are not merely run-of-the-river structures as allowed under the treaty but their number and structures allow India to acquire manipulative control that could be used to hamper water flows into Pakistan. The worst scenario for Pakistan is the Indian ability to stop water in lean period and release it in wet season. Further, Indian projects have adverse transboundary impacts both environmental and in terms of power generation as is evident in the case of Neelum-Jhelum project. This has certainly widened the trust gap between the two countries and catapulted water to the top of bilateral agenda, making it a core issue in India-Pakistan relations.

An array of these upcoming Indian projects has also unfolded many challenges to the functioning of the PIWC. The institution is unable to cope with the issues which were originally not within its purview as they did not exist at that time. Taking cue

from the Baglihar verdict of the NE that reinterpreted the Treaty in the light of “new technical norms and new standards,” “state of the art” and “best and latest practices in the field of construction and operation,” the risks of increased floods associated with “climate change,’ it appears that the Treaty has to accommodate the new realities in the Indus basin, not only in terms of technical norms but also growing pressures on the health and viability of the Indus basin rivers. If climate change is to lead to a period of frequent floods, it will also be followed by a period of shortfalls in water flows. This demands a common water vision by India and Pakistan that will be based on realization of the importance of the shared rivers as being a natural resource that is integral to their survival. New and innovative areas of cooperation, inside and outside the Treaty, can be envisaged. This should include watershed management of the catchment areas of the Indus river system, especially upper catchment areas of the Western rivers. "Water should be an instrument of peace — a means to achieve human security rather than a source of discord."[225]

Notes and references

1. Alexander Cariou, *Water, Conflict and Cooperation,* (Canada: institute of Peace and Conflict, 2003), p.54.
2. Almost all of the water on the planet — over 97 per cent — is saline ocean water, unusable by most terrestrial organisms. Of the 2.79 per cent of fresh water, 0.62 per cent is aquifer and 2.14 per cent glacial, leaving 0.03 per cent for human consumption. J.C. Padowski & JW Jawitz, "The future of global water scarcity: Policy and management challenges and opportunities," *The Whitehead Journal of Diplomacy and international Relations,* Summer/Fall 2009, <www.journalofdiplomacy.org/p.99>.
3. "World Water Assessment Programme," *The United Nations World Water Development Report 3: Water in a Changing World*, (Paris: UNESCO, and London "Earthscan, 2009), p.29.
4. "Water at a crossroads", Dialogue and Debate at the 5th World Water Forum, Istanbul 2009. World Water Council, p.50.
5. Boutros Boutros-Ghali, "I Support the Algerian Government," *Middle East Quarterly,* September 2007.
6. Ismail Serageldin's homepage, <www.serageldin.com/water.htm>.
7. See, T. Deen, "Climate change deepening world water crisis", 19 March 2008, available at <www.globalpolicy.org/socecon/environment/climate/2008/0319deepwater.htm>, (see original statement)
8. M. Zeitoun and N. Mirumachi, "Transboundary Water Interaction I: Reconsidering Conflict and Cooperation", *International Environmental Agreements,* 8: 4, 2008,p. 298.
9. Prof. Evan, Vlachos, "Water Conflict and Cooperation: The Transition to a Purposeful Future", available at: <http://www.unesco.org/water/wwap/pccp/zaragoza/speakers/doc/Keynote_Speech_Vlachos.pdf>.
10. Ibid.

11. Jannik Boesen and Helle Munk Ravnborg, "From water 'wars' to water 'riots'? Lessons from Transboundary water management", Danish Institute for international Studies, Copenhagen 2004. p.6.

12. *International Water Event Database: 1950-2005, Program in Water conflict* Management and Transformation, Institute for Water and Watersheds, Oregon State University, <http://www.transboundarywaters.orst.edu/database/interwatereventdata.html>.

13. David Michel, Amit Pandia, (eds) *Troubled Waters: Climate Change, hydroponics, and Transboundary Resources*, The Henry L. Stimson Center, Washington, D.C., USA, 2009.

14. Pacific Institute initiated a project in the late 1980s to track and categorize events related to water and conflict which has been continuously updated ever since. See, Dr Peter H. Gleick, "Water Conflict Chronology," Pacific Institute for Studies in Development, Environment, and Security, 2009, at <http://www.worldwater.org/conflict/list/>.

15. Dr Peter H. Gleick, "Water Conflict Chronology", Pacific Institute for Studies in Development, Environment, and Security, November 2009, at <http//:www.worldwater.org/conflict>, Data from the Pacific Institute for Studies in Development, Environment, and Security database on Water and Conflict (Water Brief).

16. S. Yoffe, A. T. Wolf and M. Giordano, "Conflict and cooperation over international freshwater resources: Indicators of Basins at risk" *Journal of the American Water Resources Association* 39 (5) 2003, cited in David Michel, op.cit. (ref.13)... p.82.

17. John Briscoe, Usman Qamar, *Pakistan's Water Economy Running Dry*, The World Bank, Oxford University Press, 2005.p.xiii.

18. Pakistan Strategic Country Environmental Assessment Report, 2006.

19. Briscoe and Qamar, op.cit., (ref.17), p.xiv.

20. *Country Paper: Pakistan*, Asian Development Bank Outlook 2007 (Tokyo: Asia Pacific Water Forum, 2007), p.3.

21. *Economic Survey of Pakistan, 2009-10,* <http://www.finance.gov.pk/survey/chapter_10/02_Agriculture.pdf>.

22. Toufiq A. Siddiqi and Shirin Tahirkheli, *Water Needs in South Asia: Closing the Demand-Supply Gap* (Honolulu: Global Environment and Energy in the 21st Century, 2004), p.79. cited in Introduction, Michael Kugelman, Robert M. Hathaway, (eds), *Running on Empty: Pakistan's Water Crisis,* (Washington, D.C.: Woodrow Wilson International Center for Scholars, 2009) <www.wilsoncenter.org/p.24>.

23. Source: Abrar Kazi, *Kalabagh Dam: The Sindh Case*, Creative Communications, 1998, Hyderabad. Updated based on data from government of Pakistan, Ministry of Water and Power. Cited in Kaiser Bengali, "Water Management under Constraints: The Need for a Paradigm Shift", in Michael Kugelman, Robert M. Hathaway, ed, *Running on Empty: Pakistan's Water Crisis*, Woodrow Wilson International Center for Scholars, 2009. Washington, D.C: <www.wilsoncenter.org/p.52>.

24. Economic Survey of Pakistan, 2009-10, op.cit., (ref.21), p.13.

25. Sundip Waslekar, *The Final Settlement: Restructuring India-Pakistan Relations*, (Mumbai: Strategic Foresight Group, 2005).

26. Ramaswamy R. Iyer, "South Asian Water Concerns," *South Asian Journal*, <http://www.southasianmedia.net/Magazine/Journal/8_water_concerns.htm>.

27. "The diminishing performance of big hydro projects in India", South Asia Network on Dams, Rivers and Peoples (SANDRP), Delhi, 1 May 2010. <http://www.sandrp.in/hydropower/Diminishing_Hydro_Performance_in_India_May_2010.pdf>.

28. Boesen and Ravnborg, op.cit., (ref.11), pp.10-11.

29. Ashfak Bokhari, "Water dispute and war risk", Dawn, Islamabad, 18 January 2010.

30. Nirupama Subramanian, “Violation of treaty will damage ties: Zardari”, *The Hindu*, New Delhi, 13 October 2008.

31. Asif Ali Zardari, “Partnering with Pakistan”, *The Washington Post*, 28 January 2009, <http://www.washingtonpost.com/wp-dyn/content/article/2009/01/27/AR2009012702675_pf.html>.

32. “Assef fears war with India over water”, *The News,* Islamabad/Rawalpindi, 3 January 2010.

33. "Assef warns India against water theft", *Dawn*, 3 January 2010.

34. Bokhari, op.cit., (ref.29).

35. "Water issue a serious problem, says Shahbaz", *The News,* 21 March 2010.

36. Vimal Sumbly, "Baglihar project: J&K’s possible entry into ‘power’ zone", *The Tribune*, Chandigarh, 26 December 2007.

37. 'India plans 52 projects to control Pakistan's water', *The Nation*, Islamabad, 30 March 2010.

38. Ibid.

39. “Assef fears war…”, op.cit., (ref.32).

40. Bokhari, op.cit., (ref.29).

41. See, a four-part series by Khalid Hussain, "Water, War and Peace: Dispelling myths", *The News*, 27 April 2010; “Sustained, open communication is essential", 28 April 2010.

42. Waqar Gillani, “Troubled waters,” *The News*, 4 April 2010.

43. John Briscoe, “War or peace on the Indus?”, *The News*, 3 April 2010.

44. Ibid.

45. Sandeep Dikshit, "Pakistan for new measures to energise Indus Treaty", *The Hindu*, 13 March 2010.

46. "India ‘not responsible for Pak’s water woes’” *The Kashmir Times*, Jammu, 27 March 2010.

47. Dikshit, op.cit., (ref.45).

48. Anita Joshua, "Discourse on India-Pakistan water sharing hots up", *The Hindu*, 4 April 2010.

49. Ibid.

50. Imtiaz Ali, "India not responsible for water shortage: envoy," *The News,* 4 April 2010.

51. Ashok Tuteja, "India slams Pak over water sharing", *The Tribune*, 5 March 2010.

52. "A Tribune Special: Waters of discontent", *The Tribune*, 4 April 2010.

53. Arvind Gupt, "Vicious anti-India propaganda in Pakistan on Water issues", *IDSA Comment,* 29 March 2010. <http://www.idsa.in/idsacomments/ViciousantiIndiapropagandainPakistanonWaterissues_agupta_290310>.

54. Vaslekar, op.cit., (ref.25).

55. Uttam Kumar Sinha, "India and Pakistan: Introspecting the Indus Treaty", *Strategic Analysis,* Vol. 32, No. 6., November 2008, p.965.

56. D Suba Chandran, "Indus Waters Governance-II: From 'Letter and Spirit' to 'Letter vs Spirit", *IPCS*, #3193, 19 July 2010.

57. Sumbly, op.cit., (ref.36).

58. "IWT can't be abrogated: Noorani", *The Kashmir Times*, 6 February 2008.

59. M.S. Menon, "Withdraw from Indus treaty", *The Tribune*, 30 January 2009.

60. Ibid.

61. Ibid.

62. Lt-Gen (retd) Ranjit Singh, "Stop water flow to Pakistan", *The Tribune*, 13 January 2009.

63. Sinha, op.cit., (ref.55), p.966.

64. ASIA: International River Basin register: The Transboundary Freshwater Dispute Database *(updated August 2002)* <http://www.transboundarywaters.orst.edu/publications/register/tables/IRB_asia.html>.

65. Mukand S. Babel, Shahriar M. Wahid, “Fresh Water Under Threat: South Asia,” United Nations Environment Programme, Asian Institute of Technology, 2008.

66. Kaiser Bengali, “Water Management under Constraints: The Need for a Paradigm Shift,” in Michael Kugelman, Robert M. Hathaway, (eds), *Running on Empty: Pakistan’s Water Crisis*, (Washington, D.C: Woodrow Wilson International Center for Scholars, 2009). <www.wilsoncenter.org/p.48>.

67. Aaron T. Wolf and Joshua T. Newton, “Case Study of Transboundary Dispute Resolution: The Indus Water Treaty”, <http://www.transboundarywaters.orst.edu/research/case_studies/Indus_New.htm>.

68. Ibid.

69. M. A. Salman and Kishor Uprety, *Conflict and Cooperation in South Asia's International Rivers: A Legal Perspective,* p.42.

70. Kaiser Bengali, "Water Management under Constraints: The Need for a Paradigm Shift", in Michael Kugelman, Robert M. Hathaway, ed, Running on Empty: Pakistan’s Water Crisis", Woodrow Wilson International Center for Scholars, 2009. Washington, D.C. <www.wilsoncenter.org/pp.46>.

71. Salman and Uprety, op.cit., (ref.69), p.43.

72. Ibid., p.44.

73. Wolf and Newton, op.cit., (ref.67).

74. Salman and Uprety, op.cit., (ref.69), p.46.

75. Sardar Muhammad Tariq, “The Indus Waters Treaty and Emerging Water Management Issues in Pakistan”, in *Problems and Politics of Water Sharing and Management in Pakistan*, Islamabad Policy Research Institute (IPRI), op.cit., p.87.

76. Salman and Uprety, op.cit., (ref.69), p.48.

77. Tariq, op.cit., (ref.75). p.88.

78. Article 11 (2) through (4).

79. Article III (2)

80. Salman and Uprety, op.cit., (ref.69), p.48.
81. Iftikhar Gilani, "Water not an issue at all: India, *The Kashmir Times*, Jammu, 10 March 2010.
82. Article 1V (2)
83. Article 11 (5).
84. The Indus Waters Treaty, <http://www.waterinfo.net.pk/pdf/iwt.pdf>.
85. Article VI, (1) a, b, c, d, and e.
86. Article VI, (1)
87. Article VI, (2)
88. Article VII, (1)
89. Article VII, (1) (a), (b), (c).
90. Article VII, (2)
91. Article 1V, (10)
92. Article VIII (4)
93. Indus Waters Treaty, World Bank, <http://web.worldbank.org/>.
94. Details about the 23 categories falling under NE purview are provided in Annexure F of the Treaty.
95. Procedural details provided in Annexure G.
96. Briscoe, op.cit., (ref.43).
97. See, <http://www.nhpcindia.com/english/50000MW_initiative.htm>.
98. "Hydropower Policy 2008," Ministry of Power, Government of India, p.15, <http://powermin.nic.in/whats_new/pdf/new_hydro_policy.pdf>.
99. "Indus Water Treaty: J&K asks Centre for compensation", *The Kashmir Times*, 24 June 2009.
100. Data provided by Indus Waters Commission, Pakistan.
101. "Hydro Electric Potential in the District", <http://doda.nic.in/others/hydro.htm>.
102. Data provided by Indus Waters Commission, Pakistan.
103. Gillani, op.cit., (ref.42).

104. *Keesing's Contemporary Archives, 1978,* p.29019.

105. Shaista Tabassum, "The Role of CBMs in Resolving Non-military Issues between India and Pakistan: A Case Study of the Indus Water Treaty," in Moonis Ahmar, (ed.), *The challenge of confidence-building measures in South Asia* , Haranand Publications, New Delhi, 2001. p. 396.

106. *Keesing's Contemporary Archives, 1978,* p. 29019.

107. "India, Pakistan to hold talks on Wullar Barrage next week", *The Kashmir Times*, Srinagar, 19 June 2007.

108. "50 years of Indus Basin Treaty", Report of the seminar organized by *Sustainable Development Policy Institute* (SDPI) Islamabad, on 20 February 2010.

109. Ahmer Bilal Soofi, "Legal Purview: Wullar Barrage, Siachen and Sir Creek", <http://www.southasianmedia.net/Magazine/Journal/7_legal_purview.htm>.

110. Ibid.

111. "Talks on Wullar barrage to continue", *Dawn,* 30 June 2005.

112. "Tulbul, Wullar barrage talks: Pak team reaches Delhi", *The Kashmir Times*, Srinagar, 30 August 2007.

113. "Talks on Wullar barrage...", op.cit., (ref.111).

114. "Tulbul, Wullar barrage talks...", op.cit., (ref.112).

115. Indrani Bagchi, "Govt keen to revive Tulbul project in J&K", *Times of India*, New Delhi, 12 February 2009.

116. Arjimand Hussain Talib, "Soz's Jhelum fantasy", *The Kashmir Times*, Srinagar, 25 September 2007.

117. Ibid.

118. B. G. Verghese, "Fuss over Indus -1: India's Rights are set out in the Treaty", *The Tribune*, Chandigarh, 25 May 2005.

119. Khaleeq Kiani, "Pakistan wants neutral expert on Baglihar dam: Meeting with India begins in Islamabad", *Dawn,* 17 January 2004.

120. Syed Shahid Husain, “Pakistan's Perspective: The Baglihar Project”, *South Asian Journal*, April-June 2005. <http://www.southasianmedia.net/Magazine/Journal/8_baglihar_project.htm>.
121. Khalid Mustafa, “Plan to offset impact on defence, *The News*, 13 February 2008.
122. Anwar Iqbal and Khaleeq Kiani, "World Bank’s Baglihar verdict may not end dispute, say experts, *Dawn* , 10 February 2007.
123. Shahid Husain, op.cit., (ref.120).
124. Ibid.
125. “Indus Water Treaty and Baglihar project: Relevance of International Watercourses Law”, *Economic and Political Weekly*, Mumbai, 16 July 2005.
126. Ramaswamy Iyer, “South Asian Water issues,” *South Asian Journal*, April-June 2005. <http://www.southasianmedia.net/Magazine/Journal/8_baglihar_project.htm>.
127. Gargi Prasai, “Baglihar: India may go in for technical changes”, *The Hindu*, 22 May 2005.
128. Robert G. Wirsing, & Christopher Jasparro, "Spotlight on Indus Water Diplomacy: India, Pakistan, and the Baglihar Dam", Asia-Pacific Center for Security Studies (APCSS), May 2006, p.5.
129. Aamir Kabir, "Baglihar controversy remains unresolved, *Dawn*, 28 June 2004.
130. Rauf Klasra, "Pak-India talks on Baglihar Plant fail", *The News*, 7 February 2003.
131. Husain, op.cit., (ref.120).
132. The Article VIII (4) (c) and (d) stand for cooperative arrangements, including a general tour of inspection once in five years to ascertain facts about various development works on rivers. Clause (d) stipulates a tour of inspection of such works or sites on the rivers as may be considered necessary to ascertain the facts connected with those works and sites.

133. Aamir Kabir, "Deadlock over Baglihar; who reaps the benefit?", *Dawn,* 8 March 2004.

134. B.G. Verghese, From Indus-I to Indus- II: Feeding into ongoing India-Pakistan Peace process", *Mainstream,* New Delhi, 2 July 2005.

135. Raymond Laffitte is a professor at the Swiss Federal Institute of Technology in Lausanne, Chairman of the Committee on Governance of Dam Projects of the International Commission on Large Dams (ICOLD). ICOLD is in favour of large dams.

136. "Baglihar Hydroelectric Plant: Expert Determination, Executive Summary," 12 February 2007, available at World Bank website, p.5.

137. Ibid.

138. Ibid.

139. Ibid., pp.9-10. Also see, Salman M. A. Salman, "The Baglihar difference and its resolution process- a triumph for the Indus Water Treaty? *Water Policy*, No. 10, 2008, p. 115.

140. Baglihar Hydroelectric Plant: op.cit. (ref.136), p.13.

141. Ibid., p.15.

142. Ibid., p.17.

143. Ibid., p.18.

144. Salman, op.cit., (ref.139), p.115.

145. Ibid., p.115.

146. "WB cuts Baglihar dam down to size", *The News*, 13 February 2007.

147. Khalid Mustafa, "Pakistan to move ICA on Baglihar dam issue", *The News*, 10 January 2010.

148. Gargi Parsai, "Baglihar dam: India claims moral victory", *The Hindu*, 13 February 2007. Date:13/02/2007 URL: <http://www.thehindu.com/2007/02/13/stories/2007021313270100.htm>.

149. Sonu Jain, "J&K can plug into more power as neutral expert clears Baglihar dam", *Indian Express*, New Delhi, 13 February 2007.

150. Ashfak Bokhari, "Water dispute takes serious turn", <http://www.dawn.com/2008/12/08/ebr17.htm>.

151. Ibid.

152. Qudssia Akhlaque, "Zardari may write to Singh on Chenab water", *The News,* 4 November 2008.

153. Gargi Parsai, "India rejects Pakistan's demand for compensation", *The Hindu*, 7 December 2008.

154. <http://www.sandrp.in/hydropower/Baglihar_Crucial_Facts_0207.pdf>.

155. "Indian team to discuss Kishanganga project on April 26", *The Hindustan Times*, Delhi, 20 April 2005.

156. Arshad H. Abbasi, "Lethal change of course ", *Dawn*, 9 February 2010.

157. Ahmad Fraz Khan, "Pak accepts India's deadline on Kishenganga project," *The Tribune*, 10 May 2005.

158. Verghese, "Fuss over Indus-I..." op.cit., (ref.118).

159. Ibid.

160. "Kishenganga project gets Central Cabinet's nod", *The Kashmir Times*, Jammu, 27 December 2008.

161. Khalid Mustafa, "Pakistan asks India to review modified design again, *The News*, 6 September 2006.

162. Indus Waters Commission of Pakistan.

163. Ibid.

164. "Kishenganga project gets...," op.cit., (ref.160).

165. Iftikhar Gilani, Kishenganga power project a non-starter; Steep cost escalation has centre in a tizzy", *The Kashmir Times*, Jammu, 19 April 2008: R. Suryamurthy, "Disputed dam sparks Indo-Pak race", *The Telegraph*, Calcutta, 16 April 2008. *Dawn*, 15 April 2008. Jawed Naqvi, Chinese help for dam in AJK spurs India response.

166. "Pak okay with Baglihar but stalemate over Kishenganga", *The Kashmir Times,* 2 August 2008.

167. "Kishenganga project gets..." op.cit., (ref.160).

168. Ibid.

169. Iftikhar Gilani, "Pakistan unlikely to be satisfied by Kishanganga's redesign", *Daily Times*, Islamabad, 21 April 2006.

170. Now they will decide it by draw of lots who — between the United Nations Secretary-General and the World Bank President — will appoint a chairman to head the court, will select the chairman for the Court of Arbitration. The draw of lots will also decide whether the Massachusetts Institute of Technology (MIT), United States, or the Imperial College of Engineering, UK, will select the technical umpire, and whether the Chief Justice of the US or the Lord Chief Justice of England and Wales will appoint the legal umpire.

171. Syed Faisal Shakeel, "Kishanganga dam: Pakistan urges India to resolve row", *The News*, 11 April 2007.

172. Khalid Mustafa, "Kaikobad is out, old team stays to fight Kishanganga, *The News,* 9 May 2010.

173. Shakeel, op.cit., (ref.171).

174. "Pak okay with Baglihar...", op.cit., (ref.166).

175. Indus Waters Commission of Pakistan.

176. Ibid.

177. "Uri-II Project", <http://www.nhpcindia.com/Projects/english/Scripts/Prj_Introduction.aspx?vid=21>.

178. "Uri-I Power Station", <http://www.nhpcindia.com/Projects/English/Scripts/Prj_Features.aspx?Vid=9>.

179. "Indus water commission meet begins in Delhi", *The Kashmir Times*, Srinagar, 1 June 2007.

180. Iftikhar Gilani, "Pak protest against Uri-II hydel project , *The Kashmir Times*, Srinagar, 2 June 2007.

181. 'Pak rejects contention that IWT hampers J&K's development: Indian team to visit Neelum valley", *The Kashmir Times,* Srinagar, 5 June 2007.

182. Rajeev Sharma, "Uri Project, Pak threatens to approach WB, *The Tribune*, 5 June 2007.

183. Ibid.

184. Khalid Mustafa, "India constructing three dams in held Kashmir", *The News*. 9 February 2009.

185. Khalid Mustafa, "Pakistan may send water experts to India", *The News*, 22 February 2009.

186. Arshad H. Abbasi, "Transboundary water governance ', *The Nation*, 2 April 2009.

187. "Pak, India resolve Baglihar Dam", *The Nation*, 2 June 2010.

188. "Salient features of Nimoo Bazgo H E Project (3×14 MW)", *Hydroelectric Power Plants",* available at <http://hydropowerstation.com/?p=798>.

189. Indus Waters Commission of Pakistan.

190. Ahmad Fraz Khan, "Pakistan and India disagree over power project", *Dawn*, March 30, 2010.

191. "India, Pakistan make little progress on water talks", *The News,* 23 July 2010.

192. Munawar Hasan, "India gives go-ahead to another dam on Chenab in IHK", *The News,* 14 March 2010.

193. Ibid.

194. Pakal Dul Project, <http://www.nhpcindia.com/Projects/English/Scripts/Prj_Introduction.aspx?vid=32>.

195. National Hydropower Corporation of India (NHPC), <http://www.nhpcindia.com>.

196. Ahmad Fraz Khan, "India to suspend work on power project ", *Dawn*, 31 May 2004.

197. Environmental Management for Power Development, a collaborative program coordinated by the World Bank. <http://www.worldbank.org/html/fpd/em/hydro/rrp.stm>.

198. *Mountains of Concrete: Dam Building in the Himalayas*, International Rivers, December 2008. p.2. Available at <www.internationalrivers.org/p.25.>.

199. Briscoe, "War or peace …", op.cit., (ref.43).

200. Ibid.

201. Ibid.

202. Ramaswamy R. Iyer, "Water through Pakistani eyes" 6 August 2010, URL: <http://www.thehindu.com/2010/08/06/stories/2010080654681200.htm>.

203. Shakeel, op.cit., (ref.171).

204. Sinha, op.cit., (ref.55), p.964.

205. Iftikhar Gilani, "Baglihar project accelerating erosion in IHK region", *Daily Times*, 10 September 2009.

206. Pia Malhotra, "Kashmir: A Case for Watershed Management?", *IPCS,* Article#3194, 19 July 2010. available at <http://www.ipcs.org/article/jammu-kashmir/kashmir-a-case-for-watershed-management-3194.html>

207. "Baglihar HEP: Some Crucial Facts", South Asia Network on Dams, Rivers and People (SANDRP), May-June 2005. <http://www.sandrp.in/hydropower/Baglihar_Crucial_Facts_0207.pdf>.

208. Declining generation of big hydro projects", South Asia Network on Dams, Rivers and People (SANDRP), April-May 2010. p.5. <http://www.sandrp.in/drp/DRP_Apr_May-2010.pdf>.

209. "Baglihar HEP: Some Crucial Facts", op.cit., (ref.207).

210. "50 years of Indus Basin Treaty", Report of the seminar organized by Sustainable Development Policy Institute (SDPI) Islamabad, on 20 February 2010.

211. "India, Pakistan make little progress on water talks", *The News*. 23 July 2010.

212. Ahmad Fraz Khan, "Pakistan and India agree to install telemetry system," *Dawn,* 23 July 2010.

213. "India and Pakistan must use water as a tool to build trust", *The Hindu*, 31 July 2010.

214. Indus Waters Commission sources.

215. Sandeep Dikshit, “Pakistan for new measures to energize Indus Treaty”, *The Hindu*, 13 March 2010.

216. Khalid Hussain, “Water, War and Peace: Indus Water Treaty under Threat-Part III”, <http://www.amankiasha.com_cat.asp?catId=1&id=50>.

217. “Lurking threat to peace process”, *The Kashmir Times*, Jammu, 18 October 2008.

218. Ibid.

219. Abbasi, “Lethal change of course”, op.cit., (ref.156).

220. Dikshit, “Pakistan for new measures,” op.cit., (ref.215).

221. “India agrees to site inspection of hydropower projects”, *The News*, 24 July 2010.

222. Imtiaz Ali, “India not responsible for water shortage: envoy”, *The News*, 4 April 2010.

223. Is Commission effective in resolving the issues? “Pakistan, India to jointly inspect pollution of drains”, *Daily Times*, 24 July 2010.

224. Kaiser Bengali, “Water Management...” op.cit., (ref.23), p.61.

225. “Water at a crossroads,” op.cit., (ref.4), p.51.

CONTENTS