

## **Trans-boundary River Basins in South Asia: Options for Conflict Resolution**

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South Asian trans-boundary issues are inextricably linked to regional geopolitics since the main trans-national river systems are circum-Himalayan and involve countries that are unequal in size and power and have been involved in wars in the last six decades. The main river systems, the Indus, the Ganges and the Brahmaputra are all connected to the Tibet Autonomous Region (TAR) of China. The Indus basin connects China, Afghanistan, Pakistan and India, while the Brahmaputra and the Ganga connect China, Bhutan, India, Nepal and Bangladesh. India has been involved in military conflict with China and Pakistan and water-related tensions with Pakistan and Bangladesh. India regards Nepal as its special sphere of influence and has very strong interests in Nepal’s rivers.

India and China are in a phase of rapid economic expansion, resulting in increased use of water and hydropower. Both India and China have plans to step up inter-basin water transfers to meet their water demands and have accelerated their hydropower dam construction programmes. Both countries also economically and politically overshadow their smaller neighbours and countries downstream of these long and large river systems.

In all, India’s trans-boundary riparian policies affect four countries – Pakistan, Nepal, Bhutan and Bangladesh – on three river systems – the Indus, the Ganga and the Brahmaputra-Meghna. China’s riparian policies affect nine countries to the south – Pakistan, India, Nepal, Bangladesh, Myanmar, Laos, Thailand, Cambodia and Vietnam – on five river systems – the Indus, the Ganga, the Brahmaputra, the Salween and the Mekong.

The most crucial geo-political aspect of the trans-boundary South Asian basins is the hydrological dependence of all of them on China. The headwaters of all these rivers, except the main Ganga river, rise within a few hundred kilometers of each other, in the south-western region of the Tibetan plateau. The headwaters of some major mid-stream tributaries of the Ganga rise in the Tibetan plateau and pass through the width of Nepal. This has important consequences, given that China is the largest and technologically the most advanced country among these co-riparian countries.

The second major geo-political factor is that the three countries of South Asia, Bangladesh, India and Pakistan, were administratively a single unit under the British Empire, before being divided first into two and then three countries under hostile circumstances. With the first division into India and Pakistan in 1947, both the Indus basin and the Ganga-Brahmaputra basin were divided between the two countries. Subsequently, Bangladesh, where the Ganga-Brahmaputra-Meghna system flows into the Bay of Bengal, was created out of East Pakistan in 1971.

## The Indus Basin

The Indus basin consists of six major rivers. The mainstream of the Indus rises in Tibet and flows down to the Arabian Sea in the Sindh province of Pakistan. The other five rivers are the Jhelum, Chenab, Ravi, Beas and Sutlej<sup>1</sup>. The Indus originates in the [Tibetan plateau](#) near [Lake Mansarovar](#), flows through the [Ladakh](#) district of state of [Jammu and Kashmir](#) of India and then enters Pakistan. There it flows through the [Northern Areas](#), the North West Frontier Province, Punjab, eastern Baluchistan and Sindh. At Mithankot in Punjab it is joined by the Panjnad River, itself the consolidated flow of the Jhelum, Chenab, Ravi, Beas and Sutlej. Being snow-fed and rain-fed, the Indus, which extends 3,180 kilometres, exhibits seasonal fluctuations of flow.

Four of the five rivers that make up the Panjnad rise in India and flow through Pakistan. These are the Jhelum, the Chenab, the Ravi and the Beas. The fifth, the Sutlej, rises in Tibet and flows through India before entering Pakistan. The Jhelum rises below the Pir Panjal range in Himachal Pradesh, flows through the Wular lake and enters Pakistan. After flowing a length of 813 kilometres it joins the Chenab. The Chenab rises in Himachal Pradesh in India and enters Pakistan in Punjab. The Chenab is joined by the Jhelum and lower downstream by the Ravi after which it merges with the Sutlej to become the Panjnad that joins the Indus at Mithankot.

The Ravi River, which flows a total length of 720 kilometres, rises in the [Rohtang Pass](#) near [Kullu](#) in [Himachal Pradesh](#), India, and joins the Chenab in Pakistan after flowing through the Indian city of Amritsar and the Pakistani city of Lahore. The 460 kilometre long Beas River rises in the [Himalayas](#) in [Himachal Pradesh](#), India, and joins the [Sutlej River](#) in the Indian [Punjab](#). The Sutlej which rises from Lake Rakshasthal in Tibet is, at 960 kilometres, the longest and easternmost of the five main tributary rivers of the Indus.

Some 300 million people are estimated to live in the Indus basin, which covers a total estimated area of 1.12 million km<sup>2</sup>, of which 8 percent lies in China, 47 percent in Pakistan, 6 percent in Afghanistan and 39 percent in India. The Indus is the mainstay of Pakistan, covering 520,000 km<sup>2</sup> and every province. It substantially serves the Northern Areas, the North West Frontier Province (NWFP), Punjab and Sindh province, and the eastern portion of Baluchistan.

In India the principal tributaries of the Indus mainstream drain an estimated 440,000 km<sup>2</sup>. These rivers supply water to the states of Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana and Rajasthan. Over the last few decades there has been considerable fluctuation and overall decline in the flow of the Indus. When the Indus Water Treaty (IWT)<sup>2</sup> was signed it was estimated, based on a 25 year average from 1921 to 1946<sup>3</sup>, that the total flow in the Indus was 207 km<sup>3</sup> (1

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<sup>1</sup> The Indus also has some smaller western tributaries, such as the Kabul and Gomal rivers. These tributaries do not concern India-Pakistan trans-boundary relations.

<sup>2</sup> (a) *Op. cit. 12, pp. 248-250; and also, (b)* S.M.A. Salman and K. Uprety, *Conflict and Cooperation on South Asia's International Rivers: A Legal Perspective*, 2002, Washington, DC: World Bank, pp. 37-61.

<sup>3</sup> 2011, Aquastat, Food and Agriculture Organization's Information System on Water and Agriculture, at [http://www.fao.org/nr/water/aquastat/countries\\_regions/asia\\_southeast/index.stm](http://www.fao.org/nr/water/aquastat/countries_regions/asia_southeast/index.stm)

suggests that the flow on the Indus was 232.487 km<sup>3</sup> of which an estimated 181.62 km<sup>3</sup> of water flowed from China to the Indian part of the Indus basin. From India, the flows from the western and eastern tributaries into Pakistan were estimated to be 50.86 km<sup>3</sup>

$\text{km}^3 = 1 \times 10^{12}$  litres). This was inclusive of the flow of the eastern and western rivers of the eastern tributary system.

Before the partition that created India and Pakistan, the British government had, from the 1850s, constructed an extensive canal irrigation network in undivided Punjab, which was developed for commercial agriculture. In 1859 the Upper Bari Doab Canal on the Ravi River was completed which replaced the seasonal inundation canals in operation till then. In 1872 the Sirhind Canal was completed on the Sutlej. In 1886 the Sidhnai barrage and canal became operational on the Ravi River. This was followed by the Lower Chenab canal in 1892, and the Lower Jhelum in 1901. Between 1885 and 1914 the Lower and Upper Swat, the Kabul River and Paharpur Canals in NWFP (Pakistan) were completed.

A sub-basin river transfer scheme, the Triple Canal Project was initiated in 1907 and completed in 1915. Through this project water was transferred from the Jhelum and Chenab to the Ravi. Infrastructure development on the Indus was almost continuous since then. In the 1930s and 40s the Sutlej Valley Project, the Sukkur Barrage on the lower Indus, the Haveli and Rangpur canal systems on the Chenab and the Thal Canal on the Indus were completed in quick succession.

When India and Pakistan were created by the partition of 1947, the entire inter-connected system was disrupted since the upstream of the rivers on which these projects were constructed went to India, including two important head-works, Madhopur on the Ravi and Ferozpur on the Sutlej, on which the irrigation of Pakistan Punjab depended. In addition, this was the period of dam construction as the hydro-technocratic establishment gained control over rivers. Consequently, partition created additional conflicts over water.

Soon after the partition, due to the problems of water control on the Indus basin that arose almost immediately, a standstill arrangement was signed between the countries, maintaining the existing flow of water till March 1948. With the expiry of the standstill agreement, conflict arose once again as India withheld water flowing through the head-works that it controlled. This crisis led to the Inter Dominion Agreement of 1948, signed in May 1948. The agreement proved to be inadequate and problems over the Indus waters continued.

In 1951 the World Bank initiated talks towards a more durable and acceptable settlement. Finally after nine years of disagreement the IWT was signed in 1960, allocating the waters of the three eastern rivers, Sutlej, Beas and Ravi to India and the three western rivers Indus, Jhelum and Chenab to Pakistan. India was given some upstream rights, including restricted consumptive and storage rights, to enable flow control necessary for power generation on the western rivers in Indian territory.

To build infrastructure to replace what Pakistan had lost from the use of the eastern rivers and to augment the flow of the western rivers the Indus Basin Project was launched. This included the Tarbela dam on the Indus, the Mangala dam on the Jhelum and several barrages and eight link canals to carry out water transfers between the three western rivers and irrigate areas formerly

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Hydrographic estimates tend to vary, depending upon the period under consideration because long term averages are increasingly affected by significant annual fluctuations in flow.

supplied by the eastern rivers. India meanwhile also set up multi-purpose projects on the eastern rivers, the Bakhra Nangal on the Sutlej, the Pong on the Beas and the Thein on the Beas. The three eastern rivers also have link canals for sub-basin inter-river water transfer.

A number of water works were taken up both in India and Pakistan soon after partition, even before the IWT was signed. In Pakistan the Guddu, Kotri and Taunsa barrages were built on the Indus. Three sub-basin link canals were also constructed prior to the initiation of the Indus Basin Project (IBP). After the IWT several major projects were taken up to realign the existing network and to add capacity. Pakistan's Indus Basin Project (IBP) was developed after the IWT. From 1960 a series of replacement works to compensate for structures lost to India were undertaken. The two main components of IBP were the major storage reservoirs, Mangla on the Jhelum and Tarbela on the Indus. The Mangla Dam was completed in 1968. The Tarbela dam started partial operation in 1975-76.

In Pakistan 14.87 million hectares are served by the Indus system, which includes Tarbela, Mangla, and Chashma reservoirs, 23 barrages, head-works and siphons, 12 inter-river link canals and 45 canal commands. The total installed dam capacity on the Indus system in Pakistan is estimated at 23.36 km<sup>3</sup>. Apart from the three large hydropower dams there are over 50 smaller dams.

After the signing of the IWT India also undertook massive infrastructure development works on the Indus. India has six large dams in the Indus River Basin. These are the Bhakra and Nangal dams on the Sutlej, the Salal and Baglihar on the Chenab and the Pandoh and Pong on the Beas. Together they have a total capacity of 18.6 km<sup>3</sup>.

### **The Greater Ganga Basin**

The Greater Ganga Basin (GGB) consists of the areas in Nepal, Bhutan, India and Bangladesh drained by the Ganga and its tributaries, the Brahmaputra, and the Barak-Meghna rivers. The Ganga and the Brahmaputra are complex systems made up of an intricate web of rivers that flow through different countries and terrains. About 500 million people are estimated to live in the GGB, whose total annual discharges into the Bay of Bengal in Bangladesh exceeds 1,110.6 km<sup>3</sup>.

The mainstream of the Ganga rises in the Garhwal Himalaya in India. Principle tributaries from Nepal rising in the trans-Himalayan watershed join the Ganga midstream. These are Mahakali, Gandaki, Karnali and Koshi rivers. Before the Ganga enters Bangladesh it branches into two. While the eastern branch flows into Bangladesh, the western branch, known as the Bhagirathi, flows into the Indian state of West Bengal and becomes the Hooghly in Kolkata. The annual flow of the Ganges from China to Nepal is 12.0 km<sup>3</sup>. From Nepal the tributaries provide an annual discharge of 210.2 km<sup>3</sup> into the Ganga. The annual flow of the Ganga from India to Bangladesh is 525.02 km<sup>3</sup>.

The Brahmaputra, rising in the Tibetan plateau and flowing through the TAR by the name of Yarlung Tsangpo, after covering about 1,600 kilometres of Chinese territory, enters India through Arunachal Pradesh in the north-east, where it is called the Siang. The Siang is joined by the Dibang and the Lohit rivers and is then known as the Brahmaputra. Joined by many

tributaries as it flows westward it enters Bangladesh where it becomes the Jamuna and merges with the Ganga to become the Padma. This is joined by the Barak, which becomes the Meghna on entering Bangladesh. The total length of the Brahmaputra is about 2,800 kilometres.

The total drainage basin of the Brahmaputra, which has some 150 tributaries, is roughly about 5,80,000 km<sup>2</sup>. Approximately 50.5 per cent of this area is in China, 8 per cent is in Bhutan, 33.6 per cent is in India, and 8 per cent is in Bangladesh. Most of the river's rain-fed tributaries are in India and some of its glacier-fed tributaries rise in Tibet. Annually the Yarlung Tsangpo discharges 165.40 km<sup>3</sup> of water into the Brahmaputra. Bhutan contributes 78 km<sup>3</sup> of annual discharge to the Brahmaputra. The Brahmaputra then carries some 537.24 km<sup>3</sup> of water into Bangladesh.

The Barak River rises in north-east India and branches into two, the Surma and the Kushiara which merge as the Meghna in Bangladesh. The Ganga-Brahmaputra which becomes the Padma are joined by the Meghna after which the consolidated waters are called lower Meghna. Together the Ganga, the Brahmaputra and the Meghna rivers create a huge delta through which the waters are discharged into the Bay of Bengal. The annual flow of the Meghna River basin from India to Bangladesh is 48.36 km<sup>3</sup>.

From the mid-19th century, building on the existing foundation of traditional irrigation canals, the British initiated a programme of rapid infrastructure development in the Ganga basin, beginning with the 9,575 kilometre Upper Ganga Canal system regulated by the Bhimgoda dam in Haridwar, and the 8,240 kilometre Lower Ganga Canal system. Other irrigations works in the basin include the Eastern and Western Yamuna Canals, the Sone canal in Bihar, the Tribeni canal on the Gandak and the Sarda Canal system.

Independent India expanded the irrigation system by initiating more projects. Some irrigation development was also undertaken by the then Pakistan government in what is today Bangladesh. In the 1960s, the government of Pakistan implemented Ganges-Kobadak irrigation project downstream of Hardinge Bridge. Presently the total irrigated area in the Greater Ganga basin is estimated to be around 35.1 million hectares. Of the 82.2 percent is in India, 14 percent is in Bangladesh, 3.3 percent is in Nepal, 0.4 percent is in China and 0.1 percent is in Bhutan.

There has also been extensive dam construction in the GGB, which has accelerated in recent decades, in Bhutan, Nepal and India. The most controversial of these was the Tehri dam in India on the Bhagirathi, completed in 2006. Some of the other important projects in the Ganga basin are Gandhi Sagar, Rana Partap Sagar, Rajghat, Rihand, Tenughat, Maithon and Kangasabati. In all India has reportedly constructed about 200 major, medium and small storage dams in the basin.

In Nepal too dam capacity is being expanded with Indian investment and technology. The present total dam capacity is estimated at 85 million m<sup>3</sup>. The water establishment has estimated that potential exists for more. New dams surveys are being conducted for Pancheshwar, Koshi High Dam, Upper Karnali, Upper Seti, Arun 3 and many more.

Bhutan has also been building dams with Indian financial investment and technical assistance. The existing dams in Bhutan are the 40 m high Chhukha dam on the Wang River, the 91 m high Tala-Wankha dam also on the Wang River, the 33 m high Kurichhu dam on the Kuri River, the Basochu dam on the Basochu River, the 141 m high Punatsangchu dam on Puna Tsang River. The Tala Hydro Power Project was commissioned in 2006. The Mangdechhu Hydropower Project consisting of two dams and the Sunkosh Multipurpose Project (SMP), the largest yet in the country, are in the pipeline.

The Bhutan model has had unfortunate consequences. It is ironic that the downstream impact of the dams in Bhutan, built with Indian financial and technical assistance, for export of power to India, is felt in India. Kurichu and Mangdechu will also impact on Manas Wildlife Sanctuary, a UNESCO world heritage site

### **Treaties and Conflicts in the Indus Basin**

Both the Indus and the Ganga-Brahmaputra-Meghna basin are covered by trans-boundary riparian treaties. The Indus is a trans-boundary co-basin treaty that covers all the shared rivers in the basin. The treaty emerged from protracted talks mediated by a third party, the World Bank, following a series of crisis on the Indus basin arising from the haphazard nature of partition, which left India with the capacity to turn off water flow to Pakistan.

Because the Inter-Dominion Agreement of 1948 was inadequate to deal with the situation and periodic conflicts arose on the Indus, the World Bank initiated talks in 1951 which lasted for nine years before it crystallized into a treaty. The Indus Water Treaty of 1960 has 12 Articles and 9 Annexures, which cover a range of issues on river sharing, restriction on use and mechanisms for resolving problems<sup>4</sup>.

As per the IWT, the Indian part of the eastern rivers, the Sutlej, the Beas and the Ravi, were given over to India to use, provided that any major water works that it constructed does not affect the overall pattern and volume of flow of the basin. The Indian part of the western rivers, the Jhelum and the Chenab were not available for consumptive use or storage, with some limited technical margin.

To deal with the prickly issues arising from the sharing a large basin between two hostile countries, the IWT established a Permanent Indus Commission to sort out issues that are referred to as ‘questions’. A question that cannot be resolved by the Commission is a ‘difference’, which is to be resolved through the offices of a neutral expert identified by the World Bank and appointed in consultation with both governments. Higher than a difference is a ‘dispute’, which is to be taken to a 7-member arbitration court that is to be constituted by the two governments and relevant multi-lateral institutions.

While it has been suggested that the IWT is a successful instance of water co-operation, the treaty is under increasing stress as competition for the Indus waters is on the rise. Three recent

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<sup>4</sup> For a brief summary and timeline of the India-Pakistan water conflict and the various agreements leading up to the Indus Water Treaty see [http://www.trans-boundarywaters.orst.edu/research/case\\_studies/Indus\\_New.htm](http://www.trans-boundarywaters.orst.edu/research/case_studies/Indus_New.htm)

instances concerning the Chenab and the Jhelum are conspicuous. In 1999, India began the construction of the 450 megawatt Baglihar Hydropower Project on the Chenab River in the state of Jammu and Kashmir. After the construction began, Pakistan raised concerns about the design parameters of the project, arguing that it exceeded the necessary storage requirements, thus giving India the capacity to regulate the flow of the river. Following several inconclusive rounds of talks between 1999 and 2004, Pakistan, in January 2005, submitted six objections to the World Bank. This was the first time that a neutral expert had to be called in to resolve the matter.

The World Bank ruled that Pakistan's submission constituted a 'difference' and in May 2005 appointed a Swiss engineer as the neutral expert to adjudicate the matter. In February 2007 the neutral expert submitted his verdict rejecting Pakistan's objection on the height and gated control of the spillway, but asked India to lower the dam height by 1.5 metres, raise the power intake tunnels by 3 metres and reduce the storage capacity from 37.5 million cubic metres to 32.58 cubic metres.

The verdict has not resolved the problem. Pakistan claims that India has impounded 0.2 million acre feet of water at the dam and reduced flow in the Chenab by 20,000 cusecs. India attributes the reduced flow to drought conditions in the upstream catchment. The neutral expert's decision has also been criticized by water experts on the ground that it is a technical verdict based on criteria of techno-economic efficiency and is indifferent to the spirit of the treaty and the realities of India-Pakistan relations.

There are two other Indian projects involving the Jhelum and its tributary, the Kishanganga (which becomes the Neelum in Pakistan and joins the Jhelum), and the Wular Barrage / Tulbul Navigation Project. India initiated the 330 megawatt Kishenganga Project on the Kishanganga River in 1997. Pakistan says that it had in 1989 informed India of its own plan to construct a 969 megawatt project on the Neelum River.

Pakistan's complaint is that India's project involves a transfer of the Kishanganga water to the Jhelum at Wular lake and thereby affect not only its own project on the Neelum but would alter the overall pattern of flow in the Indus basin. In response to Pakistan's objections India says that the height of the proposed dam has been lowered from 98 metres to 37 metres.

In May 2011 Pakistan sought the intervention of an arbitration panel and in June, though work on the tunnels has begun, an international delegation visited the dam site to determine the validity of Pakistan's complaints. Within the current framework of economic development the stakes are high for both countries. If a mutually acceptable solution is not identified, the treaty will be severely tested, as will overall relations between India and Pakistan.

The second project on the Jhelum against which Pakistan has protested is the Tulbul Navigation Project on the Wular Lake. India began construction of a 134 metre long and 12 metre wide barrage, with a storage capacity of 0.30 million acre feet, at the mouth of the Wular lake. India justifies it on the ground that it was required for maintaining minimum depth in the Kashmir valley of Jhelum River to enable year round navigation. Pakistan raised objections to the construction in 1986 invoking Article I, which prohibits artificial obstructions that result in a

change in the volume of water, and Article III, which prohibits India from storing water on the western rivers.

Pakistan's concerns pertained to the adverse effect of the barrage on the its triple canal project downstream – the Upper Jhelum, the Upper Chenab and Lower Bari Doab canals. In 1987 Pakistan referred the matter to the Indus Commission, following which India halted work on the Wular project. In May of 2011 a new round of talks was opened following 13 inconclusive rounds since 1987. At these talks India offered to leave one of the gates of the barrage open. However, a section of opinion in Pakistan has argued against such a minor modification.

These are only three instances of conflict over projects that commenced many years ago. There are many pending Indian projects on the Indus that will invite opposition from Pakistan. The situation is aggravated by the volatile state of flow in the river owing to changes upstream, most notably glacial melt, which can in the short and medium run increase season flow and at the same time increase sediment load. The former will necessitate changes in the flow control schedules and the latter could seriously affect storage structures on account of increased siltation.

These trans-boundary conflicts are in addition to intractable domestic conflicts in both India and Pakistan. The Indus waters are distributed in India between Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana and Rajasthan. In Pakistan, competition has increased between Punjab and Sindh and has provoked resentment in the Northern Areas. In both countries these disputes have not been handled very well as economic development has placed many demands on the waters of the Indus.

### **Treaties and Conflicts in the Greater Ganga Basin**

Unlike the Indus basin, which covers the entire co-riparian basin and has a mechanism for conflict resolution which moves progressively towards third-party mediation acceptable to both countries, the GGB does not have a single treaty. Nor does it have well-defined and feasible conflict resolution mechanisms. The main reason for this is that co-riparian basin is shared among four countries – Nepal, Bhutan, India and Bangladesh. This basin is overwhelmingly dominated by India which claims both upstream and downstream rights. The treaties in this basin are piecemeal, on a river by river basis, except for the agreement with Bangladesh, which subsumes the lower part of the combined basin and therefore, has multi-river upstream implications.

The first international treaty in the basin was the Sarda Barrage Letter of Exchange between the British Indian government and the government of Nepal in 1920 for the diversion of the Mahakali-Sarda water for irrigation of what is currently Uttar Pradesh in India. This agreement was the historical precursor for all subsequent agreements, treaties and projects between India and Nepal. It provided Nepal with a canal and 460 cusecs of free water for irrigation, and, subject to availability of surplus water, up to an additional 1,000 cusecs during the planting season. The agreement was mainly related to the use of Nepali land for the construction of the barrage and, in return for cooperating with the British-Indian government, Nepal got 'free' water. This treaty did not evolve any other basic principles of trans-boundary water management and

benefit-sharing. Because of the absence of fair principles of equitable sharing and sustainable use in this treaty, all subsequent treaties suffer from the same inadequacy.

The second treaty was the Koshi Agreement of 1954 in which Nepal's prior right to withdraw water from the Koshi River and/or its tributaries as and when required was preserved.<sup>5</sup> However, with respect to sharing of irrigation and hydropower, there was resentment in Nepal that the treaty was grossly unfair. Some rectifications were made in the revised agreement of 1966 to provide a few more benefits for Nepal. The third agreement was the 1959 Gandak Agreement<sup>6</sup>, which was similar to the original 1954 Koshi agreement in terms of benefits to Nepal. Nepal was to receive 15,000KW of power and 20 cusecs of water for irrigation from each of the western and eastern canals. The rest of the power and water went to India. Unlike the Koshi Agreement, Nepal's right to withdraw water from the Gandak and its tributaries was restricted to ensure the maintenance of minimum water flow for the project.<sup>7</sup>

The 1991 Tanakpur Barrage<sup>8</sup> agreement was signed in a form of Memorandum of Understanding between the two Governments. It expanded the scope of the original Sarda project to cover the Tanakpur hydropower project on the same river, work on which had already commenced in 1988. This agreement was declared unconstitutional by the Nepali Supreme Court as it was never presented for ratification before the Parliament as required for under the 1990 Constitution. The agreement secured the use of Nepali territory covering an area of 2.9 hectares, to build a 577-metre long afflux bund to generate "the desired amount of electricity for India".<sup>9</sup> In return, Nepal was given only 10 MW of power annually, only initially "free" of cost, and 150 cusecs of water to irrigate some 4,000-5,000 hectares of Nepali land.

The fourth agreement, known as the Mahakali Treaty, was signed in 1996 between Nepal and India.<sup>10</sup> In addition to the incorporation of the Sharada Barrage and the revival of the constitutionally defunct Tanakpur Barrage, its centrepiece was the construction of the multi-purpose Pancheswar dam. This treaty, for the first time in India-Nepal water relations, laid down some specific principles on the sharing of the waters of the trans-boundary river. It recognised "the principle of equal rights over the waters of the river" and "equal entitlement in the utilisation of the waters of the Mahakali River".<sup>11</sup> However, this principle was undermined by the provisions relating to the existing consumptive use of the Mahakali waters before its allocation under the Mahakali Treaty, particularly after the construction of the Pancheswar

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<sup>5</sup> (a) Agreement between His Majesty's Government of Nepal and the Government of India concerning the Koshi Project. Signed on 25 April 1954 followed by the Revised Agreement between His Majesty's Government of Nepal and the Government of India on 9 December 1966, Article 4; (b) *ibid*, p. 125; and also, (c) *op. cit.* 18, pp. 144-145.

<sup>6</sup> *Op. cit.* 74, p. 126.

<sup>7</sup> *Ibid*, pp. 126-127.

<sup>8</sup> *Ibid*, p. 129.

<sup>9</sup> *Ibid*, p. 128.

<sup>10</sup> Treaty between His Majesty's Government of Nepal and the Government of India, concerning the Integrated Development of the Mahakali River including Sharada Barrage, Tanakpur Barrage and Pancheshwar Project. Signed on 12 February 1996 and ratified by the Parliament of Nepal on 4 September 1996. A. Shrestha, S. Rana, M.P. Siwakoti, R. Bhandari and K.K. Siwakoti (eds.), *Nepal-India and China Treaties (Detailed Commentaries)* (*Nepal-Bharat ra Chin Sandhi (Samikchhyatmak Bibechana)*), 2066 (2009), Kathmandu: Madhuban Prakashan, pp. 234-241.

<sup>11</sup> Article 3, *op. cit.* 84.

project, as there is no clear definition of the term “consumptive use”.<sup>12</sup> Moreover, benefit-sharing was provided in proportion to the costs borne by the two contracting parties concerned, which is perceived in Nepal as being favourable to India.

This treaty provoked intense hostility in Nepal even though it was ratified by Parliament as required by the Constitution. The treaty has been in limbo for 15 years and there is no likelihood of it every becoming applicable with Nepali consent. Perhaps in order to avoid the Nepali constitutional provisions of ratification, several agreements or contracts for hydropower projects in Nepal have subsequently been signed between Indian public and private companies and the Government of Nepal, applying the principle of build, own, operate and transfer (BOOT). These agreements/contracts signed between the government of Nepal and Indian companies, mainly GMR-ITD and Satluj Jal Vidyut Nigam Limited, for infrastructure development on Upper Karnali and Arun 3, are contentious because they are deemed to be unequal in intent and outcome. In July 2011, the West Seti agreement, of similar nature, signed with the Australian multinational company, Snowy Mountain Engineering Corporation (SMEC), was terminated following massive public campaigns over the past 15 years and due to SMEC’s failure to manage financing. The purpose of such agreements is specifically designed to circumvent the requirement of parliamentary ratification had they been government-to-government agreements. There are no clear constitutional provisions covering such “public-private” agreements. However, domestic opposition continues at many of these dam sites, particularly in Upper Karnali.

While India and Bhutan have managed to work out an arrangement for India to benefit from Bhutan’s rivers, India and Bangladesh have had continuous problems since 1951, ever since Pakistan discovered India’s plans to build the Farakka diversionary barrage to divert water, between January and June, to the Hooghly and Kolkata port. The diversion would affect flow of water into the Padma in what was then East Pakistan and is today Bangladesh. By 1952 the complaint had enlarged to include a reported diversionary project on the Gandak for irrigation. In 1960 the first bilateral negotiations took place on the Ganga, but soon, thereafter, India announced that it was proceeding with the Farakka project. Following this there were four technical discussions in 1961 and another in 1968. Five subsequent meetings were held between 1968 and 1970 by which time India had completed construction of the barrage.

In 1971 Bangladesh became independent and in 1972 an Indo-Bangladesh Joint Rivers Commission (JRC) was set up by the Treaty of Friendship, Cooperation and Peace, but its mandate excluded the sharing of river waters, which has to be dealt with at the prime ministerial level. In 1974 a Joint Declaration stated that flow in the Ganga would need to be augmented in the lean season to meet the needs of Kolkata port and Bangladesh’s requirements. At the JRC Bangladesh proposed storage schemes in India and Nepal to maintain flow in the lean season. India rejected this suggestion and proposed instead sub-basin transfer from the Brahmaputra to the Ganga, which Bangladesh rejected.

Persistent problems relating to Bangladesh’s claim that India was overdrawing water and endangering habitats in the delta led to the Interim Agreement of 1975. In 1975 Bangladesh

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<sup>12</sup> *Op. cit.* 74, p. 134.

acceded to India's request to test run the Farakka diversion in ten-day periods from April to May. India, however, continued to divert water at the facility's full capacity even through the lean season of 1976. Since India failed to discontinue the diversion, whose effect downstream was catastrophic, Bangladesh approached the UN, which advised both countries to negotiate a settlement. Following this several rounds of talks were held which led to the five year agreement on sharing dry season flow, giving Bangladesh 60 percent of the volume at Farakka. A Guarantee Clause gave Bangladesh 80 percent of water flow in case of exceptionally low flow.

To augment lean season flow Bangladesh reiterated its earlier position of storage facilities in India and Nepal and India reiterated its proposal for a diversion from the Brahmaputra which Bangladesh rejected. In 1982 when the five-year agreement lapsed a new two-year Memorandum of Understanding was signed, which was followed by a three-year Memorandum of Understanding after the unilateral Indian withdrawals at Farakka in the lean season of 1985. When this arrangement expired in 1988, there was no mechanism for water sharing and India commenced unilateral withdrawals that year. In 1992 there was a prime ministerial level agreement to find a solution for allocation all the 54 trans-boundary rivers shared by India and Bangladesh.

Finally in 1996 the two countries signed the 30 year Ganges Water Treaty<sup>13</sup>, recognising Bangladesh's lower riparian rights. Despite all the agreements of the past, problems had persisted on the issue of the amount of water India was diverting at Farakka. The Ganges Water Treaty of 1996 was meant to sort out this problem, but the Treaty has not been very successful in amicably resolving issues. Compared to the previous agreements, the Treaty has prescribed for "an actual formula for sharing the waters of the Ganges between the two countries"<sup>14</sup> by applying the principle of equality in the share of waters, based on the balance of flow available at different periods of time.<sup>15</sup> In case of emergencies, where flow is reduced to below 50,000 cusecs in any 10-day period, "the principles of equity, fair play and no harm" will be applied.<sup>16</sup>

## **International Law and Its Absence**

In South Asia multilateral treaties to govern the use of trans-boundary rivers is glaringly absent. In large part this is because India, as a middle riparian, uses different upstream and downstream principles depending on the river and the country it is dealing with. And China, which has the headwaters of two of these river systems and of some of the principle tributaries of the third country is not part of any treaty arrangement in either South Asia or South East Asia. Of the countries in these trans-Himalayan basins, China voted against the 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses (UNCIW), India and Pakistan abstained, Bhutan absented itself. Only Bangladesh and Nepal voted in favour of it.

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<sup>13</sup> The Treaty between the Government of the Republic of India and the Government of the People's Republic of Bangladesh on Sharing of the Ganga/Ganges Waters at Farakka was signed 12 December 1996 to be valid for a period of 30 years. *Op. cit.* 1, pp. 257-259.

<sup>14</sup> *Ibid(b)*.

<sup>15</sup> *Ibid(b)*, p. 172.

<sup>16</sup> *Ibid*, Article IX.

It is abundantly clear that much of the disputes surrounding trans-boundary rivers in South Asia have clearly adhered to certain principles of international law. Yet they are governed only by a few bi-lateral treaties that derive very little from international legal instruments, standards and judicial precedents. However, most of the established principles are practiced by India but only within its territory on inter-state water sharing issues and disputes. Due to regional imbalances in power among the South Asian countries, mutual hostility, suspicion and the absence of a universally binding international legal regime, sharing trans-boundary rivers and simultaneously ensuring the health of the riparian ecosystem has become complex. Multilateral attention to the problems of South Asia's trans-boundary rivers is also ad hoc and rarely comprehensive in focus. Conflict over water has increasingly come to dominate the international discourse so that the equally important issue of the deteriorating condition of these rivers barely figures in the documents of most institutions.

As regards inter-country conflicts, there are precedents to draw from as is clear from the existing international instruments governing trans-boundary rivers. There are now over 300 watercourses laws, treaties and agreements of different kinds worldwide<sup>17</sup>. The evolution of trans-boundary watercourses law has many levels, stages and constituencies. Historically speaking, they were first found among religious, cultural and social traditions, rituals and practices of the communities living in river-basin areas<sup>18</sup>. These constitute community law whose force in South Asia is increasingly being undermined by domestic statutory law and inter-governmental treaties and agreements.

Traditional law and custom incorporated the principle of protecting the water source, which historically entered judicially created common law as the 'natural flow' doctrine. Moreover, traditional frameworks of water use were held together by religious and cultural sanctions pertaining to water bodies that were treated as sacred. Even today, in the remoter areas of Nepal such customary notions and institutions still survive among the different indigenous and ethnic communities, but as people lose control of water to corporations and the state, these are steadily being undermined. These are being regularly reflected in various declarations adopted in recent years by local communities and the civil society movements in Nepal and South Asia.

The modern technocratic developmental states, whose primary aim is to maximise productive resource utilization, has emerged and expanded in scope over the last 200 years. To achieve its utilitarian objectives it has promulgated national legislation, bi-lateral or multi-lateral agreements which led to judicial decisions and precedents. Underlying these is the belief that technology can control all forces and solve all problems. As a result, traditional knowledge and patterns of resource protection have given way to resource exploitation. However, in more recent times concern for the environment and climate change has emerged as a factor in the making of international laws that are primarily designed to ensure equitable water sharing between countries.

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<sup>17</sup> World Commission on Dams, *Dams and Development: A New Framework for Decision-Making*, 2000, London: Earthscan Publications Ltd., p. 251.

<sup>18</sup> For example, S. Sharma, "Water in Hinduism: Continuities and Disjunctures Between Scriptural Cannons and Local Traditions in Nepal" in A. Dixit (ed.), *WaterNepal (Water, Human Rights and Governance)*, Vol. 9/19, No. 1/2, July 2001-July 2003, Kathmandu: Nepal Water Conservation Foundation, pp. 215-215.

It is from an earlier generation of bi-lateral or multi-lateral negotiations, arbitrations and dispute resolution mechanisms that today's international legal principles, provisions and mechanisms governing trans-boundary watercourses has emerged<sup>19</sup>. In the later stage of the development of international watercourses law, in addition to recognising environmental concerns, many concepts, principles and practices from the indigenous corpus of customary law have been gradually incorporated and codified<sup>20</sup>.

The evolution of the trans-boundary watercourses law points to some commonalities of principles and provisions that could be considered for their use and/or adoption in the region in the future. As bi-lateral and multi-lateral riparian issues will be coming up more often than in the past, there is no way to escape from some kind of legal and institutional arrangements at the trans-boundary and trans-Himalayan levels, and at both the bi-lateral and multi-lateral levels, to regulate water resource development, managing benefit-sharing and minimising disputes arising there from.

## Selected Cases

The most conspicuous principle in international water law pertains to equitable sharing and protection against adverse downstream impact. Legal provisions and judicial precedents from the USA have contributed immensely to formulating and upholding contemporary international riparian law. The US Supreme Court decisions based on the principles of 'equitable utilisation' and 'equitable apportionment' has played a pioneering role in the development of international water law jurisprudence. As the Federal States within the US have their own water laws, intra-state disputes are settled by the Supreme Court by applying national and international laws, norms and principles.

For example, in *Kansas v. Colorado*, 1902 & 1907,<sup>21</sup> downstream Kansas complained against upstream Colorado over the latter's claim of absolute territorial right on the Arkansas rivers originating in its territory. The Court, rejecting Colorado's claim, applied the principles of international law and guaranteed the equitable apportionment right of both states. In *Wyoming v. Colorado*, 1921,<sup>22</sup> the Court also rejected the Harmon Doctrine of territorial sovereignty practiced since 1896 by the USA. Wyoming had complained against the inter-basin water transfer from the Laramie River which Colorado defended on the grounds of absolute territorial right and the principle of the Harmon Doctrine. The Court rejected both arguments and ruled on

<sup>19</sup> S.C. McCaffrey, *The Law of International Watercourses: Non-Navigational Uses*, 2003, Oxford: Oxford University Press, pp. 58-65.

<sup>20</sup> The Indigenous and Tribal Peoples Convention (ILO Convention No. 169). Adopted on 27 June 1989, entered into force on 5 September 1991, and Nepal ratified it on 14 October 2007.

<sup>21</sup> (a) *Op. cit.* 12, pp. 286-293; and also (b) B.R. Chauhan, *Settlement of International and Inter-State Water Disputes in India*, 1992, Bombay: N.M. Tripathi Pvt. Ltd., pp. 208-209.

<sup>22</sup> (a) 308-310 U.S. 84 (1940) p. 960.]; and also (b) *op. cit.* 3, p 22.

the equitable utilisation of water by both the states irrespective of their right to absolute use of water provisions in their respective constitutions.

In *New Jersey v. New York*, 1931<sup>23</sup> the Court allowed New Jersey to divert some quantum of water with conditions without jeopardising the equitable utilisation right of New York and further stated that “[b]oth states have real and substantial interests and rights over the waters of a river that must be reconciled as best they can”<sup>24</sup> In various other cases such as *Colorado v. New Mexico*, 1975,<sup>25</sup> *Arizona v. California*, 1963<sup>26</sup> and *Connecticut v. Massachusetts*, 1931<sup>27</sup> the Court has applied the principle of equitable apportionment for the equitable use of water resources between riparian states.

Similarly, cases and experiences from Europe have also contributed significantly towards the evolution and codification of the principle of equitable distribution in international water law. One such is the case of *Aargau v. Zurich*,<sup>28</sup> a dispute between two Swiss Cantons after the construction of Zwillikon Dam on Jonabach stream flowing from Zurich to Aargau. The dispute arose over a Zurich-based private firm diverting water from the Jonabach for the dam, causing adverse effect on the flow of water for the running of mills based in Aargau Canton. The Supreme Court stressed the principle of equitable apportionment between the two Cantons. In an Austrian case involving the diversion of water from the Leith River affecting downstream Hungary, the Royal Imperial Court of Austria held that unilateral diversion affecting downstream right is against the principle of international customary law and recognised the equitable water sharing right of Hungary.

Likewise, in the case of *Societe Energie Electriquedu Littoral Mediterancen v. Compagnia Imprese Elettriche Liguri*, 1939,<sup>29</sup> the Italian Court of Cassation upheld the right of other states to the use of water for their own national needs. In the *Wurttemberg & Prussia v. Baden*, 1927<sup>30</sup> regarding seepage loss from the Danube to the basin of the Rhine River, the German Supreme Court held that no state could undermine the rights of other states to equitable benefit sharing.

In the *Lake Lanoux Case*, 1957<sup>31</sup> between France and Spain, based on the 1929 Arbitration Treaty, dispute arose over the diversion of freshwater by France from the Lake Lanoux to the Friege River for hydropower generation and the release of the same volume of water to the Carol River, the Lake’s original outlet. The Tribunal rejected Spain’s claim that the diversion would have adverse impact in its territory on the ground that the flow of water was going to remain the

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<sup>23</sup> (b) 283 U.S. 336 (1931), pp. 1104-1109; and also, (b) *ibid(b)*, *op. cit.* 3, 22-23.

<sup>24</sup> *Ibid.*

<sup>25</sup> (a) 459 U.S. 176 (1975), pp. 332-335; and also (b) *ibid*, p. 23.

<sup>26</sup> (a) 282-283 U.S. (1931), pp. 1155-1131; (b) 296-298 U.S. 80 (1935), pp. 1331-1339; and also, (c) *ibid(b)*, pp. 23-24.

<sup>27</sup> (a) 282-283 U.S. (1931), p. 603; and also (b) *ibid(c)*, p. 24-25

<sup>28</sup> H.A. Smith, *The Economic Uses of International Rivers*, 1931, London: P.K. King and Son Ltd., pp. 39-43.

<sup>29</sup> (a) *Ibid*, pp. 253-254; (b) *op. cit.* 3, pp. 33-34; and also (c) *Digest of Public International Law Cases*, (1938-1940), p. 120.

<sup>30</sup> *Op. cit.* 3, pp. 34-36.

<sup>31</sup> (a) *Op. cit.* 12, pp. 197-203; (b) *op. cit.* 21(b), p. 1233; (c) R. Bernhard (ed.), *Encyclopedia of Public International Law: Decision or Decisions of International Courts and Tribunal and International Arbitration*, 1981, The Hague: North-Holland Company, pp. 166-167; (d) 24 ILR (1961), p. 101; and also, (e) 53 AJIL (1959), p. 156.

same. Though the ruling apparently favoured the upstream country, it reiterated the principle of prior consultation in case of serious, substantial and adverse impacts on the other side due to the implementation of a new scheme.

In the *Gut Dam Case 1968*<sup>32</sup> between Canada and the USA, the dispute concerned the violation by Canada of the 1904 treaty provision signed between the two countries for the construction of a dam with the consent of the US and incorporating a guarantee that there would be no adverse impact. However, the dam constructed by Canada in Adams Island on Canadian territory and Les Gallops Island of the US to improve navigation caused severe erosion and damage to US soil in 1951/52 due to the increase in water flow after some 48 years. As a result, Canada was obliged to pay US \$350,000 as compensation awarded by the US-Canada Lake Ontario Tribunal in 1965.

## Water Treaties around the World

Inter-state practices in resolving bi-lateral or multi-lateral disputes have contributed to the evolution of modern international law relating to trans-boundary watercourses. Historically, the 1911 *Madrid Declaration*<sup>33</sup> allowed riparian states to use their water independently provided it was not detrimental to co-riparian states. The *General Convention Relating to the Development of Hydraulic Power Affecting More than One State, 1923*<sup>34</sup> adopted by several European countries, required states using trans-boundary water resources to secure the prior consent of co-riparian states. Under the *1929 Convention between Sweden and Norway on Certain Questions relating to the Law on Watercourses*, both parties agreed to seek prior consent before undertaking any alteration of the flow of waters.<sup>35</sup> In 1933, Brazil and Uruguay negotiated a similar arrangement<sup>36</sup>.

The USA and Canada sought to regulate their boundary water dispute through the *Boundary Water Treaty in 1909*<sup>37</sup> which incorporated the principle of mutual rights and benefits notwithstanding exclusive national rights to water within respective territories. An International Joint Commission was established to ensure the implementation of the treaty. The *Treaty of the Colorado & Lower Grande, 1944*<sup>38</sup> signed between the US and Mexico, recognised the latter's rights over the Colorado, Tijuana and Rio-Grande (Rio Bravo). Similarly, the *Columbia River Treaty, 1961* concluded between the US and Canada for hydropower generation and flood control, also recognised the principle of equitable sharing.

The *Nile River Treaty*, first signed in 1929 between Egypt and Sudan under British rule but abrogated by Sudan in 1956 after it became independent, was renegotiated in 1959. The new treaty provided for the distribution of 4 billion cubic metres of water for Sudan and 48 billion

<sup>32</sup> (a) *Op. cit.* 12, pp. 207-211; (b) P. Sands, *Principles of International Environmental Law*, New York: Manchester University, 1995, pp. 360-361; and also, (c) 8 LLM (1969), p. 118.

<sup>33</sup> *Op. cit.* 3, pp. 56-57.

<sup>34</sup> *Ibid*, p. 55.

<sup>35</sup> *Ibid*, pp. 54-55.

<sup>36</sup> R. D'Souza, *Interstate Disputes over Krishna Waters: Law, Science and Imperialism*, 2006, New Delhi: Orient Longman

<sup>37</sup> *Ibid*, pp. 57-59.

<sup>38</sup> *Op. cit.* 12, pp. 77-78 and 105-106.

cubic metres for Egypt on the principle of prior appropriation. As a result of the unequal distribution and because it excluded the rights of other co-riparian states, the treaty is once again in dispute.

Elsewhere in Africa, the Southern Africa Development Community (SADC) countries consisting of Angola, Botswana, Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zimbabwe-Tanzania and Zambia signed the *Agreement on the Environmentally Sound Management of the Common Zambezi River System 1987*<sup>39</sup>. Its main objective was to manage and share the Zambezi River basin mutually while developing an environmentally sound comprehensive plan. The Agreement has been implemented through an inter-governmental monitoring and co-ordinating committee armed with a trust fund established under the Council of Ministers of SADC countries for institutional and financial arrangements.<sup>40</sup> The Agreement is now supplemented by a new Protocol negotiated in 1995 and revised in 2002 for ensuring mutual benefit.

In South America, Bolivia, Brazil, Columbia, Guyana, Peru, Suriname and Venezuela signed The *Treaty for Amazon Co-operation*,<sup>41</sup> in 1978 for equitable sharing. Earlier, in 1973 Paraguay and Brazil signed the *Treaty on Utilisation of the Parana River, Guaira Falls and Ygazu River*, 1973 for the joint development of a 12,500 MW hydropower dam invoking the principle of mutual benefit. In West Asia, where conflict has been endemic, the *Treaty of Peace, 1994*<sup>42</sup> signed between Israel, Jordan and the Palestine Liberation Organisation (PLO) sought to resolve outstanding problems between the Arab states and Israel on water sharing. It provides for the sharing of water according to the seasons, prohibits reciprocally detrimental use, guarantees water quality and safeguards against contamination and pollution. This arrangement was informed by the basic principles of co-operation, sustainability and equitable use of both surface and groundwater.

A major multilateral development in Asia was the *Statement on Co-operation for the Sustainable Development of the Mekong River, 1995*<sup>43</sup> signed by Thailand, Laos, Cambodia and Vietnam and which established the Mekong River Commission. A conspicuous deficiency in the arrangement is the absence of China, which controls the headwaters of the Mekong River. China has its own project plans upstream and is determined to exercise its sovereign territorial jurisdiction as expressed in its refusal to sign UNCIW.<sup>44</sup>

## The Multilateral Framework

The contributions made by various professional and inter-governmental institutions, though not legally binding, have contributed to the development of trans-boundary watercourses law (TWL). The work of the International Law Association (ILA) continuously since 1954 has been

<sup>39</sup> 27 ILM (1988), pp. 1109-1143

<sup>40</sup> *Ibid*, pp. 66-67; also 27 ILM (1988), pp. 1109-1143.

<sup>41</sup> (a) 17 ILM (1978), pp. 1045-1053; and also, (b) *ibid*, p. 66.

<sup>42</sup> (a) 34 ILM (1995), pp. 43-54; (b) 36 ILM (1997), pp. 763-770

<sup>43</sup> 34 ILM (1995), pp. 864-880

<sup>44</sup> China voted against the adoption of the Convention on the Law of the Non-Navigational Uses of International Watercourses. *Op. cit.* 12, p. 315.

instrumental. For example, the *Helsinki Rules*, 1966<sup>45</sup> adopted by the ILA is the primary corpus at the heart of UNCIW. The Helsinki Rules are guided by the single drainage basin approach to holistic and integrated management of international waters. They are based on the principles of equitable utilization, no harm rule both for present and future use, and compensation for injury and dispute resolution through negotiation. ILA has been seeking to incorporate additional provisions to the Helsinki Rules.<sup>46</sup>

*The International Law Commission (ILC), founded in 1947 by the United Nations, drafted the UNCIW over 25 years. The UN General Assembly adopted UNCIW on 21 May 1997.<sup>47</sup> Since its adoption, the UNCIW has had significant influence in the resolution of international disputes as well as the conclusion of new treaties and agreements relating to international watercourses. The UNCIW is widely accepted as a codification of customary international law. UNCIW also incorporated principles from the International Regulation on the Use of International Watercourses for Purposes Other than Navigation, also known as the Madrid Declaration, which was adopted by the Institute of International Law (IIL) in 1911. The IIL also developed a Resolution for the Use of International Non-Maritime Waters, 1961 which provides for the settlement of disputes on the basis of equity, compensation for damages, requirement of prior consultation and negotiation in good faith.<sup>48</sup>*

There are also many regional as well as multilateral initiatives for the sharing of international drainage basins. In 1967, the Inter-American Bar Association formulated five principles relating to the equitable and adequate use of international waters. The Asian-African Legal Consultative Committee (AALCC) adopted a *Draft Proposition on the Law of International Rivers* in 1973 advocating the principles of “reasonable and equitable shares in the beneficial use of the waters of an international drainage basin”.<sup>49</sup> The *Convention on the Protection and Use of Trans-boundary Watercourses and Lakes*, 1992 adopted by the Economic Commission for Europe is a major institutional contribution to the development of TWL.

These instruments have provided the basic conceptual and theoretical framework with human rights, environmental and eco-system perspectives in natural and water resources management by all co-riparian countries and river basin communities. These instruments reiterate the co-basin principles of equity in utilisation, mutual benefit, consultation before undertaking projects and

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<sup>45</sup> The Helsinki Rules on the Uses of the Waters of International Rivers is an international guideline regulating how rivers and their connected ground-waters that cross national boundaries may be used, adopted by the International Law Association (ILA) in Helsinki, Finland in August 1966. In spite of its adoption by the ILA, there is no mechanism in place by which the rules can be enforced. Notwithstanding the guideline's lack of formal status, its work on rules governing international rivers was pioneering. It led to the creation of the United Nations' Convention on the Law of Non-Navigational Uses of International Watercourses. In 2004, it was superseded by the Berlin Rules on Water Resources." Adopted by the International Law Association at Helsinki, 20 August 1966. 52 I.L.A. 484 (1967).

<sup>46</sup> *Op. cit.* 3, pp. 77-80.

<sup>47</sup> The International Law Commission was given this task upon the General Assembly Resolution 2669 (XXV) of 8 December 1970.

<sup>48</sup> D.A. Caponera (ed.), *The Law of International Water Resources*, 1980, Rome: FAO Legislative Study No. 23, p. 280.

<sup>49</sup> AALCC, Report of the Fourteenth Session held in New Delhi, 10-18 January (1973), pp. 7-14.

prohibition of unilateral decisions, compensation for damage, negotiating in good faith, the no harm rule, prior rights, and protection of downstream interests.

## Other Fora

Given the operational limitations of international law in South Asia, other institutional platforms are important in trying to minimise imbalances in water resource use and mitigating potential conflict that could arise from them. Some of the big global platforms are multi-stakeholder events such as the World Water Forum (WWF)<sup>50</sup> and World Water Week (WWW).<sup>51</sup> As multi-stakeholder forums and events are largely controlled and financed by governments, international financial institutions (IFIs)<sup>52</sup> and trans-national corporations (TNCs), the influence of civil society organisations and people's movements in such events has been weak. As a result, many of these multi-stakeholder forums have been promoting the agenda of the IFIs and the TNCs together with other companies seeking the corporate takeover of the world's water resources.

The policies and plans of action adopted by these fora have tended towards the privatisation of water services, investment and management aimed at securing high profits at the expense of the poor and to detriment of the environment. There has been a lot of talk about public-private partnership (PPP) where the private investors and operators have the upper hand compared to the public utilities due to their major role in financing and their capacity to supply sophisticated construction and management technology. Under PPPs the costs are borne by the government or the public while the benefits largely accrue to the private partner. They also have been putting pressure on governments to renege on their domestic and/or international obligations relating to human rights and environmental principles and standards and to adopt the free-market and free-trade policies designed by the IFIs<sup>53</sup> and the criteria and guidelines adopted by corporations<sup>54</sup>.

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<sup>50</sup> The first World Water Forum was organized in 2000 and then every three years. See generally about its objectives and visions at. [http://www.worldwaterforum5.org/fileadmin/WWF5/Final\\_Report/WWF5\\_Final\\_Report.pdf](http://www.worldwaterforum5.org/fileadmin/WWF5/Final_Report/WWF5_Final_Report.pdf)

<sup>51</sup> The World Water Week is organized every year in Stockholm which is largely dominated by the corporate interests, see generally at <http://www.worldwaterweek.org/visitstockholm>.

<sup>52</sup> The IFIs such as the World Bank, International Monetary Fund and Asian Development Bank) provide loans and assistance only to those governments or countries who have adopted the policies of economic liberalization, privatisation and global competitions even in domestic development activities. The lending conditionality of the ADB to privatise Kathmandu water supply for the approval of its loan to the Melamchi Water Supply Project is one example. See, G. Siwakoti 'Chintan', "How Donors Reject Governance and Human Rights: Two Case Studies of Hydropower and Water Supply Projects in Nepal" in *The Reality of Aid Report 2004*, 2004, Manila: The Reality of Aid, pp. 114-124; also "ADB – Development Debacles: [Controversies Continue to Plague the Melamchi Water Supply Project](http://developmentdebacles.blogspot.com/2008/02/controversies-continue-to-plague.html)" (Saturday, February 2, 2008) at <http://developmentdebacles.blogspot.com/2008/02/controversies-continue-to-plague.html> and "Nepal Water Privatization: Role of ADB and PSI's Call for Quality Water Services and Public Water Management" at [http://www.waterjustice.org/uploads/attachments/2\\_ADB\\_Waterprivatization\\_Nepal\\_vpc\\_kyoto\\_may07\\_eng.pdf](http://www.waterjustice.org/uploads/attachments/2_ADB_Waterprivatization_Nepal_vpc_kyoto_may07_eng.pdf).

<sup>53</sup> The IFIs such as the World Bank, International Monetary Fund and Asian Development Bank) provide loans and assistance only to those governments or countries who have adopted the policies of economic liberalization, privatisation and global competitions even in domestic development activities. The lending conditionality of the ADB to privatise Kathmandu water supply for the approval of its loan to the Melamchi Water Supply Project is one example. See, G. Siwakoti 'Chintan', "How Donors Reject Governance and Human Rights: Two Case Studies of Hydropower and Water Supply Projects in Nepal" in *The Reality of Aid Report 2004*, 2004, Manila:

The World Commission on Dams (WCD) has made some normative contributions to the issue of internationally shared water resources. Initiated by the World Bank and the International Union of Nature Conservation (IUCN), the WCD is the first-ever multi-stakeholder global body to look into the impact of large dams around the world. Its report, released in 2000, made a global review of hundreds of large dams from the perspective of technical, financial, economic, environmental and social performance.<sup>55</sup> A major contribution of the report is its proposal to enhance human development through rights, risks and negotiated outcomes; the identification of seven strategic priorities as a new policy framework for the development of water and energy resources<sup>56</sup> and the 26 criteria and guidelines<sup>57</sup> for the application of the set strategic priorities.<sup>58</sup>

The most relevant Strategic Priority is the one relating to the sharing of rivers for peace, development and security. The key message is that:<sup>59</sup>

Storage and diversion of water from trans-boundary rivers has been a source of considerable tension between countries and within countries. As specific interventions for diverting water, dams require constructive co-operation. Consequently, the use and management of resources increasingly becomes the subject of agreement between States to promote mutual self-interest for regional co-operation and peaceful collaboration. This

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The Reality of Aid, pp. 114-124; also "ADB – Development Debacles: [Controversies Continue to Plague the Melamchi Water Supply Project](#)" (Saturday, February 2, 2008) at <http://developmentdebacles.blogspot.com/2008/02/controversies-continue-to-plague.html> and "Nepal Water Privatization: Role of ADB and PSI's Call for Quality Water Services and Public Water Management" at [http://www.waterjustice.org/uploads/attachments/2\\_ADB\\_Waterprivatization\\_Nepal\\_vpc\\_kyoto\\_may07\\_en.pdf](http://www.waterjustice.org/uploads/attachments/2_ADB_Waterprivatization_Nepal_vpc_kyoto_may07_en.pdf)

<sup>54</sup> International Hydropower Association and International Federation of Consulting Engineers promote contracts that are suitable to companies and pay less or no attention to human rights, environmental and development sustainability safeguards. See, generally at [http://www1.fidic.org/resources/contracts/launch/launch\\_intro.html](http://www1.fidic.org/resources/contracts/launch/launch_intro.html)

<sup>55</sup> *Op. cit.* 4, p. 28.

<sup>56</sup> The seven strategic priorities are: Gaining Public Acceptance; Comprehensive Options Assessment; Addressing Existing Dams; Sustaining Rivers and Livelihoods; Recognising Entitlements and Sharing Benefits; Ensuring Compliance; and Sharing Rivers for Peace, Development and Security. See pp. 213-258.

<sup>57</sup> The 26 Guidelines are: 1. Stakeholder Analysis; 2. Negotiated Decision-Making Processes; and 3. Free, Prior and Informed Consent (Strategic Priority 1 on Gaining Public Acceptance); 4. Strategic Impact Assessment for Environmental, Social, Health and Cultural Heritage Issues; 5. Project-Level Impact Assessment for Environmental, Social, Health and Cultural Heritage Issues; 6. Multi-Criteria Analysis; 7. Life Cycle Assessment; 8. Greenhouse Gas Emissions; 9. Distributional Analysis of Projects; 10. Valuation of Social and Environmental Impacts; and 11. Improving Economic Risk Assessment (for Strategic Priority 2 on Comprehensive Options Assessment); 12. Ensuring Operating Rules Reflect Social and Environmental Concerns; and 13 Improving Reservoir Operations (for Strategic Priority 3 on Addressing Existing Dams); 14. Baseline Ecosystem Surveys; and 15. Environmental Flow Assessment; and 16. Maintaining Productive Fisheries (for Strategic Priority 4 on Sustaining Rivers and Livelihoods); 17. Baseline Social Conditions; 18. Impoverishment Risk Analysis; 19. Implementation of the Mitigation, Resettlement and Development Action Plan; and 20 Project Benefit-Sharing Mechanisms (for Strategic Priority 5 on Recognising Entitlements and Sharing Benefits); 21 Compliance Plans; 22. Independent Review Panels for Social and Environmental Matters; 23. Performance Bonds; 24. Trust Funds; 25. Integrity Pacts (for Strategic Priority 6 on Ensuring Compliance); and 26. Procedures for Shared Rivers (for Strategic Priority 7 on Sharing Rivers for Peace, Development, and Security). *Ibid*, p. 278.

<sup>58</sup> *Ibid*, pp. 213-258.

<sup>59</sup> World Commission on Dams, *Dams and Development: A New Framework for Decision-Making*, 2000, London: Earthscan Publications Ltd., p. xxxv.

leads to a shift in focus from the narrow approach of allocating a finite resource to the sharing of rivers and their associated benefits in which States are innovative in defining the scope of issues for discussion. External financing agencies support the principles of good faith negotiations between riparian states.

For the effective implementation of this strategic priority, it has recommended the application of five underlining policy principles<sup>60</sup> which emphasise the adoption of national water policy for basin-level agreement with riparian States. The rationale presented in the Report is that trans-boundary water conflicts are generally the result of power imbalances and in some cases upstream States may be more influential and powerful and hence requires a principle-based negotiation framework.

Large dam building countries are comfortable with a more unilateral approach, and those more financially, technically and politically powerful entities could easily ignore the rights and interests of other co-riparian countries. As these States are less interested in the ratification and application of the UNCIW, the Report has suggested measures to be adopted by all the riparian States on the basis of ‘consent’ and ‘no objection’ on the basis of ‘good faith’ for ‘equitable and reasonable utilisation’ with ‘no significant harm’ to each other, and with ‘prior information’ in case of any project undertaking – dams on shared rivers in this case.<sup>61</sup>

The international dam industry rejected the specific recommendations of the WCD report. In 2008-2010, the dam industry together with selected governments, financiers and big Northern NGOs, prepared the Hydropower Sustainability Assessment Protocol (HSAP) in response to the WCD report. The industry protocol does not define any bottom lines that hydropower projects must comply with, but offers a long list of criteria with which dam builders can voluntarily assess the quality of their projects. A draft of the protocol which was published in 2009 included a separate section on trans-boundary rivers. This section stipulated as best practice for hydropower projects that “measures to address trans-boundary issues are an outcome of dialogue with key stakeholders” and that “plans for trans-boundary issues avoid harm to any affected riparian country”. Due to the opposition of the Chinese government, the HSAP authors deleted these provisions from the draft. The final protocol which was launched in June 2011 does not include any specific guidance on trans-boundary impacts of hydropower projects.

Because of the failure of officially sponsored multi-stakeholder platforms, barring the WCD, events organised by people’s organisations, resistance movements and non-governmental organisations such as the World Social Forum (WSF)<sup>62</sup> and international conference of peoples

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<sup>60</sup> *Ibid*, p. 251.

<sup>61</sup> *Ibid*, p. 253.

<sup>62</sup> "The World Social Forum (WSF) is an annual meeting, based in [Brazil](#), that defines itself as "an opened space – plural, diverse, non-governmental and non-partisan – that stimulates the decentralized debate, reflection, proposals building, experiences exchange and alliances among movements and organizations engaged in concrete actions towards a more solidary, democratic and fair world ... a permanent space and process to build alternatives to [neoliberalism](#)." It is held by members of the [alter-globalization](#) movement (also referred to as the [global justice movement](#)) who come together to coordinate world campaigns, share and refine organizing strategies, and inform each other about movements from around the world and their issues. It tends to meet in January at the same time as its "great capitalist rival", the [World Economic Forum](#)'s meeting in [Davos, Switzerland](#). This date is usually picked in hopes that having a meeting that promotes alternative answers to

and families affected by dams have become important. Such events advocate more strict rules and regulations for corporations and for bringing IFIs and TNCs also within the human rights, environmental and developmental framework of the UN system. The WSF has been one of the main global resistance sites actively engaged in the campaign against the corporate impulses driving policy. The meetings of the WSF have also been regionalised up to the grass-root levels in different parts of the world.

Affected communities and people's organisations have also been taking similar initiatives at local, national and trans-boundary levels to push their governments, donors, IFIs and TNCs to respect basic human rights and environmental laws. For example, the Curitiba Declaration states that the fight against destructive large dams is a fight "for human rights, social justice, and an end to environmental destruction". The Rasi Salai Declaration demands that "Governments, funding institutions, export credit agencies and corporations must comply with the recommendations of the WCD, in particular those on public acceptance and informed consent, reparations and existing dams, ecosystems and needs and options assessments".

The focus of all sources of trans-boundary watercourses law as discussed above is seen mainly in the settlement of riparian rights, interests and disputes at State levels. The concerns of trans-boundary river basin communities have not been taken into account when raising complaints and settling disputes. There are very few exceptions where the issue of adverse effects on river-basin or co-riparian communities living in and around international watercourses are mentioned, such as the declaration by the Permanent Court of International Justice (PCIJ), succeeded later by International Court of Justice (ICJ) after the birth of the United Nations, of the jurisdiction of both riparian States and communities throughout its watercourse, in the case of the Oder River dispute<sup>63</sup>.

The issue of prior information, environmental aspects, compensation and resettlement of people displaced by a project or any activity in an international watercourse, the ancestral rights of indigenous and tribal peoples, and participation of affected communities in trans-boundary water activities with the guarantee of benefit sharing are either totally ignored or discussed only from the perspectives of the interest of the states rather than the affected people and communities. As long as the negotiating parties or complainants are satisfied with the outcome of such negotiation or dispute settlement, the rights and interests of all the rest of the stakeholders are forgotten.

Although, the UNCIW has emphasised the environmental dimension in managing international watercourses, it is noticeably silent on other aspects of rights and interests of the riparian communities as mentioned above. It is only the WCD Report, a non-binding global document that has raised all the above issues from the perspective of the rights and risks of river-basin communities in managing water and energy resources, particularly as regards dams.

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world economic problems oppose the World Economic Forum will help the WSF's ideas get better coverage in the [news media](#)." Visit

[http://en.wikipedia.org/wiki/World\\_Social\\_Forum](http://en.wikipedia.org/wiki/World_Social_Forum).

<sup>63</sup> <http://www.internationalwaterlaw.org/cases/pcij.html>

From the South Asian context and experiences, it is clear that the treaty-based legal regime is largely dominated by political considerations. They have focused more on specific development projects located in specific river sites for dams and barrages.

## The Problems of the South Asian Paradigm

### ***Missing multilateralism***

Many countries today recognise international trans-boundary watercourses law, such as the *UN Convention on the Law of the Non-Navigational Uses of International Watercourses* (UNCIW),<sup>64</sup> as the primary basis for river sharing and use. However, globally these laws conflict with the interests of national elites, states, administrative agencies and technocratic institutions.

The main obstacle is that these international law principles and provisions have legally binding effects only if and when the states concerned ratify those particular instruments and assume their obligations to comply with these instruments at the domestic level. The difficulty is that these laws can be meaningful and effective only when all riparian countries become States Parties to these instruments. The absence of even one state can lead to deadlocks in managing trans-boundary watercourses for shared benefit in a just, peaceful and sustainable manner. In the worst case, non-ratification of such an international instrument by just one powerful riparian country poses immense difficulties in finding negotiated solutions to the problems of trans-boundary water sharing.

This is the reality that prevails in the Himalayan and the South Asia region today. The biggest riparian countries, China and India, are simply not interested in adopting any international or even regional multi-lateral framework of law or principles that restrain them from unilateral actions in developing commonly shared water resources. For example, China voted against the adoption of the UNCIW in 1997 on the grounds that it did not respect ‘the principle of territorial sovereignty of a watercourse State’ and was imbalanced ‘between the rights and obligations of the upstream and downstream states’. Likewise, India made similar comments pertaining to the lack of ‘State’s autonomy to conclude agreements without being fettered by the Convention’ and

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<sup>64</sup> UN Convention on the Non-Navigational Use of International Watercourses, annexed to UN GA Res./51/229, 21 May 1997. A majority of States voted in favour (103 in number), which indicates that the rules embodied in the convention were acceptable; only three states voted against ([Burundi](#), [China](#) and [Turkey](#)) and 27 abstained ([Andorra](#), [Argentina](#), [Azerbaijan](#), [Belgium](#), [Bolivia](#), [Bulgaria](#), [Colombia](#), [Cuba](#), [Ecuador](#), [Egypt](#), [Ethiopia](#), [France](#), [Ghana](#), [Guatemala](#), [India](#), [Israel](#), [Mali](#), [Monaco](#), [Mongolia](#), [Pakistan](#), [Panama](#), [Paraguay](#), [Peru](#), [Rwanda](#), [Spain](#), [Tanzania](#), [Uzbekistan](#)). The number of ratifications necessary to bring the convention into force was set at a level of thirty-five which was rather modest in comparison with the number of [UN](#) members and the positive votes. However, only 8 states agreed to the terms by 20 May 2000 of this first global treaty that focuses on regulating the use of international watercourses (i.e. [Finland](#), [Hungary](#), [Jordan](#), [Lebanon](#), [Norway](#), [South Africa](#), [Sweden](#) and [Syria](#); 10 more states had signed). On 8 December 1970, the General Assembly adopted resolution 2669 (XXV), entitled “Progressive Development and Codification of the Rules of International Law Relating to International Watercourses” and instructed the International Law Commission to “take up the study of the law of the non-navigational uses of international watercourses with a view to its progressive development and codification.” Earlier, the General Assembly adopted a resolution 1401(XIV) on 21 November 1959 indicating that it was “desirable to initiate preliminary studies on the legal problems relating to the utilization and use of international rivers with a view to determining whether the subject is appropriate for codification.” See, [http://untreaty.un.org/cod/avl/pdf/ha/clnuiw/clnuiw\\_e.pdf](http://untreaty.un.org/cod/avl/pdf/ha/clnuiw/clnuiw_e.pdf).

objected to the mandatory settlement of disputes while rejecting the involvement of any third party in the event of disputes. It then abstained from voting with Bhutan following suit. Pakistan likewise abstained. Endorsement of the UNCIW by Nepal and Bangladesh as the respective upper and lower riparian countries served little purpose in ensuring its operational efficacy.

In South Asia multilateral treaties to govern the use of trans-boundary rivers is glaringly absent. In large part this is because India, as a middle riparian, uses different upstream and downstream principles depending on the river and the country it is dealing with. And China, which has the headwaters of two of these river systems and of some of the principle tributaries of the third country is not part of any treaty arrangement in either South Asia or South East Asia. Further, if China acts unilaterally on the upstream without sharing information about its plans, as it is increasingly doing, the entire system that is in place now could fall apart.

There have been reports of Chinese proposals for dams and water diversion projects that have consequences downstream. In November 2010 China officially confirmed the construction of the 510 MW Zangmu Hydropower Project at Gyaca County in the Shannan Prefecture of TAR. After diverting the flow of the Yarlung Tsangpo to a diversion channel the main dam is being built across the river. Reportedly five other dams are under consideration on the river, along with a dam on one of its tributaries. There is also speculation about a mega dam project at the Great Bend where the river drops dramatically through a deep gorge.

In addition there are reports of south-north river diversion projects to feed the water scarce northern region of China. Various sections of Indian opinion have expressed concern about the proposed Chinese plans. Yet Chinese activity is no different from the various Indian proposals for damming and linking of rivers for inter-basin transfers to the detriment of downstream countries. Lacking a respect for internationally established principles of water sharing, the region is likely to witness and escalation of competition and hence conflict, notwithstanding all the sanguine expressions of confidence based on the success of the existing treaties.

### ***Engineering excess***

However, lack of commitment to the known international principles of TWL is not the only deficit in the South Asian region. All existing law is subordinated to engineering principles without much heed to environmental or ecological principles. For instance, David Lilienthal, who made the initial proposal for a settlement on the Indus, regarded the Indus problem as an engineering problem that should be dealt with by engineers. Eugene Black, then president of the World Bank, observed, “One of the strengths of the engineering profession is that, all over the world, engineers speak the same language and approach problems with common standards of judgment”.

The naïve faith in engineers was a phenomenon of that time. In recent decades it is clear that there is more to a river than engineering knowledge and the current decrepit state of the basins is in large measure the handiwork of engineers. Yet all past and current treaties continue to keep the engineer and the engineering option at their centre, oblivious of all adverse consequences to the river basins themselves. The technocratic principle that relies on optimum efficiency of usage

based on engineering calculations is still the mainstay of the utilitarian states approach to the water. The market, riding on scarcity takes the same approach.

As a result the potential for conflict and the evaluation of failure or success of existing treaties must be seen at several levels. The first is the adherence to the legal provisions of the treaty, informed by the engineering spirit. The second, which has become increasingly important lately, is the condition of a river basin and the extent to which it no longer conforms to its old hydrology or to the mathematical calculations that informs the basins treaty. The changing hydrology induced by climate change has also meant that the level of predictability in the riparian system is much lower and, therefore, existing assumptions are no longer valid. Hence the river systems are today less amenable to stable engineering projections.

Across the world it has become clear that the engineering activities of the last hundred years have ruined rivers. All the major river systems of Asia have been affected, be it the Indus, the Ganga, the Yangtze or the Mekong. Saline ingress in the Meghna delta has penetrated a long way inland from the coast. The Indus River has difficulty reaching the sea, leading to incursion by the sea. The latest high profile casualty is the Yangtze Kiang, which hosts the Three Gorges Dam. Sections of the river downstream of the dam do not have water for navigation. Any release from the dam to make up this deficit will lower its efficiency in power generation. In addition, environmental problems have already begun to surface necessitating further resettlement of several hundred thousand people.

While these problems have been prominently publicized in various western publications, in South Asia the media has not been quite as forthcoming in making such concerns public. As a result there is still a tendency to believe that the engineering paradigm can solve the water and hydrological problems of the subcontinent.

### ***Silt and science***

The failure of a treaty in its engineering dimension is just as crucial as the failure of the treaty in its legal-administrative dimension. Often the engineering calculations ignore the limits imposed on the discipline by eco-systemic factors that outweigh the capacities of technology. For instance, the Farakka barrage has, in the view of many experts, failed to serve its ostensible purpose of keeping the Kolkata port silt free despite sometimes diverting as much as 40,000 cusecs of water in the lean season<sup>65</sup>.

According to various experts, the siltation of the port was the result of other engineering activity upstream on the Damodar-Rupnarayan, which affected optimal flushing of the Hooghly channel. This assessment was made even prior to the construction of the Farakka barrage and its feeder channel, which has a full capacity of 45,000 cusecs. Other factors have since made the Kolkata port less critical to Indian shipping. The port of Haldia has been developed further downstream. As a result, there is no longer any necessity for diversion of the Ganga waters at Farakka if its engineering purpose was to keep the port silt free.

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<sup>65</sup> Khan, Tauhidul Anwar, 'Management and Sharing of the Ganges, *Natural Resources Journal*, Volume 36

It is now clear that even maximum diversion did not fully flush the port, while the emergence of the Haldia port has made the Kolkata port less important. Yet water continues to be diverted at the Farakka when it is obvious that this flow is vital lower in deltaic Bangladesh. In this sense, both the Farakka barrage and the Ganges Water Treaty of 1996, in so far as it pertains to Farakka, are both failures. Yet there is till now no inclination on the part of the Indian water establishment to re-evaluate the project and the treaty.

Likewise, on the Indus, given the high sediment load, the level of siltation is so high that storage projects are constantly losing capacity. The Food and Agricultural Organisation, citing World Bank figures, argues that total designed live storage capacity of the three large hydropower dams in the Indus basin was 22.98 km<sup>3</sup> (Tarbela 11.96 km<sup>3</sup>, the raised Mangla 10.15 km<sup>3</sup>, and Chashma 0.87 km<sup>3</sup>). However, the current live storage capacity of these three large hydropower dams is 17.89 km<sup>3</sup>, which constitutes a capacity loss of 22 percent.

There is a constant need in the IBIS to replenish storage just to replace capacity lost to sedimentation. Both the Tarbela and the Mangla are silting rapidly and in 2008 the Mangla was raised by 30 feet to restore 3.58 km<sup>3</sup> of storage (World Bank, 2005). The designed live storage capacity of 50 small dams is 0.383 km<sup>3</sup>. Exact data on sedimentation and loss of live storage of these dams is not available, but has been estimated at an average 25 percent of the live storage. Their current live storage is estimated at 0.287 km<sup>3</sup>. It appears that the effect of the sediment factor on live storage capacity has not curbed the enthusiasm for large projects on the Indus. The loss of silt downstream has cumulative effects on the delta, but that seems never to concern hydro-electric engineers.

## **Recommendations**

There are, therefore, several factors to be considered in international basin management. For one, as established in international law and practice, the principles of equality and preventing mutual harm are essential in formulating treaties. The obligation to avoid harm should not be confined to an interpretation of harm as harm merely to the water rights of a co-riparian country. It must equally be the obligation not to harm the basin, irrespective of whether that harm is tolerated by co-riparian countries or not. The river has an independent existence as a hydrological phenomenon circulating water on the planet.

Therefore, any engineering activity undertaken in the basin must be subsumed by the first principle of protecting the basin. All equitable use of the river must take place within this framework. Engineering activity must be subsumed by the principle of equitable allocation within a paradigm of use that does not compromise the integrity of the basin, an indication of which is the health of the delta. The utility of any engineering project must be justified in terms of achieving its purpose efficiently, within the framework of equitable and environmentally feasible use of the basin. Considering the decrepit state of the Indus and the GGB, it is obvious that cumulatively, river projects and other water withdrawals, such as excessive ground water removal in the irrigated belts, have shown themselves to be either harmful for the basin, or inequitable or unjustifiable in terms of efficiency of purpose.

The water technocracies of all the basin countries, acting within or outside the limitations of existing treaty arrangements, or acting independently of any obligatory framework, and serving the interests of commercial forces, have over the last many decades pursued a policy of maximum utilization of water, without regard to future consequences. Given the kind of proposals for further development of river waters that are on the anvil it is clear that there are few inhibiting factors to restrain them. Even strong popular movements have not always been successful in moderating the technocratic drive, as the Tehri and Narmada projects have demonstrated. Even the unpredictable effects of climate change, such as alterations in the patterns of precipitation and the rapidity of glacial melt, which threaten all the trans-Himalayan basins and could render all present technical assumptions and calculations irrelevant, have not made any significant difference to the plans for water exploitation.

In the circumstances, it is necessary to widen the ambit of policy-making and remove planning out of the narrowly technical framework in which it is presently lodged. It is impossible to have complete and comprehensive basin-wide knowledge about the character and behaviour of river systems. This is particularly true of micro-factors pertaining to the ecology and hydrology of rivers. Nor for that matter is the existing and known hydrology and geomorphology of rivers likely to remain unaffected by glacial lake outbursts in the Himalaya.

It is incumbent that the process and speed of decision-making pertaining to large riparian projects is decelerated through democratization. Loss of livelihood and land and the deterioration of the basin through unrestrained exploitation are in many ways interlinked. The consultative process must be widened to take the decision process to the affected people. Presently such decisions rest exclusively with the technocratic, bureaucratic and high political establishment.

The other requirement in the long-run is the creation of a multi-lateral mechanism in which all the co-riparian countries/basins have equal power. Ideally the body should have trans-boundary legislative powers pertaining to the basin and its waters. And this body should be elected and representative. One way of doing this to advocate for the establishment of representative national water commission's in all the co-basin countries. These national water commissions could consist of elected delegates from provincial water commissions, which are in turn elected by district water commissions, which in turn are elected by local water users committees. However, this is largely a matter for future discussion. In the short-run, we have no choice other than to rely on existing domestic and bi-lateral legal and administrative bodies and institutions, including mediation and arbitration.

To ensure proper representation of local users, all water commissions upward from the local committee must have a minimum number of representatives from the local committees, including in the trans-national legislative mechanism. Such complicated procedures will slow down decision-making to the level of caution that is warranted by the current climatic and riparian circumstances. In the absence of such democratic methods the only future is the steady destruction of ancient basins with the new found capacities of engineering.

To address all these matters properly legally and institutionally, all the trans-Himalayan co-riparian countries must come together to adopt a system of water governance based on minimum international legal principles. Depending on the nature and the use of trans-boundary rivers, the

principles of “equal”, “equitable” and “reasonable” must be applied with human rights and environmental considerations for the river-basin communities. The principles and frameworks endorsed at various South Asian consultations and meetings could definitely be of great use towards such goals.<sup>66</sup>

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<sup>66</sup> They include: Sagarmatha Declaration and Programme of Action (2003), Dhaka Declaration ....(2004) and Nirjuli Consensus 2005. See, <http://wafed.org/declarations.php>