

## **Managing International Rivers in the GBM Region: Indo-Bangladesh Perspectives**

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**Abstract:** This paper critically examines the issues related to sharing the international rivers in the Ganges-Brahmaputra-Meghna (GBM) region from Indo-Bangladesh perspectives. It provides a historical account of the water-related contentions and an in-depth analysis of the important issues that are confronted by the co-basin countries, particularly Bangladesh and India. These issues include the adverse location problem, waterlogging, information sharing, water sharing, flow augmentation, non-navigational water requirements, water quality management, and institutional constraints. It then highlights the avenues of progress that can be explored by the parties involved.

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## Introduction

The Ganges-Brahmaputra-Meghna (GBM) region is made up of the catchment areas of three major river systems that flow through India, Nepal, Bhutan, the Tibet region of China, and Bangladesh (Figure 1). This huge system is second only to the Amazon, with an annual discharge of 1,350 billion cubic meters (bcm) and total drainage area of 1.75 million square kilometers (Table 1). Of the total annual discharge, the Ganges contributes about 500 bcm, the Brahmaputra 700 bcm and the Meghna 150 bcm. In addition, the system carries up to a billion and a half tons of sediment per year that originate in the foothills of the Himalayas. The GBM region has a combined population of about 600 million—far greater than the population of North America or Europe. More importantly, this huge population is still growing at a rate of over 2 percent per year, leading to enormous pressure on the land and water resources throughout the region.

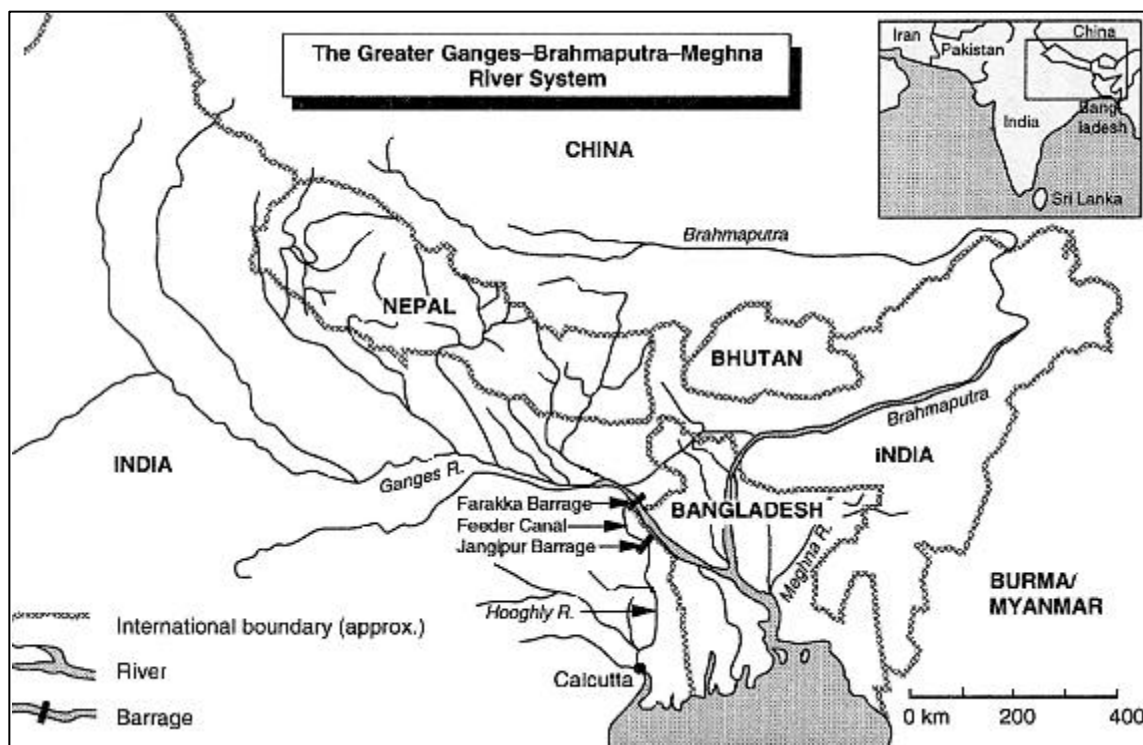


Figure 1: The Ganges-Brahmaputra-Meghna Basin

This vast region faces many water-related issues of contention that span territories of two or more countries. The upper riparian countries, or river states, such as Nepal and Bhutan, are mainly concerned about developing their respective freshwater resources. These countries have a significant hydropower potential that can be exploited in collaboration with India, their downstream neighbor. Both upstream countries have favorable ratios of per capita water availability, and have no major outstanding water-related problems with India.

The situation, however, is just the opposite for Bangladesh. Bangladesh is situated at the downstream end of this region through which the combined flow of the Ganges, Brahmaputra, and Meghna is discharged into the Bay of Bengal. These rivers contribute more than 90 percent of the annual stream flow and about 80 percent of the annual freshwater inflow into the country.<sup>1</sup>

Although Bangladesh accounts for only 8 percent of the GBM basin, the hydrological catchment areas that lie within its borders represent 88 percent of the country's 147,570 square kilometers. Thus, the livelihood of the people of Bangladesh is intricately dependent on these rivers.

Table 1: The Ganges-Brahmaputra-Meghna (GBM) Region

Country/basin parameters	Nepal	India	Bangladesh	Bhutan	Tibet (China)	GBM
Drainage area (1000 sq. km)	140	1,105	129	45	326	1,745
Arable area (million ha)	2.6	67.2	9.1	0.2	Negligible	79.1
Population (million)	22	460	114	2	3	601
Population growth rate	2.5	1.8	1.9	2.4	-	2.15

Source: Haq, M. *Human Development in South Asia (Delhi: Oxford University Press, 1999)*

Bangladesh has more than two hundred large and small rivers of which fifty-seven are transboundary rivers—fifty-four entering Bangladesh from India and the remaining three from Myanmar. Many of these common rivers enter Bangladesh at a mature state—when the velocity drops, sedimentation rates increase, and the river changes its course, braiding into multiple channels. Since these rivers include the “mighty three” constituting the GBM system, and 92 percent of the GBM basin is situated outside the country, Bangladesh manages on its own the problems caused by these transboundary rivers. In the long run, the country must collaborate with the upstream riparian states to ensure lasting solutions to the common water-related problems such as flood, drought, erosion, sedimentation, and water quality deterioration.

Against this backdrop, this paper critically examines the transboundary water-related issues that currently exist between Bangladesh and India, and the possible solutions to these problems that both parties have broached thus far. The problems and solutions are then analyzed in the light of the geopolitical realities that currently prevail in the co-basin countries, especially in Bangladesh and India. Finally, a number of recommendations that are likely to promote better understanding of the issues at hand are presented. The analysis focuses on the ways in which an environment conducive to developing timely, cost-effective, equitable, and sustainable solutions can be developed for the common good of the peoples of the GBM region.

## Historical Perspective

The history of Indo-Pakistan and subsequently the Indo-Bangladesh dialogue on water sharing is more than half a century old. As early as 1951, the Government of Pakistan issued a letter to India inquiring about the Farakka Barrage project. This was the beginning of a long and not so fruitful chain of exchanges between the two countries. In 1956, India denounced the articles in the Barcelona Convention on the Regime of Navigable Waterways of International Concerns that, on the one hand, called for states “to refrain from all measures likely to prejudice the

navigability of the [international] waterway,” and, on the other hand, expected states to “take as rapidly as possible all necessary steps for removing any obstacles and dangers which may occur to navigation.”<sup>ii</sup> Pakistan argued that the proposed barrage at Farakka would adversely affect navigation downstream in then-East Pakistan. Between 1962 and 1970, five expert-level and another five secretary-level meetings were held to discuss various water and data sharing issues. In 1971, East Pakistan earned its independence as Bangladesh after a short but intense liberation war, which was fought against Pakistan with active help and support from India. This changed the entire equation of water sharing in the GBM.

Right after the independence of Bangladesh, the governments of India and Bangladesh recognized the importance of resolving contentious water issues and attempted to expedite the process by establishing the Joint Rivers Commission (JRC) on 24 November 1972. The functions of JRC, as described in its statutes, are summarized below:<sup>iii</sup>

- ☞ Ensure most effective joint efforts in maximizing the benefits from common rivers.
- ☞ Formulate flood control works and recommend implementation of joint projects.
- ☞ Formulate detailed proposals on flood and cyclone warning and flood forecasting.
- ☞ Study flood control and irrigation projects to ascertain equitable sharing of water resources for mutual benefit of the peoples of the two countries.
- ☞ Formulate proposals for carrying out joint research on problem of flood control affecting both the countries.

With these guidelines before it, the JRC has been the key facilitating agency for dealing with common water-related issues since 1972.

### **Current issues**

In the thirty years that ensued, both countries have raised repeatedly a number of specific water-related issues, either through the JRC or through various other forums of political dialogue—both formal and informal. The long list of outstanding water disputes falls into two broad categories, namely local issues that impact small geographical areas but generate significant local tension; and regional or national issues that affect a large part of the country and population. In fact, a third group will be discussed: one that comprises various institutional issues, ranging from problems with regard to sharing scientific data to difficulties in establishing river basin authorities.

Among the two main local issues, the first arises from the 180-kilometer section of the Indo-Bangladeshi border that lies along common rivers. When these rivers shift course—eroding along one side of the border and accreting along the other—they create territorial disputes. Local inhabitants occupy and use the newly accreted land (called the adverse location) contiguous to either Bangladesh or India, but which actually belongs to the other country. The second major issue, mirrored on a larger scale at the national level, arises from local uses on one side of the border that produce adverse effects in neighboring communities on the other side of the border. Rural communities developed the countryside for agricultural purposes independently on either side of the border, ignoring potential negative impacts across national boundaries. Along the eastern border of Bangladesh, for instance, many Indian farming communities built cross dams to divert lean season flow from small hilly streams to their farmlands, leaving the downstream side of the river—in Bangladesh—high and dry. On the other hand, in the northeast and

southwest of Bangladesh, embankments and polders have been built that block the natural drainage from the Indian side, leading to waterlogging.

At the interstate level, there are several contentious issues. The first one concerns basic data and information sharing. Presently, there is a limited arrangement for data sharing between India and Bangladesh, the sole purpose of which is to provide flood forecasting and warning. As such, actual and forecast data are transmitted to the Flood Forecasting and Warning Center in Dhaka from five Indian stations. This mode of data transmission, however, is not continuous—it starts whenever the water level reaches one meter below the danger level and rainfall exceeds 50 millimeters. Bangladeshi officials are unhappy with this arrangement because it allows little lead time for the northern and western part of the country. Bangladesh wants real time data transmissions from Indian stations. Furthermore, performance of the existing hydrodynamic models that Bangladesh uses could be significantly improved if India agreed to share more data with Bangladesh, including cross-sectional, discharge, and rainfall data from stations farther upstream. In order to arrive at correct assessments of water quantity, quality, and availability, there should be a basinwide data collection and monitoring network in the GBM region.

Another significant source of tension are the ongoing disputes over how to share the flow of major rivers, and, related to that, how to augment the flow of depleted rivers. One example is the completion of the Farakka Barrage in 1975, about eighteen kilometers upstream from the border with Bangladesh. The barrage allows India to divert the Ganges water into the Bhagirati-Hoogly River through a 1133 cumec capacity feeder canal, which flushes the accumulated silts from the riverbed and improves navigability at the port of Calcutta. The completed project led to a 51 percent decline in the average dry season flow of the Ganges at the Hardinge Bridge inside Bangladesh.<sup>iv</sup> The drastic drop in flow has caused significant economic and ecological damage in the southwestern region of Bangladesh. Although several agreements were signed between 1977 and 1996, the issue is not yet resolved, and a suitable means for flow augmentation has yet to be worked out.

A third outstanding problem is how to alleviate and manage water quality and sedimentation. Finally, negotiations over all three cross-border issues have been slowed or have stalled because of disagreement between the two countries on the proper forum for negotiation. There is still no consensus on whether negotiations should be bilateral or multilateral—including the participation of the other countries that share the GBM waters, such as Nepal and Bhutan. Indeed, India has insisted in the past on resolving outstanding issues bilaterally, whereas Bangladesh favored including other neighbors such as Nepal and Bhutan in the process. Another key issue regarding negotiations between the two countries is whether solutions should be pursued separately within each river basin, or whether they should integrate all of the major river basins into one system. Bangladesh insists that options for augmenting the flow of the Ganges River should only be explored within the Ganges Basin. India, on the other hand, argues that all three major rivers form an interconnected system and should therefore be treated as a single, integrated unit.

### **A Closer Look at Local Issues**

The adverse location problem is technically easy to deal with as long as people are aware of the international and mutually agreed upon border-setting rules. This is primarily a problem of enforcement—rivers will continue to change courses and border authorities have to be vigilant to prevent new problems from arising in the future.

However, the situation becomes more complicated when the change of a river's course cannot be attributed to natural causes. If one country builds flow diversion structures to protect a border town from erosion, which in turn causes erosion of the opposite bank, the community living on the eroded side may interpret this as a deliberate act of territorial expansion. This is what happened in the Muhuri River, a river entering Bangladesh from the state of Tripura in India. In order to protect the town of Belunia, flow diversion structures have been built along the Indian side of the border, provoking erosion of the opposite bank within Bangladesh. An additional border dispute in the same region dates back to the original border delineation in 1947, when Sir Cyril Radcliffe left the border between India and then-East Pakistan undefined for some 6.5 kilometers near Comilla. Ownership of about 20 hectares of farmland in the flood plain of the Muhuri River is in dispute.<sup>v</sup> In 1974, the Bangladeshi and Indian governments agreed to settle this dispute, but it has yet to be resolved.<sup>vi</sup> In fact, the situation deteriorated into violence in 1977, when the Bangladesh Rifles and the Indian Border Security Force exchanged many rounds of fire.

Problems related to local flow diversion and drainage congestion can best be dealt with through local committees comprised of government officials, representatives of the border security forces, and local representatives from both sides. Such problems have a tendency to flare up repeatedly, even though local communities have learned to adapt their economic activities to the underlying water-related disputes. For example, the Kushkhali-Boikari border embankment was built some time back, which blocked natural drainage of some Indian land through *Dant Bhangra Beel* (a perennial wetland in Bangladesh later converted into a polder). India developed a drainage system parallel to the border to deal with the problem. During a devastating flood in 2000, however, the Kushkhali embankment was breached at a number of locations. After the flood, the Indian side opposed reconstruction of the embankment on the ground that no permanent structure can be built within the "security zone" along the border. Now, with a breached embankment, the region faces the threat of frequent flooding. This is an example of how bitter political relations can create new problems where the original issue would otherwise have been taken care of long ago.

### **Flow Sharing and Flow Augmentation Disputes**

Of all the outstanding disputes between the two riparian countries, the most problematic have been their disagreements over how to allocate and share the waters of the Ganges and the Teesta, as well as of several other common rivers. Although proposals for flow augmentation have been advanced, there is still no agreement on a permanent mechanism for water allocation.

#### *Disputes over Sharing Common Freshwater Resources*

The Farakka Barrage was finally commissioned in 1975, after twenty-five years of frequent altercations between India and its smaller riparian neighbor. Since then, the average dry season flow of the Ganges in Bangladesh (measured at Hardinge Bridge) has shown a decline of 51 percent compared to the pre-Farakka flow. Ever since, Bangladesh has urgently sought to reach an agreement with India on sharing the Ganges water. After much negotiation, the first such agreement was signed in 1977 for a five-year period.<sup>vii</sup> Later, two Memoranda of Understanding (MOUs) were signed in 1982 and 1984 respectively. Most recently, a thirty-year treaty was signed in 1996 on sharing the dry season flow of the Ganges downstream of Farakka.<sup>viii</sup>

S. Tanseema and I. M. Faisal have examined the essential features of these agreements and MOUs.<sup>ix</sup> Based on analysis of actual and simulated water flow data, they show that neither the 1977 agreement nor the 1996 treaty improve the lean season water availability in Bangladesh. In fact, the 1996 treaty performed poorly compared to the 1977 agreement in the most critical ten-day period in March and April. These agreements essentially validated the status quo rather than providing Bangladesh with its historic share of river water. On a positive note, however, these agreements did prevent the ongoing disputes from degenerating further. Indeed, Bangladesh can in fact devise long-term plans for the southwestern part of the country, including a plan for dry season flow augmentation.

The issue of flow augmentation has been contentious from the very beginning. As per the agreement of 1977, “[t]he Indo-Bangladesh Joint Rivers Commission established by the two Governments in 1972 shall carry out investigation and study of schemes relating to the augmentation of the dry season flows of the Ganges, proposed or to be proposed by either Government with a view to finding a solution which is economical and feasible.” For eighteen long years, both countries searched in vein for a mutually agreeable flow augmentation plan. Eventually, Bangladesh abandoned its negotiating strategy of linking the issue of sharing the Ganges with the method of subsequent flow augmentation, and agreed to isolate the immediate problem of water sharing from its long-term interests with regard to flow augmentation. Both countries found a mutually agreeable compromise, which culminated in the 1996 treaty.

Of course, sharing the Ganges is not the only water allocation dispute between Bangladesh and India—there are fifty-three other transboundary rivers to deal with. As a follow-up of the 1996 treaty, the JRC met in Dhaka in July 1997. Both countries agreed to set up a Joint Committee of Experts (JCE) to work out permanent agreements for sharing their common rivers, to be implemented in successive phases. The delegates chose to focus on seven small and medium-sized rivers, according special emphasis to the Teesta.

The Teesta originates in the Himalayas and runs through the Sikkim and West Bengal regions of India before converging with the Brahmaputra in Bangladesh. It has a total catchment area of 12,540 square kilometers, of which 10,200 square kilometers are in India. Both India and Bangladesh have constructed barrages on the Teesta, basic features of which are provided in Box 1. Presently, these barrages are being used for supplementary irrigation in the post-monsoon period. However, these barrages cannot be used for intensive irrigation in the lean season because the natural flow is too weak (about 142 cubic meters per second in February compared to the maximum capacity of the irrigation canals of 822 cubic meters per second).

The JRC has been working on the Teesta for quite a while. As early as 1974, it considered connecting the embankments along the banks of this river on both sides of the border for flood control purposes. The project was eventually completed in 1998, which shows how slow the pace of progress can be, even when both the countries stand to benefit from the project.

The contentious issues arising from joint management of the Teesta have not yet reached a crisis point because various projects developed along the river have yet to reach their “full

Box 1: Teesta Projects of India and Bangladesh	
<i>Indian Project</i>	
Barrage length	936m
Off-take canals	2 – 1 right bank, 1 left bank
Capacity	Right – 539 cumec; Left – 152 cumec
Command area	Right – 1.75 million acres; Left – 0.53 million acres
Operation	1987
<i>Bangladesh Project</i>	
Barrage length	615m
Off-take canals	1 – right bank
Capacity	283 cumec
Command area	1.34 million acres
Operation	1990

capacity” stage. In other words, the distribution systems and flow regulation structures are still under construction on both sides. However, a future conflict is inevitable, and this is why both the JRC and the JCE should work out a flow-sharing arrangement as early as possible. One such effort was made in July 1983 on an *ad hoc* basis. Under this plan, pending completion of scientific studies, 39 percent of the dry season flow was to be allocated to India, 36 percent to Bangladesh, while 25 percent would remain unallocated. This *ad hoc* arrangement was valid until 1985 and later extended to 1987. Unfortunately, a permanent arrangement never materialized because the parties failed to work out the details. The issue therefore remains outstanding and a potential crisis looms.

*Options for Flow Augmentation*

When the 1977 agreement was signed, both parties realized that the dry season flow of the Ganges would have to be augmented. Accordingly, the two sides exchanged their proposals in March 1978. In this first round of exchanges, India proposed to transfer water from the Brahmaputra through a gigantic canal, which would run from Jogighopa, in Assam, across northern Bangladesh, to just above Farakka. Bangladesh on the other hand, proposed diverting water from the Gandak and Kosi. Both countries rejected the other’s proposal as unrealistic.

In 1983, they submitted their updated proposals to each other.<sup>xi</sup> This time, Bangladesh proposed to build seven dams in Nepal (these were being considered by India and Nepal under various project proposals). The Bangladeshi proposal suggested raising the height of these dams so that sufficient additional water could be stored for augmenting the dry season flow of the Ganges. The updated Indian proposal comprised two parts. The first part outlined plans for a barrage at Jogighopa, in Assam, as well as a 324-kilometer-long, link canal crossing northern Bangladesh to reach the Ganges. The second part envisaged the construction of three large dams at Dihang, Subansiri, and Tipaimukh, basic features of which are given in Table 2. All three of these sites have been mentioned as potential hydropower cum flood control dam sites in the Brahmaputra Master Plan of 1986.<sup>xii</sup>

Table 3: Three large dams proposed in the Brahmaputra-Barak sub-basin for flow augmentation by India

Item	Reservoir	Catchment Area	Flow at site	Dam height	Gross storage	Live storage	Submergence
		Sq. km	BCM	Meter	BCM	BCM	Sq. km
1	Subansiri	27,000	52.7	257	14.0	10.0	193
2	Dihang	2,47,500	179.0	296	47.0	35.5	490
3	Tipaimukh	12,758	12.5	161	15.9	9.0	291

Source: *Brahmaputra Master Plan (1986)*

Again, both sides rejected the counterpart proposal, calling it unrealistic and unacceptable. India insisted that the augmentation issue had to be worked out in a bilateral manner without involving Nepal. Nepal, India pointed out, could have its own plans and priorities that might not match Bangladesh’s requirements. Even if the dams were built, India claimed that any surplus water available from these dams would be required to meet future needs of India and Nepal. Thus, there was no “surplus” flow in the Ganges basin that can be stored or transferred to compensate for the low dry season flow of the Ganges below Farakka.

Bangladesh, on the other hand, found the Indian proposal disastrous. It raised many objections on technical, economic, social, political, environmental, and legal grounds.<sup>xiii</sup> Bangladesh also raised a strategic objection to the proposed canal link, arguing that it would sever the country in two by establishing a one-kilometer-wide “canal zone” through the country. The link canal would in effect allow the Indian Navy to sail from the Bay of Bengal all the way to the Indo-Chinese border through Bangladesh. The project was therefore rejected by Bangladesh on national security grounds.

Apart from the objections mentioned above, there was another deeper issue embedded in the Indian proposal that raised suspicion in the minds of the Bangladeshi negotiators. In the flow augmentation plan, India proposed to divert the equivalent of 100,000 cumec from the Brahmaputra in the dry season (whose flow is estimated at 150,000 cumec) through the link canal to Farakka. This additional water flow would be divided into two parts: 60 percent would be released toward Bangladesh, the remaining 40 percent being diverted to the Port of Calcutta (now Kolkata). This meant that the dry season Ganges flow would be 60,000 cumec. Adding to this the remaining 50,000 cumec flow of the Brahmaputra would yield a combined Ganges-Brahmaputra flow of 110,000 cumec. The Indian side asserted that this would be enough to meet the minimum flow requirement at the Meghna estuary, where 80,000 cumec are needed to prevent inward movement of the salinity front. Should more water be needed, it could be supplied by building a dam in the Barak basin (e.g., at Tipaimukh).

The calculations above appear to be satisfactory barring one critical question—what happens to the share of Ganges water that Bangladesh had been receiving even after the completion of the Farakka Barrage? There is no satisfactory answer in the plan, and this led many to believe that the augmentation proposal was designed to deprive Bangladesh of its historic share of the Ganges. This was one of the reasons Bangladesh kept on insisting that the flow augmentation options should be explored within the Ganges basin without complicating matters further by transforming it into an inter-basin water transfer issue.<sup>xiv</sup>

The second part of the augmentation proposal was also controversial because India failed to persuade Bangladesh that it was serious about building the proposed dams. During the 1980s, the Indian position was to agree to the construction of these dams only after observing the effect of the flow diversion from the Brahmaputra through the link canal. Moreover, the Indian state of Arunachal was opposed to the Dihang and Subansiri dams because of the threat of inundation to several new urban centers. Recently, the design of both these dams has been altered to reduce the risk of inundation by suggesting three cascading dams instead of just one structure. According to the new estimates, the Dihang and Subansiri dams would flood about 180 square kilometers and 172 square kilometers respectively, far less compared to the original estimates of 490 square kilometers and 193 square kilometers. Clearly, the original plan was ill conceived and, had Bangladesh agreed to it, it would have created significant environmental disruption.

### **The non-navigational flow requirements**

It should be noted that past discussions on the proposed link-canal centered around the technical and socio-economic feasibilities of diverting sufficient flow from the Brahmaputra to the Ganges to meet the needs of the Kolkata Port in India and the southwestern region of Bangladesh. Such a large scale water transfer, however, is likely to have serious consequences for the river ecosystems and species living therein. Although occasional references have been made to the possibility of inward movement of the salt-water front in the coastal zone of

Bangladesh, the non-navigational, in-stream water requirements have received very little attention so far.

For example, a decline in the flow through the Ganges, Brahmaputra or Meghna will affect the longitudinal (within river) and lateral (river to flood plain) migration of river fish species in Bangladesh. Most open-water fish species in Bangladesh reach sexual maturation and begin to migrate to their breeding grounds in the pre-monsoon period between late February and late April. The spawning migration of the major carps (*ruhi*, *katla* and *mrigal*) occurs at this time in the Brahmaputra River. Scientists believe that spawning grounds of the Brahmaputra stock are probably located in the southern tributaries of the Brahmaputra in the Assam Hills in India, where spawning occurs in May-June period<sup>xv</sup>. Clearly, any large scale water transfer from the Brahmaputra to the Ganges will affect this natural migration of the major carps in Bangladesh. This will be further hindered if physical barriers, such as barrages and dams, are built across the river in future. In fact, it is conceivable that due to a 50% decline of the dry season flow in the Ganges since commissioning of the Farakka Barrage in 1975, the Ganges carp stock has already been affected in a significant way. Of course, there are numerous other aquatic species such as shrimp, crab, turtle and fresh water dolphin that are found in the GBM system, all of which are likely to be affected by any large scale inter-basin water diversion. In future dialogues on sharing the common waters in the GBM region, these in-stream ecological impacts should be given due attention.

### **Water Quality and Sediment Management**

Among the three major rivers flowing into Bangladesh, the Ganges is the most polluted. Nearly 1,600 million liters of raw municipal sewage, industrial effluent, and agricultural runoff are discharged into the Ganges every day as it flows through the Indian states of Uttar Pradesh, Bihar, and West Bengal. On top of that, many partially cremated bodies are found floating in the river due to the high cost of wood used for cremation. The Indian government undertook the Ganga Action Plan in the latter part of the 1980s. This has now been incorporated into a larger National Rivers Conservation Program (NWCP), which is coordinated by the Central Pollution Control Board of India. This program, if properly implemented, would certainly benefit Bangladesh as it would receive better quality water through the Ganges.

Bangladesh, however, is more concerned about the increased salinity in the southwestern part of the country, caused by the decline in the Ganges flow. Increased salinity has adversely affected agriculture, industry, and ecosystems in the entire region. Despite the Indian claim that “withdrawal of 40,000 cumec at Farakka would have practically no effect at all,” scientific investigations have clearly established that the dry season salinity level has significantly increased in the greater Khulna area since 1976.<sup>xvi</sup>

The issue of managing sediment load is more complicated. Sediments come from upstream denuded hill slopes as well as agricultural fields. Sediment measurements compiled for the “National Water Plan Phase I and Phase II” of the Master Plan Organization (MPO) indicate that there was a significant increase in sediment discharge in the Brahmaputra and the Ganges between 1980 and 1991<sup>1</sup>. Many anthropogenic and natural factors may have contributed to this rise including deforestation, mining, intensive agriculture, and landslides. When deposited on fertile crop fields and riverbeds, sediments can cause significant economic and ecological damage. This problem can only be tackled jointly by all the co-basin countries through an integrated watershed management scheme.

<p><b>Box 2: The Sapta Koshi High Dam Multipurpose Project</b></p>
<p>The feasibility of this project was conducted in 1981 by the government of India which comprises of construction of 269m high concrete dam on Kosi river at about 2 km upstream of Barah Kshetra with a gross storage volume of 13.45 BCM. The hydropower station will have an installed capacity 3,000 MW and annual energy generation of 16,810 GWh. The project also includes construction of a barrage near Chatra about 8 km downstream of the dam. The barrage would supply irrigation water to a total of about 1.522 million ha of land, which include 976,000 ha in India and about 546,000 ha in Nepal. A further power generation of 300 MW is possible through the canal system. This project has multipurpose dimension including flood control, sedimentation, navigation together with irrigation and hydropower.</p> <p><i>Source:</i> <a href="http://www.doi.gov.np/doi/ID7/2/">http://www.doi.gov.np/doi/ID7/2/</a></p>

**Signs of Progress**

In addition to sharing the Ganges, the 1996 treaty stipulated, in Article IX, that Bangladesh and India should “agree to conclude water sharing Treaties/Agreements with regard to other common rives.”<sup>8</sup> Thus, despite temporary setbacks and derailments, both countries have agreed to continue working on mutually agreeable solutions to their water-related disputes. There have been a number of recent developments that bring new hope.<sup>xvii</sup>

A particularly promising project for augmenting the dry season flow of the Ganges is the Sapta Kosi High Dam Project in Nepal. This dam will have a huge storage capacity of 9 bcm, which will provide flood control during the monsoon season in both North Bihar, in India, and Bangladesh, and will augment the lean season flow of the Ganges, while also meeting all of Nepal’s irrigation requirements. This project has multiple dimensions including flood control, sediment management, improved navigation, better irrigation, and hydropower (see Box 2).

In relation to flow augmentation, another option that has come up recently is the proposed Sunkosh Dam in Bhutan. Water stored here could be released into a canal that would supply about 12,000 cumec of water to the Teesta and Mahananda barrages in West Bengal. The part going to the Teesta can be partly allocated to Bangladesh to meet its

winter irrigation needs, while the rest could be used to augment the Ganges at Farakka. However, this project has yet to be approved by the Bhutanese Government, and the amount of water that might be available for augmenting the Ganges would be small. In addition, the Teesta Hydropower Cascade project, to be constructed in Sikkim and in the Darjeeling district of West Bengal, constitutes yet another opportunity for water flow augmentation of the Ganges.

In the mean time, Bangladesh is trying to restore the flow of the Gorai (the principal tributary of the Ganges) by dredging through a silt plug some thirty kilometers long. This project was initiated in 1998 with Dutch assistance. Its impact will be much more significant if the Pangsha barrage—sixty kilometers downstream of the Hardinge Bridge—is built on the Ganges. The backwater created by the barrage will force water from the Ganges into the Gorai and hopefully help revive its flow. This is crucial for the agriculture, navigation, and ecology of the entire southwestern zone of Bangladesh.

**Outstanding Institutional and Political Issues**

If any progress is to be made in resolving the common water issues between the two countries, they must first find solutions to the institutional and political differences that have blocked effective negotiations thus far.

the Joint Rivers Commission remains the principle facilitating body for resolving transboundary water disputes between India and Bangladesh. The JRC's jurisdiction, as specified in its statutes, still remain valid, but new issues have emerged and gained importance over the years. Besides, valuable lessons have been learned from the experience gained in the last thirty years. It is therefore necessary to revise the structure and jurisdiction of the JRC to make the institution more efficient and effective.<sup>xviii</sup>

First of all, the JRC must be given more authority. Currently, it is merely a recommending body. Suggestions put forward by the JRC have to be ratified in appropriate political forums in Bangladesh and India. For large regional projects, this is acceptable, but for small-scale local issues, this makes the process very inefficient and slow.

Second, the JRC should be allowed to work independently, without excess influence from the prevailing political mood. On the other hand, top-level guidance from both the governments is necessary to prevent the JRC from remaining idle or wandering from issue to issue in an *ad hoc* manner.

Third, the scope of the commission should be broadened to include such issues as water quality, wetlands, and estuaries management. Expanding the purview of the commission could come about by redesignating the JRC as the Joint Waters Commission (JWC).

Fourth, the JRC should recommend setting up separate governing bodies for the major common rivers, namely the Ganges, the Brahmaputra, and the Barak-Meghna. With the growing need for water, and the implementation of numerous water projects all over the catchment areas, such exclusive catchment-based institutions may become essential in the future. The JRC would still remain as the highest coordinating agency.

Fifth, the JRC should have a mechanism for disseminating information to the public. At present, the public knows very little about the workings of the institution despite the fact that the JRC's recommendations may have profound implications for local communities. Transparency would make the JRC more accountable (though not formally) and therefore more credible to the peoples of both India and Bangladesh.

Two other major institutional and political issues still need to be overcome. On the one hand, the two countries have yet to agree whether negotiations should be bilateral or multilateral; on the other hand, they are still at odds regarding interbasin water transfers as a solution to flow sharing and augmentation problems. Some Indian experts are now more amenable to the idea of inviting Bangladesh, Nepal, and Bhutan—and even a delegation representing Tibet's hydrological interests if possible—to the dialogue in order to develop an integrated plan for the GBM system. R. Rangachari and B. G. Verghese rightly assert:

India has shied away from multilateral discussions barring on one limited occasion, on the ground that bilateral negotiations are difficult enough without introducing further complexities through trilateralisation. There has been perhaps a fear of smaller neighbors ganging up against it and of third party vetoes blocking progress. These apprehensions are exaggerated as much as the notion that India has malevolent designs on its smaller neighbours.<sup>xix</sup>

In fact, initiating a multiparty dialogue would be very much in the spirit of the 1997 Male Declaration and the 1998 Colombo Declaration of the South Asian Association for Regional Cooperation (SAARC), both of which sanctioned the concept of subregional cooperation by accepting the idea of two or more countries collaborating on project-based development efforts within the SAARC framework.

For Bangladesh to accept India's proposition to treat the GBM system as a single unit, it has to make a leap of faith. Bangladesh's needs are immediate and it is extremely difficult for it to wait indefinitely until India completes its proposed link canal (inside or outside Bangladesh) or the dams on the Brahmaputra for flow augmentation. India has made an extremely strong claim over the Ganges, summed up by the Indian Irrigation Secretary leading a delegation to Islamabad in 1970: "Our dependence on the waters of the Ganga is so overwhelming that whatever portion of it we may forgo will involve a sacrifice on our part."<sup>xx</sup> However, India has failed to deliver on other occasions—the "Tin Bigha" issue is a well known example where India failed to provide a 150-meter-long corridor to two Bangladeshi enclaves as per the Indo-Bangladesh Boundary Agreement of 1974 (Bangladesh handed over South Berubari as quid pro quo). B. G. Verghese, an eminent Indian water expert, roundly condemned such failures: "Inability to live up to a solemn treaty on such a trivial matter erodes India's credibility when it asks Bangladesh to take its words on such a spectacular project as the Brahmaputra-Ganga Link and associated storage dams."<sup>xxi</sup>

Along the same line, Bangladesh should also try to adopt a more holistic and pragmatic view. It should engage in negotiations in a clear and transparent manner. Instead of turning down the idea of inter-basin water transfer altogether, it should explore the possibility of harnessing the Brahmaputra water to its advantage, perhaps through a modified link canal and a Brahmaputra barrage lying entirely within its territory.<sup>xxii</sup> Given the fact that the Brahmaputra alone carries about 30 percent of India's total stream flow, it is only a matter of time before India begins to tap into this "storehouse of power and water";<sup>19</sup> by then however, Bangladesh may again find itself standing on the sideline.

## **Concluding Remarks**

Given the complexity of the issues and vastness of the area involved, the cobasin countries need to develop long-term visions that are bold, innovative, and accommodating to the needs of upstream and downstream riparian countries. The process must begin with each party first identifying "sectors and issues in respect of which cooperative strategies and action plans could be formulated using water as a focal take-off point." If such initiatives are implemented honestly, "cooperative water resources development of the GBM system would assuredly place all players in a strong synergy-driven win-win situation."<sup>xxiii</sup>

The time has come to incorporate transboundary water management into a broader framework of regional cooperation for integrated development of the GBM region that would include India, Bangladesh, Nepal, and Bhutan. This idea conforms nicely to the spirit of the SAARC Vision Beyond 2000, which emphasizes the need to "promote the welfare of the peoples of South Asia and to improve their quality of life, as well as to accelerate economic growth, social progress and cultural development."<sup>xxiv</sup>

Almost five decades ago, the late Indian Prime Minister Nehru pleaded for an innovative approach to water resources development. Despite progress in science and technology, Nehru condemned human inability to overcome not only "narrow boundaries of geography, but, what is

worse, of the mind.’<sup>xxv</sup> What is now truly needed is a fundamental change the mindset of the leaders of the GBM region.

## Notes

<sup>i</sup> Government of Bangladesh, Ministry of Irrigation, Water Development and Flood Control, *Master Plan Organization*, “National Water Plan: Executive Summary,” 1991.

<sup>ii</sup> United Nations, Food and Agriculture Organization, Texts from the Legislative Branch, *Barcelona Convention and Statutes* Rome, 20 April 1921.

<sup>iii</sup> Joint River Commission, *Statutes of the Indo-Bangladesh Joint Rivers Commission*, Dhaka, 1972.

<sup>iv</sup> The average pre-Farakka flow at the Hardinge Bridge (from 1949 to 1970) was 2,552 cubic meters per second, while for the post-Farakka period (1975-1995), it was 1,237 cubic meters per second. See S. Tanseema and I. M. Faisal, “Sharing the Ganges: A critical analysis of the water sharing treaties,” *Water Policy*, no. 3 (2001): 13-28.

<sup>v</sup> During the partitioning of British India, a Boundary Commission was appointed to decide along which line the Bengal should be divided. This Commission was comprised of four Indian and four Pakistani members, with Sir Cyril Radcliffe as the Chairman. The Commission was divided on a number of issues that compelled Radcliffe to give his own verdict on 12 August 1947. Unfortunately, Radcliffe left the border between India and East Pakistan undefined at a number of locations. This remains a contentious issue between Bangladesh and India. See Government of India, *Reports of the Bengal (and Punjab) Boundary Commission(s)*, “Radcliffe Awards,” New Delhi, 1955.

<sup>vi</sup> In 1974, the “Indo-Bangladesh Land Boundary Agreement” was signed in New Delhi by Sheikh Mujibur Rahman and Indira Gandhi, Prime Ministers of Bangladesh and India respectively. There are 111 Indian enclaves in Bangladeshi territory and fifty-one Bangladeshi enclaves in Indian territory. The main difficulty in completing the implementation this agreement is to find suitable places in which to rehabilitate the current inhabitants of the disputed enclaves.

<sup>vii</sup> Government of Bangladesh, Ministry of Flood Control, Water Resources, and Power, Secretariat, *Agreement between the Government of the People’s Republic of Bangladesh and the Government of the Republic of India on Sharing of the Ganges Waters at Farakka and on Augmenting its Flows*, Dhaka, 5 November 1977.

<sup>viii</sup> Prime Minister’s Secretariat, *Treaty between the Government of the People’s Republic of Bangladesh and the Government of the Republic of India on Sharing of the Ganga/Ganges Waters at Farakka*, Dhaka, 12 December 1996.

<sup>ix</sup> S. Tanseema and I. M. Faisal, “Sharing the Ganges.”

<sup>x</sup> Adikary et al. (ed.), *Cooperation on the Eastern Himalayan Rivers: Opportunities and Challenges*, BUP/CPR/IIDS, Konark Publishers Pvt. Ltd., New Delhi, 1999.

<sup>xi</sup> Records of the Joint Rivers Commission, *Updated Indian proposal for augmenting the dry season flows of the Ganga at Farakka*, October 1983. A corresponding updated Bangladeshi proposal was put forward in December 1983.

<sup>xii</sup> Government of India, Brahmaputra Board, *Master Plan of the Brahmaputra*, New Delhi, 1986.

<sup>xiii</sup> A summary of these objections can be found in K. Begum, *Tension over the Farakka Barrage: A techno-political tangle in South-Asia* (Dhaka: The University Press Ltd., 1987).

<sup>xiv</sup> This view has been shared with the author by Professor Ainun Nishat, who served as a member of the Joint Rivers Commission for eighteen years. Dr. Nishat is presently the Country Representative of The World Conservation Union-Bangladesh.

<sup>xv</sup> C. Tsai and M. Ali, “Openwater fisheries (carp) management program in Bangladesh,” *Fish. Inf. Bull.* 4 (2): pp51 (Dhaka : BFRSS, DOF, 1985).

<sup>xvi</sup> K. Begum, *Tension over the Farakka Barrage*, and Karim et al., *Coastal Saline Soils and their Management in Bangladesh* (Dhaka: Bangladesh Agricultural Research Council, 1982), 18.

<sup>xvii</sup> Government of Nepal, Ministry of Water Resources, Department of Irrigation, Identified Irrigation Projects, “Saptas Koshi High Dam Multipurpose Project,” (18 June 2002), <<http://www.doi.gov.np/doi/ID7/2/>> (18 June 2002).

<sup>xviii</sup> For a detail discussion of this issue, see A. Nishat and I. M. Faisal, “An Assessment of the Institutional Mechanism for Water Negotiations in the Ganges-Brahmaputra-Meghna System,” *International Negotiation* 5 (2000): 289-310.

<sup>xix</sup> R. Rangachari and B. G. Verghese, “Making Water Work to Translate Poverty into Prosperity: The Ganga-Brahmaputra-Barak Region,” in *Ganges-Brahmaputra-Meghna Region: A Framework for Sustainable Development* (Dhaka: The University Press Ltd., 2001).

<sup>xx</sup> V. V. Chari, *Text of Statement of Secretaries-level talks at Islamabad*, Press Information Bureau, Government of India, 24 February 1970.

<sup>xxi</sup> B. G. Verghese, *Waters of Hope: From Vision to Reality* (Dhaka: The University Press Ltd., 1999).

<sup>xxii</sup> M. Khalekuzzaman, "Farakka Barrage: History, Impact and Solution," <http://www.lhup.edu/~mkhaleq/khaleq-homepage/FARAKKA.doc>.

<sup>xxiii</sup> Ahmad et al., "GBM Region Water Vision: Bangladesh Perspectives," in *Ganges-Brahmaputra-Meghna Region: A Framework for Sustainable Development* (Dhaka: The University Press Ltd., 2001).

<sup>xxiv</sup> SAARC *Vision Beyond 2000* (Delhi: Shipra Publications, 1998).

<sup>xxv</sup> Jawaharlal Nehru's speech at the Silver Jubilee Celebrations of the Central Board of irrigation and Power at Delhi on 17 November 1952.