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# Management and Sharing of the Ganges

## ABSTRACT

*The Ganges river, flows through the most populous areas of the northeastern and eastern parts of the south asian region. Its basin is spread over China, India, Nepal and Bangladesh. The flow of the Ganges is highly seasonal. Floods during the monsoon seasons and scarcity of water during the dry seasons are the two extreme flow characteristics of the Ganges. India and Bangladesh had been locked in a dispute over the sharing of dry season flows of the Ganges for more than 20 years. Discussions and negotiations between the Governments of Bangladesh and India, have not provided a lasting solution to the problem till 1995. It is a tragedy that the people living in the Ganges basin area are still one of the poorest despite the basin's rich endowments. While so much could have been done, management and sharing of the water resources of the Ganges through positive riparian cooperation had been practically nil. A significant amount of the monsoon floods of the Ganges which cause widespread damages to lives and properties in the co-basin countries could be conserved in the upstream storage sites to mitigate the flood intensities downstream. The storage reservoirs would have augmented the dry season flows of the Ganges and significantly satisfied the reasonable water needs of all concerned. In addition, generation of large amounts of hydropower from the storage dams could have eased the energy crisis in the basin area and created more job opportunities through facilitating rapid industrialization in different parts of the basin. Instead of following the path of cooperation towards realization of the bounties of the Ganges for the benefit of the millions, the governments in the past became locked in controversies. Progress towards mutual cooperation had been impeded by mistrust, fears, misperceptions and myths. In 1996, new governments came to power through democratic process in both India and Bangladesh. Sincere and intense efforts by both the new governments ultimately resulted in the signing of a thirty year treaty between Bangladesh and India on sharing of the Ganges waters at Farakka in December, 1996. The signing of this treaty removed the major irritant and create a climate of trust and*

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\* Joint Commissioner of the Joint Rivers Commission, Bangladesh. The views and opinions expressed in this paper are the author's only.

*confidence congenial for further cooperation. In the interest of all, the political and conceptual problems need to be more purposefully addressed by all concerned, specially as the underlying commonality of interests in the Ganges is overwhelming.*

## I. THE RIVER GANGES AND ITS BASIN

This Section briefly describes the general features of the Ganges river and its basin including geographical and hydrological aspects. It touches upon the status of development of Ganges water resources in different co-basin countries and also provides a glimpse of the energy scene in the basin area.

### *General Features*

The Ganges ranks among the top ten large rivers of the world in terms of annual run-off.<sup>1</sup> Rising in the Gangotri glacier at about 23,000 feet on the southern slopes of the Himalayas in India, the Ganges flows through the northeastern and eastern part of the south asian region. The Gangotri's melt water stream is a full fledged river even as it emerges from the sub-glacial tunnel at the glacier terminus, the holy Gaumukh (cow's mouth) of Hindu mythology. The Gangotri is considered to be the main source of the Ganges. The Yamuna, Ramganga, Gomti, Kosi, Karnali, Gandaki and Bagmati are important tributaries of the Ganges. The basin of the Ganges spreads over China, India, Nepal and Bangladesh.

Eleven miles below Farakka (India), the Ganges enters Bangladesh and joins the Brahmaputra near Aricha (Figure-1). The combined flows meet the Meghna river before the rivers empty into the Bay of Bengal. The total length of the Ganges from source to outfall is 1,570 miles.<sup>2</sup> The Ganges basin is one of the most densely populated areas of the world. In the Bangladesh portion of the basin, the population density is 1,917 per square mile.<sup>3</sup> The estimated population of the Ganges basin is about 405 million including 346 million of India, 19 million of Nepal<sup>4</sup> and about 40 million of Bangladesh (according to Bangladesh estimate). The total basin area of the Ganges is 423,938 square miles.<sup>5</sup>

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1. K. L. Rao, *India's Water Wealth*, ORIENT LONGMAN LIMITED 52 (New Delhi 1979).

2. G. R. Choudhury & Tauhidul A. Khan, *Developing the Ganges Basin*, in RIVER BASIN DEVELOPMENT 29 (M. Zaman ed., 1983).

3. See BANGLADESH BUREAU OF STATISTICS, STATISTICAL YEARBOOK OF BANGLADESH (14th ed. 1993).

4. HARNESSING THE EASTERN HIMALAYAN RIVERS 15 (B. G. Verghese & R. Iyer Ramaswamy eds., Konark Publishers Pvt. Ltd. New Delhi, 1993).

5. *Id.* at 6.

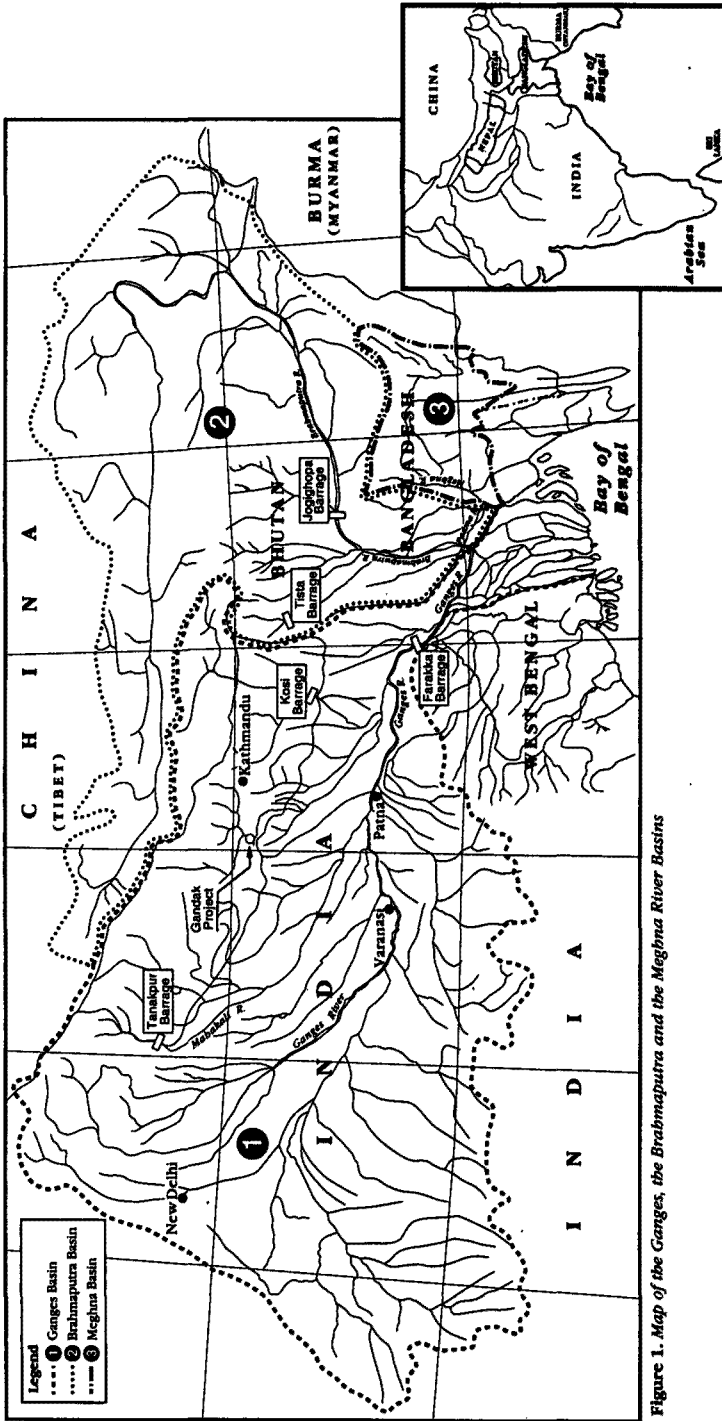


Figure 1. Map of the Ganges, the Brahmaputra and the Meghna River Basins

The surface water availability of the Ganges on an annual basis is about 446 million acre feet (maf) and about 21 maf during the dry season (January to May) at Farakka.<sup>6</sup> The three trans-Himalayan tributaries, the Karnali, Sapt Kosi, and Sapt Gandaki emanating from Nepal, provide 71 percent of the dry season flows and 41 percent of the annual flows of the Ganges at Farakka.<sup>7</sup> Floods during monsoon seasons and scarcity of water during dry seasons are the two extreme flow characteristics of the Ganges. The total availability of the Ganges at Farakka during peak monsoon floods often touches 2,500,000 cubic feet per second (cusec) mark, while during the driest months (March-April) total availability at Farakka ranges between 55 and 65 thousand cusec (at 75 percent availability).<sup>8</sup>

Flood in the Ganges is almost an annual phenomenon which causes extensive damage to crops, properties, and lives in all the co-basin countries. The population pressure in Bangladesh is greater and the occupation of the flood plains more intense than in India and Nepal in the Ganges basin. Thus, flood damage and distress is significantly higher in Bangladesh, which is also subject to periodic Cyclones.

The Ganges basin is among the poorest and most depressed in the world, a cruel paradox in the face of its rich natural endowments of land, water and people. The area has most of the resources that make for agricultural abundance and prosperity but the agricultural population living therein, particularly in Bangladesh, is extremely poor.

### *Status of Water Resources Development in the Basin*

For most of its length, the Ganges flows through India which has been developing its surface water irrigation projects in the Ganges basin area for more than a century. The British ushered in the modern period of water resources development in India.

Renovation of the Western and Eastern Yamuna Canals was the first enterprise of British military engineers and they were reopened in 1820 and 1830, respectively. The upper Ganges Canal was completed in 1854, irrigating 1.2 million acres through 2,298 miles of canals and distributaries. The Lower Ganges Canal was undertaken in 1868 and completed in 1878. Many storage works and canals were taken up in the Bundelkhand area. In Bihar, the Sone canal was completed in 1879 and the Tribeni canal on the Gandak by 1914. The Sarda Canal system in U.P.

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6. See JOINT RIVER COMMISSIONS [hereinafter JRC] (Bangladesh).

7. *Id.*

8. *Id.*

was constructed between 1915 and 1926.<sup>9</sup> During all these years, the British colonial rulers, however, did nothing in terms of irrigation or water resources development in the lowest reach of the basin, then called East Bengal. The area remained grossly neglected in every respect.

In August 1947, British India was partitioned and there emerged two independent nations, India and Pakistan. Most of erstwhile East Bengal constituted the eastern province of Pakistan, called East Pakistan. Since its independence, India made repeated efforts to harness and develop the water resources in the Ganges basin. Information indicates that India now has several dozen large barrages and other diversion structures operating in the basin which are capable of diverting about 100,000 cusec flows from the Ganges and its different tributaries.<sup>10</sup> Moreover, India constructed about 200 major, medium and small storage dams in the basin area. Of these, the 51 major storage reservoirs have a total storage capacity of fifty-one maf.<sup>11</sup> During the same period, the pace of water resources development in East Pakistan was extremely slow. The economic disparity between the Eastern and Western provinces of Pakistan widened with the passage of years. The dream of the East Pakistani farmers living in the Gangetic delta for an agricultural revolution through development of water resources of the Ganges remained unfulfilled. In the 1960s, responding to popular demands, the government of Pakistan, however, implemented a medium sized irrigation project called the Ganges-Kobadak (G-K) irrigation project. This project, located downstream of Hardinge Bridge, pumps water from the Ganges for irrigating about 200,000 acres in the greater district of Kushtia.

After a bloody war of liberation, East Pakistan gained independence from Pakistan and a new country, Bangladesh, was born in 1971. Until 1995 Bangladesh could not embark upon any major development of Ganges waters in the face of uncertainties of its dry season availability from across the border.

Nepal is another co-basin country of the Ganges. It has limited financial resources for harnessing the water resources of the tributaries of the Ganges emanating from Nepal. Over the past decades, a few projects have been undertaken in Nepal under bilateral agreements with India.

### *Status of Energy Development in the Basin*

The energy economy of the Ganges basin countries is highly dependent on non-commercial fuels especially in Nepal and Bangladesh.

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9. Verghese & Ramaswamy, *supra* note 4, at 43-44.

10. JRC, *supra* note 6.

11. *Id.*

This is itself an index of a low level of economic development. There are also a number of other implications. Reliance on dung and agricultural residues for energy is depriving the soil of valuable organic manure while the growing demand for firewood is degrading and destroying forests and other green cover.

Even though India has been rapidly expanding its supplies and use of commercial forms of energy, noncommercial and traditional forms of energy continue to dominate the Indian energy scene. Fuelwood alone accounts for 65 percent of the total non commercial energy consumed in India.<sup>12</sup> The biomass energy in Bangladesh is used predominantly by rural households in the domestic sector. In Nepal, commercial energy sources account for only 4.3 percent of the total primary energy consumption, the remaining 95.7 percent coming from fuel wood, crop residues, and dung.<sup>13</sup> A number of studies indicate that if the current uncontrolled and unregulated exploitation of forest resources in Nepal is not stopped, the forest resources of Nepal might soon totally disappear.<sup>14</sup>

Coal, oil, and hydropower are the major sources of commercial energy supply in India, with nuclear power playing a more limited role. Nepal primarily depends on hydropower. Bangladesh's power supplies are based on indigenous gas, imported fuel oil and a single hydel project. The proven gas reserves of Bangladesh are inadequate to meet the country's rising energy needs for very long. Considering the increasing demand of energy, it may well be assumed that the basin area will face an acute energy crisis soon, particularly in Bangladesh and Nepal. Moreover, if the current practice of overusing the biomass as an energy source is not altered the whole basin might soon be standing on the verge of an ecological disaster.

## II. DISPUTE OVER THE GANGES AND HISTORY OF NEGOTIATIONS

*This section briefly provides the background of the dispute between Bangladesh and India over the development and sharing of the Ganges including the history of negotiations on the Ganges, first between India and Pakistan during the period of 1960 to 1970 and then between India and Bangladesh from early 1970s till the end of 1996.*

### *The Dispute*

The dispute over the Ganges arose out of an Indian decision to build a barrage across the Ganges at Farakka, 11 miles upstream of the

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12. Verghese & Ramaswamy, *supra* note 4, at 100.

13. *Id.* at 100.

14. *Id.*

Bangladesh border. The stated purpose of the barrage was to divert water into the Hooghly river to improve the navigability of the port of Calcutta in the Indian state of West Bengal.

### *Chronology of Events: Pre-Bangladesh Period*

On October 29, 1951 the then Pakistan government drew the attention of the Indian authorities to reports of a scheme for diverting large amounts of dry season flow of the Ganges to resuscitate the Baghirathi-Hooghly river along which the Port of Calcutta is situated. Four months later, on March 8, 1952 India replied that the project was only under preliminary investigation and described Pakistan's concern over probable effects as purely hypothetical.<sup>15</sup>

On May 8, 1952 Pakistan quoted press reports that India was engaged in a multipurpose scheme envisaging the resuscitation of not one, but five, rivers in West Bengal, and a published technical report saying large quantities of water from the Gandak, a tributary of the Ganges, was being diverted for irrigation in Bihar, Uttar Pradesh (of India) and Nepal, which, together with the Ganges Barrage at Farakka would have ruinous effects on East Pakistan (now Bangladesh). The Indian reply, sent a year later on May 22, 1953, reassured that the Farakka and Gandak Projects were still being investigated and India would appreciate cooperative development of the water resources of the Ganges.<sup>16</sup>

The first bilateral negotiation on the Ganges was held between India and Pakistan from June 28 to July 3, 1960, nine years after the issue was first mooted. In January of 1961, the Government of India announced that it was going ahead with the plan to build a barrage across the River Ganges at Farakka and Pakistan was formally informed.<sup>17</sup> The actual construction work of the Farakka barrage started immediately thereafter.

Talks took place occasionally between India and Pakistan, but real negotiation and consultations did not. The Ministerial discussions promised in the agreement in London in March of 1961 between the Indian premier and Pakistani president did not occur.<sup>18</sup> During much of the time, India tried to maintain that the Ganges is not an international river. "To have entered into negotiations with Pakistan would have been denial of this line of argument" mentioned one researcher.<sup>19</sup> India did agree to some

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15. GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH, WHITE PAPER ON THE GANGES WATER DISPUTE 11 (1976) [hereinafter GOB].

16. *Id.*

17. *Id.*

18. JRC, *supra* note 6.

19. BEN CROW ET AL., SHARING THE GANGES: THE POLITICS AND TECHNOLOGY OF RIVER DEVELOPMENT 84 (Dhaka, University Press Ltd. 1995).



discussions and there were four technical exchanges in 1961, a fifth in 1968. Five meetings were held at the Secretaries' level between 1968 and 1970.<sup>20</sup> In the fourth Secretary level meeting, held at Islamabad in February of 1970, the Pakistan delegation recorded the final position taken by them regarding all the technical issues. The delegation stressed the futility of further discussion of these issues except in the context of agreed allocation of water from the Ganges to East Pakistan.<sup>21</sup> By 1970 India completed construction of the Farakka Barrage. The 24 mile feeder canal was, however, not ready.

### *Post-Bangladesh Period*

Bangladesh came into being in 1971. The governments of India and Bangladesh decided in March of 1972 to set up the Indo-Bangladesh Joint Rivers Commission (JRC). The statute of the JRC was signed eight months later in November of 1972. One of the major functions of the JRC was to maintain liaison between the participating countries in order to ensure the most effective joint efforts in maximizing the benefits from common river systems to both the countries.<sup>22</sup> The question of sharing the water of the Ganges was, however, kept out of the purview of the JRC, to be settled at the level of prime ministers.

The prime ministers of India and Bangladesh met in New Delhi in May of 1974 and discussed amongst others, the Ganges issue. Following this meeting there was a Joint Declaration on May 16, 1974, wherein they observed that during the periods of minimum flow in the Ganges, there might not be enough water and, therefore, the fair weather flow of the Ganges in the lean months would have to be augmented to meet the needs of Calcutta port and the full requirements of Bangladesh. They also agreed that the best means of augmentation through optimum utilization of the water resources of the region available to the two countries should be studied by the Joint Rivers Commission. The two sides expressed their determination that before the Farakka project is commissioned they would arrive at a mutually acceptable allocation of the water available during the periods of minimum flow in the Ganges.<sup>23</sup>

The JRC accordingly took up the issue of augmentation of the Ganges flows but was unable to reach any agreement. First the Bangladesh side in the JRC suggested storage of monsoon flow in the Ganges Basin in India and Nepal to augment the fair weather flow of the

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20. GOB, *supra* note 15, Table 1.

21. *Id.* at 13.

22. Statute of the Indo-Bangladesh Joint Rivers Commission (Nov. 24, 1972).

23. Indo-Bangladesh Joint Declaration of the Prime Ministers of India and Bangladesh, May 16, 1974, paras. 17-18 [hereinafter Joint Declaration].

Ganges in the lean months.<sup>24</sup> However, the Indian side rejected the suggestion stating that additional storage possibilities in India were limited. To depend on storage as a means for augmentation of the Ganges flows in the lower reaches for the optimum development of water resources of the region was not realistic. The Indian side rejected outright the question of considering development in Nepal because this was outside the scope of the JRC. On the other hand, India contended that in the Brahmaputra system in India, storages appeared feasible and could be developed as and when the need arose. The Brahmaputra-Ganges link held prospects of benefits to both the countries and fitted with the concept of optimum development of the region.<sup>25</sup>

In response, Bangladesh stated that requirements of the situation did not warrant transfer of water from the Brahmaputra into the Ganges. It suggested consideration of amending the pattern of diversion of the Ganges water into the Hooghly to meet the shortage in the Ganges in lean periods and also referred to the scheme of improving navigation by the construction of a navigation link from Calcutta port to the sea via Sunderban.<sup>26</sup>

But again the Indian side rejected these suggestions. The delegation contended that amending the pattern of diversion into the Hooghly was beyond the scope of the JRC. Furthermore, the proposal of constructing a separate navigation canal was not connected with the question of optimum development of the water resources of the region. A number of such and other proposals in the past had been considered and found unfeasible. Thus the JRC failed to reach any agreed conclusion on the subject.

A minister-level meeting between Bangladesh and India held in New Dehli in February 1975 also could not produce any agreement. At a subsequent minister level meeting in April of 1975 the Indian side proposed that as discussions regarding allocation of fair weather flows of the Ganges during lean months in terms of the Prime Ministers' Declaration of May of 1974 were continuing, India would like to make a test-run of the feeder canal of the Farakka Barrage for a limited period during that dry season. On good faith, Bangladesh agreed to India's request and allowed her to operate the feeder canal with varying discharges (11,000 to 16,000 cusec) in ten-day periods from April 21 to May 31, 1975, ensuring the continuance of the remaining flows to Bangladesh.<sup>27</sup>

Although India was supposed to divert limited quantities of water from the Ganges for the said test-run up to May 31, 1975, it continued

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24. GOB, *supra* note 15, at 15.

25. *Id.*

26. *Id.*

27. *Id.* at 16.

withdrawals from Farakka to the full capacity of the feeder canal during the entire dry season of 1976 without entering into any understanding or agreement on sharing the flows despite Bangladesh's repeated protests.

The consequences of India's actions have been tragic. The unilateral Indian withdrawals throughout the dry season of 1976 caused a marked reduction in the dry season Ganges flows in Bangladesh. At one stage in April of 1976, the flows amounted to only 23,200 cusec at Hardinge Bridge (flow measurement station in Bangladesh) compared to the normal pre-Farakka flows of about 70,000 cusec.<sup>28</sup> This sudden change in the flow pattern caused an alarming situation in the south western region of Bangladesh.

In view of the seriousness of the situation Bangladesh repeatedly requested India to stop the unilateral withdrawals and come to a sharing agreement. But all these requests were fruitless. Having no other option Bangladesh took the issue to the United Nations in November of 1976. The Special Political Committee of the 31st Session of the UN General Assembly approved a consensus statement at its 27th meeting on November 25, 1976. The statement reads: "both parties agreed that situation called for an urgent solution and to this end the parties have decided to meet urgently in Dhaka at Ministerial level for negotiations with a view to arriving at a fair and expeditious settlement." The statement further added, "it is open to either party to report to the General Assembly at the thirty-second session on the progress achieved in the settlement of the problem".<sup>29</sup>

In response to the UN statement, Bangladesh and India entered into more discussion. After several rounds of talks, the two sides signed an Agreement on November 5, 1977 for sharing the dry season (January 1 to May 31) flows of the Ganges available at Farakka for a period of five years (1978-1982) according to a schedule which allocated roughly 60 percent of the Ganges flows available at Farakka to Bangladesh.<sup>30</sup> The agreement provided that in case of exceptionally low flows at Farakka, Bangladesh will be guaranteed at least 80 percent of its scheduled share for the concerned ten-day period.<sup>31</sup> This is popularly termed the Guarantee Clause of the 1977 Agreement.

The 1977 Agreement also provided that the Indo-Bangladesh JRC would make an agreed recommendation for augmenting the dry season

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28. JRC, *supra* note 6.

29. Consensus Statement, U.N. GAOR Special Political Comm., 31st Sess., 27th mtg., U.N. Doc. A/SPC/31/7 (1976).

30. 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 Augmenting its Flows, November 5, 1977 [hereinafter Agreement Between Bangladesh and India].

31. *Id.*

flows of the Ganges at Farakka within a period of three years.<sup>32</sup> Accordingly, Bangladesh made a proposal for augmenting the dry season Ganges flows by conserving monsoon flows in the upstream regions of the Ganges basin through construction of storage reservoirs in India and Nepal. India, on the other hand, proposed a mega-size link canal cutting through Bangladesh territory to transfer 100,000 cusec of waters from the Brahmaputra (another international river emanating from the northern slopes of the Himalayas and entering Bangladesh after flowing through China and India) to the Ganges during dry season.<sup>33</sup> Eight meetings of the JRC were held between January of 1978 and September of 1980 but no agreement for augmenting the dry season Ganges flows was reached. Up to February of 1980, the commission could not proceed because India raised *prima facie* objections to including Nepal in the study of the Bangladesh proposal.<sup>34</sup>

The agreement for sharing the dry season flows of the Ganges at Farakka, expired on May 31, 1982. India rejected the Bangladesh proposal for extension of the Agreement period despite a provision for such extension in the 1977 Agreement.<sup>35</sup> However, by October of 1982, the two countries signed a Memorandum of Understanding (MOU) for sharing the flows of the Ganges during the dry seasons of 1983 and 1984.<sup>36</sup> This time the Guarantee Clause of 1977 was replaced by a burden sharing arrangement. The MOU also stipulated an eighteen month deadline for completing the pre-feasibility study and decide upon the optimum solution to the problem of augmenting the dry season flows at Farakka.<sup>37</sup> Accordingly Bangladesh and India updated and exchanged their proposals on augmentation in 1983. The Bangladesh proposal focused on harnessing the water resources of the Ganges basin through seven storage reservoirs in Nepal<sup>38</sup> (See Figure-2). The Indian proposal again envisaged transfer of 100,000 cusec of dry season Brahmaputra waters to Farakka through the 200 mile Brahmaputra-Ganges Link Canal<sup>39</sup> (See Figure-2). The two sides then exchanged comments on each other's proposal in February of 1984.

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32. *Id.*

33. Indian Proposal on Augmentation of the Dry Season Flows of the Ganga at Farakka (1978).

34. JRC, *supra* note 6.

35. *Id.*

36. Indo-Bangladesh Memorandum of Understanding, October 7, 1982 [hereinafter MOU].

37. *Id.*

38. GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH, UPDATED BANGLADESH PROPOSAL FOR AUGMENTATION OF THE DRY SEASON FLOWS OF THE GANGES AT FARAKKA (1983).

39. GOVERNMENT OF INDIA, UPDATED INDIAN PROPOSAL FOR AUGMENTING DRY SEASON FLOWS OF THE GANGA AT FARAKKA, (1983).

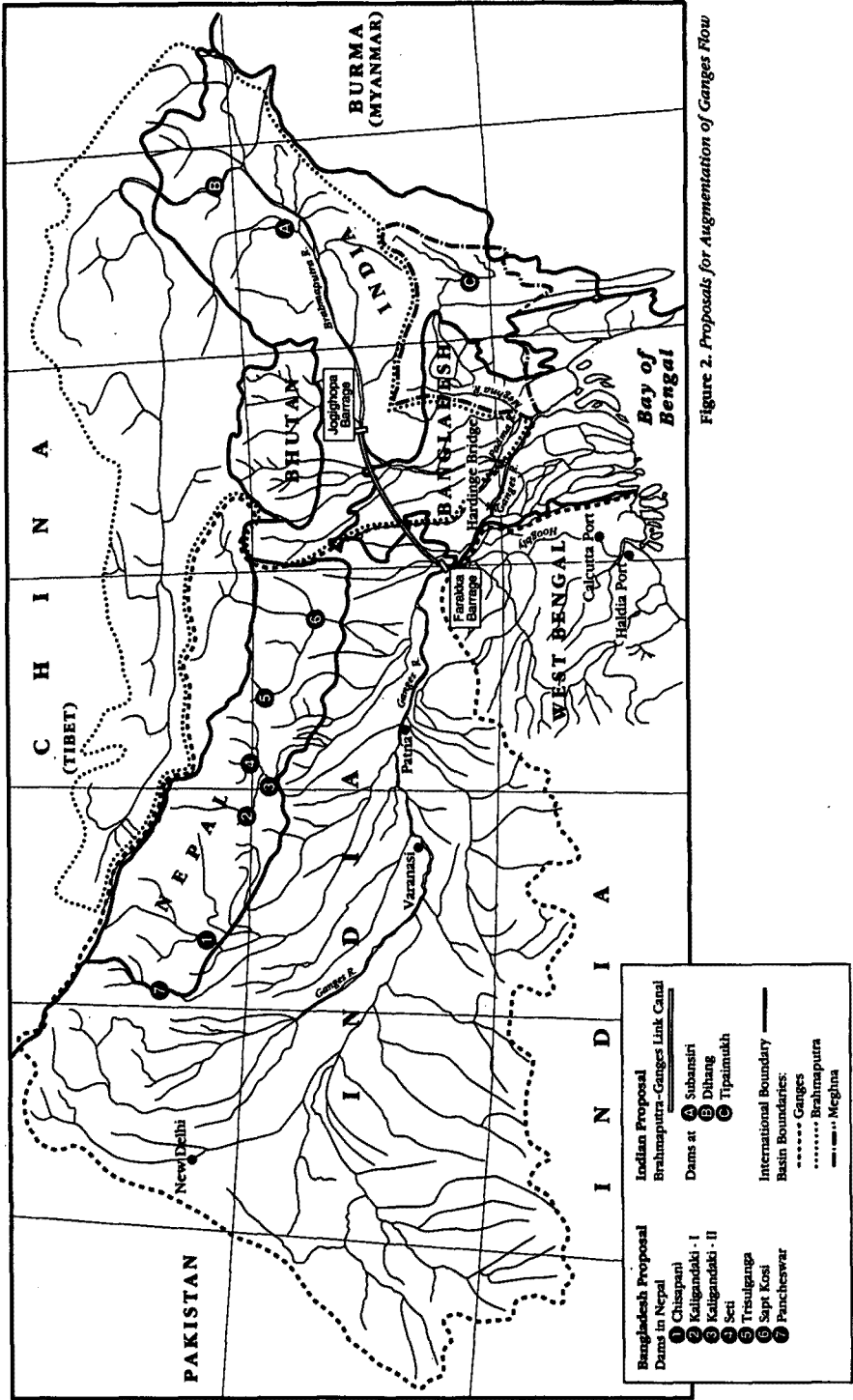


Figure 2. Proposals for Augmentation of Ganges Flow

After several rounds of discussions between December of 1982 and March of 1984, the JRC on March 3, 1984 reported, "In view of the difference of views on each others proposal it was not possible for the Indo-Bangladesh Joint Rivers Commission to make a recommendation which was acceptable to each other in regard to the optimum solution for augmentation of the dry season flows of the Ganges at Farakka".<sup>40</sup>

As a result there was a deadlock in the negotiations. The dry season of 1985 went without any sharing at Farakka. In the face of unilateral Indian withdrawal from Farakka, the flow of the Ganges at Hardinge Bridge was drastically reduced. To address the situation, the heads of governments discussed the issue when they met at Nassau, Bahamas in October of 1985 during the meeting of the Commonwealth Heads of Governments. Subsequently, an accord reached between them. Accordingly the two countries signed another MOU on November 22, 1985 for sharing the flows of the Ganges during the dry seasons of 1986-88. As in the 1982 MOU, the 1985 MOU omitted the Guarantee Clause safeguarding the Bangladesh interests in case of exceptionally low flows at Farakka. The 1985 MOU, too, provided that an Indo-Bangladesh Joint Committee of Experts (JCE) would undertake studies to work out a long-term scheme or schemes for augmentation of flows of the Ganges at Farakka within a period of twelve months.<sup>41</sup> However, in subsequent negotiations the JCE discussed the same old proposals on augmentation over a period of 24 months (with two six monthly extensions beyond the original mandate of 12 months) and again failed to arrive at an agreed scheme as each side stuck to its original stand.

The tenure of sharing arrangements under the 1985 MOU expired on May 31, 1988. Since then, there has been no instrument for sharing the dry season Ganges flows between the two countries. In the absence of any agreement, India again started unilateral withdrawals from Farakka, drastically reducing the dry season Ganges flows in Bangladesh. Table 1 provides a comparative picture of dry season Ganges flow availabilities at Hardinge Bridge in Bangladesh covering pre-Farakka period and different post-Farakka periods. The table shows that the flow of the Ganges at Hardinge Bridge from March 21 to 31 in the pre-Farakka years averaged 75,000 cusec. The table indicates that under sharing arrangements, as per the 1977 Agreement, the flow was reduced to an average of 41,239 cusec during 1978-82. With sharing according to the MOUs of 1982 and 1985, the average flow of the Ganges at Hardinge Bridge for the said ten day period of March amounted to 32,360 cusec during 1983-84 and 38,879 cusec during 1986-88. In the face of unilateral

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40. JRC, *supra* note 6.

41. Indo-Bangladesh Memorandum of Understanding, New Delhi (Nov. 22, 1985).

TABLE - 1

## Average Flows of the Ganges at Hardinge Bridge in Bangladesh

10-Daily Periods	Pre-Farakka natural flows during 1934-73	Flows after unilateral Farakka withdrawals during 1976	Flows during 1978-1982 * 1	Flows during 1983 - 1984 * 2	Flows during 1985 * 3	Flows during 1986 -1988 * 4	Flows during 1989 -1995 * 5
Jan. 1-10	108000	77516	69397	68972	59101	69011	53619
11-20	101000	65721	59796	61128	54377	75829	47726
21-31	95000	57069	52044	55492	49605	62472	40781
Feb. 1-10	91700	55268	51388	52105	46200	54299	39417
11-20	89100	52866	51547	46370	30049	50390	28868
21-28/29	85400	47074	49377	44082	34587	48500	24559
Mar. 1-10	81700	35279	46557	42492	34198	49435	22868
11-20	78100	28676	44054	37676	31452	42761	19573
21-31	75000	24508	41239	32360	27333	38879	17516
Apr. 1-10	72300	25391	42107	30574	25547	36665	17177
11-20	70600	25497	46736	31530	27829	38702	19578
21-30	69800	26239	52064	33642	28822	43687	21759
May 1-10	69700	35173	55117	42982	31558	48699	23467
11-20	73000	47781	56778	52156	29914	52474	32228
21-31	78900	56256	68343	58876	31833	54629	50410

(Source : Joint Rivers Commission, Bangladesh.)

- \* 1 Bangladesh and India shared the flows of the Ganges at Farakka according to the 1977 Agreement
- \* 2 Sharing of flows at Farakka under the Indo-Bangladesh Memorandum of Understanding (MOU) of 1982
- \* 3 No sharing at Farakka.
- \* 4 Sharing at Farakka under the Indo-Bangladesh MOU of 1985
- \* 5 No sharing at Farakka in the absence of any Agreement or Understanding

heavy upstream withdrawals by India since 1989, the flow of the Ganges for the same ten day period was severely slashed and it averaged only 17,516 cusec in the years 1989-95. This caused a crisis situation in Bangladesh.

A close look into the main elements of the 1977 Agreement and the MOUs of 1982 and 1985 reveals that the sharing of Ganges flows under these instruments was always contingent upon Bangladesh's agreement to study the Indian scheme for augmentation of flows at Farakka. In all the negotiations since 1975 Bangladesh had tried to keep the issue of flow sharing free of all conditions. Having all the advantages in its favor, India, however refused this position.

Since 1989, Bangladesh has urged India to settle the problem of sharing the Ganges flows on a long term/permanent basis, delinking it from the issue of augmentation. The Secretaries of the Ministry of Water Resources of the Governments of Bangladesh and India held five rounds of discussions between June of 1990 and October of 1991.<sup>42</sup> In the midst, the Bangladesh Foreign Minister also discussed the issue with his Indian counterpart in August of 1991. In all these discussions, India did not budge from its stand that perceived water shortages in the Ganges be replenished from Brahmaputra waters by suitable diversion structures.<sup>43</sup>

In May of 1992 at New Delhi, the Prime Ministers of Bangladesh and India directed their ministers to make renewed efforts for attaining a settlement for equitable, long-term and comprehensive sharing of the flows of the Ganges and other major rivers.<sup>44</sup> Incidentally, there are 54 rivers which flow into Bangladesh from India. The Prime Minister of India assured that every possible effort would be made to avoid undue hardships to Bangladesh by sharing the flows of the Ganges at Farakka on an equitable basis.<sup>45</sup>

However, subsequent negotiations have been disappointing. The prime ministers' meeting of 1992 was followed by one minister level and two Secretary level meetings between the two countries, but again without any positive result. The prime ministers discussed the issue in April of 1993 at Dhaka, without any outcome. The negotiations on sharing the Ganges was in a logjam despite the assurance of the Indian Prime Minister not to cause undue hardship to Bangladesh. In order to break the impasse, the Bangladesh prime minister once again took up the issue during discussions with the Indian premier at New Delhi in May of 1995. This meeting was immediately followed by two rounds of meetings between the foreign secretaries of the two governments at New

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42. See JRC, *supra* note 6.

43. *Id.*

44. Indo-Bangladesh Joint Communiqué, New Delhi (May 28, 1992).

45. *Id.*



Delhi. Bangladesh urged for a long-term sharing of the existing dry season flows of the Ganges. Talks between the foreign secretaries were again held at Dhaka in June of 1995. These also did not yield any result. The two secretaries, however, agreed to reactivate the Indo-Bangladesh Joint Rivers Commission, dormant since its 31st meeting held in June of 1990.<sup>46</sup>

During the first half of 1996 the governments in both India and Bangladesh changed and new governments have come to power in both countries. Within days of its coming to power the new government of Bangladesh launched allout efforts to settle the Ganges sharing issue with India. As a result there were several rounds of intense negotiations between the two governments during the period from July to December, 1996 at various levels. These negotiations culminated in the signing of the "treaty between the government of the Republic of India and the government of the People's Republic of Bangladesh on sharing of the Ganges waters at Farakka." The treaty was signed by the prime minister of India and Bangladesh at New Delhi, India on December 12, 1996. The treaty entered into force upon signatures and shall remain in force for a period of 30 years and its shall be renewable on the basis of mutual consent. The sharing arrangement (from January 1 to May 31, every year) shall be reviewed by the two governments at five years interval or earlier as required by either part.<sup>47</sup> This treaty is no doubt a great achievement in the history of Indo-Bangladesh negotiations on the Ganges and has removed a major irritant in the relations between the two neighboring countries.

## II. THE EFFICACY OF FARAKKA BARRAGE AND ITS IMPACT ON BANGLADESH

*Since 1975 when the Farakka Barrage was put into operation more than 20 years have passed. Has the barrage been able to serve the stated purpose for which it was built? What has been its impact on Bangladesh in the downstream reaches? These are the issues examined in this section.*

### *Efficacy of the Barrage*

The Farakka Barrage was constructed by India to divert 40,000 cusec of dry season Ganges flows into the Bhagirathi-Hooghly river of West Bengal to flush silts and to improve the navigability of the Port of Calcutta. The efficacy of diversion of waters from the Ganges for flushing

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46. See JRC, *supra* note 6.

47. *The Daily Star*, Dec. 12, 1996, Dhara.

the silts of Hooghly had been questioned in the past by many, including Indian experts. As early as 1963, Mr. Kapil Bhattacharya, an Indian expert, opined that the proposed diversion from Farakka for five months every year would only be a waste of the scarce dry season flows of the Ganges. He maintained that 40,000 cusec of Ganges waters would not be able to generate the same flushing momentum as the one created by the flood discharges of Damodar-Rupnarayan rivers of West Bengal with steeper slopes.<sup>48</sup>

About 650,000 cusec peak floods of Damodar at the Old Anderson Weir near Rhondia flowing through Rupnarayan and other channels used to flush the silts of the Hooghly into the Bay of Bengal. The deterioration of the Hooghly in the reach of the port of Calcutta was the consequence of engineering steps taken in the catchments of the Bhagirathi-Hooghly and Damodar-Rupnarayan rivers. Construction of dams by India at Maithon, Panchet and other places in the Damodar Valley by the Damodar Valley Corporation (DVC) has choked the outfall of the Bhagirathi-Hooghly-Rupnarayan system. Since the implementation of DVC projects, the peak floods from the dammed rivers reduced to 250,000 cusec from the normal 650,000 cusec.<sup>49</sup> Reduced flooding expedited the siltation process in the Hooghly and halved the carrying capacity of the river.

In 1962, eminent international experts like A. T. Ippen and C. F. Wicker, after careful study of the Farakka Barrage project, concluded that the diversion of fresh water into the Hooghly River through construction of Farakka Barrage would not contribute to the solution but was likely to accentuate the serious shoaling problems in that river and to the preservation of the port of Calcutta.<sup>50</sup> In spite of all these timely cautions voiced by many, the Farakka Barrage was constructed and commissioned by India. Twenty years have passed since then. Over all these years, India has diverted dry season Ganges flows in the range of 30,000 and 40,000 cusec into the Hooghly from Farakka.<sup>51</sup> During the years when there was no sharing agreement between India and Bangladesh, India took full advantage and made diversions from Farakka exceeding 40,000 cusec. Incidentally, the feeder canal of Farakka Barrage can actually divert up to 45,000 cusec.<sup>52</sup> The navigability of the port of Calcutta, however, did

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48. GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH, REVIEW OF THE 1977 AGREEMENT ON SHARING OF THE GANGES WATERS AT FARAKKA AND AUGMENTING ITS FLOWS, Part A, 159 (June 1982).

49. *Id.* at 157.

50. *Id.* at 159.

51. *Id.*

52. *Id.*

not improve. The relevant depth charts available with the Calcutta port Authorities would bear testimony to this fact.<sup>53</sup>

India herself probably recognised that Calcutta, a port of the past generation, could no longer meet the needs of modern shipping because of its inadequate facilities. That is why it decided to set up a modern deep sea port at a further downstream location called Haldia (about 60 miles below Calcutta) to cater to the needs of modern day large ocean going vessels. The port of Haldia, today, is bustling with activities and handling increasing amounts of cargo while the cargo handling by the port of Calcutta is rapidly declining. In a seminar held in Calcutta in December of 1981 the Regional Director of the Shipping Corporation of India Ltd. stated in his address, "Haldia was thus born as a child of necessity bridging, as it were, the generation gap of Calcutta."<sup>54</sup>

According to a senior hydrologist of Calcutta Port Trust, an unhindered flow of 40,000 cusec during the dry months, which came in between 1975 and 1977, could not prevent formation of fresh mounds of underwater silt at the mouth downstream of the port. This obstruction, known as the Balari Bar, had already restricted the draught of the incoming ships to 31 feet even though the port was designed for vessels with 40 feet draught. Based on this fact, one of the experts said "Farakka or no Farakka, Calcutta Port is doomed" (Ref. "India Today", New Delhi, February 16-28, 1981). An article which appeared in the Indian newspaper "The Telegraph" of Calcutta on July 2, 1993, commented,

[I]t is time the authorities acknowledged Calcutta port is doomed to extinction. The Calcutta port is 120 miles up the river. It needs to face the grim truth that it has outlived its utility. Sustaining it is a gross waste of scarce resources. Talks of restoring the port to its former glory are pipedreams. Haldia is close to the sea. No major sandbar needs to be negotiated to reach it. If the funds presently wasted on the Calcutta port were spent to deepen Haldia's approach channel and expand its docks it would be a worthy successor to Calcutta port.

### *The Impact of Farakka on Bangladesh*

Two decades have passed since the Farakka Barrage was put into operation. The diversions from this barrage to the Hooghly, however, have not made any noticeable improvement of the condition of Calcutta port. But the Barrage certainly did wreak havoc on Bangladesh. Large

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53. *Id.*

54. *Id.*

scale Indian withdrawals of dry season flows of the Ganges have produced ruinous impacts in every sphere of life and living in the Ganges dependent areas of this country. Today, the flow of the Ganges in Bangladesh, turns almost to trickles during dry seasons in the vast expanse of the river bed. The phenomenon has adversely affected the hydrology, river morphology, agriculture, domestic and municipal water supply, fishery, forestry, industry, navigation, public health and biodiversity. The deprivation of Bangladesh of its rightful share of the Ganges flows denied it an annual benefit of about 600 million U.S. Dollars in the agriculture sector alone. Initial assessment of only direct damages in different sectors due to Farakka withdrawals indicate Bangladesh damages to be worth three billion U.S. Dollars.<sup>55</sup> This estimate of only direct damages, however, is also preliminary and would rise further after the final accounting. The delicate ecological balance of the Ganges dependent areas of Bangladesh can tolerate only a certain amount of rough handling. The continuous and increased assault of the Farakka barrage on the environment and ecology is rapidly exhausting the area's capacity to recover.

Alarming degradation of the environment of the Ganges dependent areas in Bangladesh has already forced hundreds of people to leave in quest of survival. In the face of deteriorating human health, reduced economic productivity and loss of amenities, life and living in this part of Bangladesh is becoming increasingly vulnerable and insecure.

The diversion of the dry season Ganges flows from Farakka by India was stated to be for the improvement of navigability of the port of Calcutta. This was a new use against the existing uses in Bangladesh which has no viable alternative to replace or supplement the deprivation of natural flows of the Ganges. If measured by the original purpose of improving the navigability of the Calcutta port, injection of thousands of cusec of dry season Ganges flows from Farakka into the Hooghly has not proved to be fruitful.

#### IV. THE ISSUE OF AUGMENTATION OF GANGES FLOWS AT FARAKKA

*The issue of augmentation of the dry season Ganges flows at Farakka had been the major hurdle blocking meaningful progress of Indo-Bangladesh negotiations on the Ganges in the past. This section briefly deals with the proposals of India and Bangladesh for augmenting the flows of the Ganges at Farakka.*

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55. See JRC, *supra* note 6.

According to 1977 agreement the dry season flow of the Ganges available at Farakka, the point of sharing between India and Bangladesh, during the driest period (April 21-30) is only 55,000 cusec (on the basis of 75 percent availability). This flow is no doubt inadequate to meet the demands of Bangladesh and the port of Calcutta. It may, however, be noted that the dry season Ganges flow available at Farakka is only the residual flow that remains after upstream uses in the Indian states of Rajasthan, Haryana, Madhya Pradesh, Uttar Pradesh and Bihar. Experts estimate that the total dry season flow of the Ganges in the upstream reaches of India is more than 200,000 cusec.<sup>56</sup> With increasing upstream uses, the downstream flow of the Ganges is gradually depleting, putting tremendous stress on Bangladesh. Ironically when Bangladesh does not need any water during the monsoon, it is flooded with water, causing loss of properties and lives. In fact, Bangladesh has to give passage to the entire flood flows of the Ganges rushing down from a vast catchment of more than 400,000 square miles. On the other hand, during the dry season, when the country is in frantic need of water, there is acute scarcity of flow in the river. In the interest of millions of people such a situation argues for abatement. An urgent need exists not only to restore the dry season pre-Farakka flows of the Ganges in Bangladesh, but also to augment the flows.

Over the years Bangladesh and India have been talking about the issue of augmentation without any fruitful result. India has stuck to its position that the Ganges flows at Farakka can be augmented only through importation of dry season Brahmaputra flows. Although India has been talking on Brahmaputra-Ganges inter-basin transfer since 1974, it tabled the formal proposal in 1978.<sup>57</sup> The Indian proposal on augmentation (See Figure-2) included:

- a barrage across the Brahmaputra at Jogighopa in the State of Assam of India and a link canal about half a mile wide, 30 feet deep and 200 miles long (78 miles of which will be through Bangladesh territory) taking off from Jogighopa Barrage for diverting 100,000 cusec of dry season Brahmaputra waters to the Ganges in the pond upstream of the Farakka Barrage in India.
- three storage reservoirs, one each on the rivers Dihang and Subansiri (tributaries of the Brahmaputra) in the State of Arunachal of India to augment the flows of the Brahmaputra and one on the Barak (headstream of the Meghna river of Bangladesh) river at Tipaimukh in Mizoram/Manipur of India.

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56. *Id.*

57. GOVERNMENT OF INDIA, *supra* note 40.

This proposal was updated by India in 1983 wherein it was stated that the component of the Jogighopa Barrage and the Link Canal would be built in the first stage while the storage reservoirs would be implemented in subsequent phases.

Bangladesh also updated its proposal and exchanged it with India. Following exchange of the updated proposals, each country also exchanged comments on each other's proposal in 1983. After detailed examination of the Indian Link-canal proposal, Bangladesh informed India that:

- the total lean season demand of Brahmaputra waters by Bangladesh surpasses the average dry season availability of this river in the country. There is, therefore, no surplus water available in the Brahmaputra during the dry season for transfer elsewhere.<sup>58</sup>
- the feasibility of the proposed Brahmaputra - Ganges link canal from Jogighopa in Assam to Farakka in West Bengal is seriously discounted on several grounds:
- It envisages construction of a gravity canal against the lay of terrain contrary to the natural flow of the rivers. Such a canal would totally disrupt the natural drainage system of the area.<sup>59</sup>
- It predicates construction of what would be the world's largest canal, with a capacity of 100,000 cusec. The canal would be substantially below the water table of a potentially good aquifer, crossing 14 rivers with highly seasonal discharge and high sediment concentration, in an area characterized by fluvial instability.<sup>60</sup>

The economic consequences of the Indian proposal are even more far-reaching. The Brahmaputra basin encompasses a large area and population of Bangladesh. The negative impact on agricultural and industrial productivity, irrigation, power, forestry and fishery is sufficient to threaten the present and future economic development of the entire basin, since this river, too, would be left almost dry during the dry season after the transfer of 100,000 cusec from its flows.<sup>61</sup>

For construction of the canal length inside Bangladesh, about 30,000 acres of land needs to be acquired. A vast area of about 593,000 acres will have to be considered lost as a result of water logging after the

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58. GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH, COMMENTS ON THE INDIAN PROPOSAL FOR AUGMENTATION OF THE DRY SEASON FLOWS OF THE GANGES AT FARAKKA, Dhaka (Feb. 1981).

59. *Id.*

60. *Id.*

61. *Id.*

project is implemented. The canal, proposal, therefore, would be an economic and cultural disaster. It would lead directly and indirectly to the displacement of more than a million people, depriving them of their land, home and hearth and would create a grave rehabilitation problem.<sup>62</sup> Bangladesh is a land-hungry country with one of the lowest land to man ratios in the world. In Bangladesh, per capita availability of cultivated land was only 0.22 acres in 1991. About 90 percent of the people are dependent on land for their livelihood. The link canal would also disrupt communications and truncate the land with no clear appreciation of the potential adverse impacts on the hydrological, geological or geomorphologic consequences on the region.

In the issue of augmentation of Brahmaputra flows by storage dams in Dihang and Subansiri, a study undertaken by the Assam Institute of Development Studies of India concluded ( as published in the *Assam Tribune* from Guahati, State of Assam, India on July 22, 1981):

The storage prospect of Brahmaputra are not encouraging. Out of the average annual yields of 420 MAF of the Brahmaputra basin, a total storage of 30 MAF i. e. only 7 percent of the total can be created even overstepping the reservations voiced by the geologists and seismologists on many of the dams. The above approximations have closely tallied with the estimation of Dr. K. L. Rao (an eminent Water Resources Engineer and Ex-Minister of Water Resources of the Government of India) who stated that barely 10 percent of the Brahmaputra waters are usable. Incidentally, of the total catchment area of the Brahmaputra at Guahati (India), 69 percent is in Tibet (China).

As against the Indian proposal of inter-basin transfer for augmentation of Ganges flows, Bangladesh has all along been stressing the need for optimum development of surface water resources of the Ganges basin through a coordinated basin plan undertaken jointly by the co-basin countries—Bangladesh, India and Nepal. Through this plan, the dry season Ganges flows can be augmented to the required level to meet the water demands of the co-basin countries. Bangladesh discussed the concept first in the tenth meeting of the JRC held in September of 1974.<sup>63</sup>

In 1978, Bangladesh formally tabled its proposal for augmenting the dry season Ganges flows through storage dams in Nepal and India. India maintained that storage possibilities in the Ganges in India were limited. Most of the storages had already been built or were being built and their waters were being used or would be used. The rest were distributed over wide areas and at far off distances from Farakka.

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62. *Id.*

63. See *supra* JRC at note 6.

Therefore, possibilities of augmentation through storages were low. Bangladesh disagreed saying that there was enough water in the Ganges basin on an annual basis. Proper development and utilization of this water could meet the needs of the two countries. Bangladesh had suggested that the Ganges tributaries coming from Nepal, which contribute a substantial part of the Ganges flow, could be developed for the benefit of the countries concerned.

Bangladesh, in its updated proposal for augmentation stated that flow regulation of the four largest Nepalese catchments by constructing seven storage dams at Chisapani, Kaligandaki (1 and 2), Trisulganga, Seti, Sapt Kosi and Pancheswar (See Figure-2) would facilitate augmentation of the dry season Ganges flows at Farakka by an amount of 58,500 cusec.<sup>64</sup> It was proposed that if out of the stated seven dams, four at Chisapani, Trisulganga, Seti, and Sapt Kosi were raised to natural limits (imposed by either storage limitations or the water availability for extra storage), then the dry season flows of the Ganges at Farakka could be augmented by 188,500 cusec during the period January to May.<sup>65</sup> Restricting the number of storage dams to only seven, despite numerous sites being available in Nepal, would cause minimal interference with nature and create less rehabilitational problems. Studies indicated that the additional area of inundation due to raising of the four dam heights would be far less than the amount of land which would go under water if new dams were constructed for the same amount of augmentation. Besides augmenting the dry season Ganges flows at Farakka, the storage dams in Nepal would bring in other benefits like:

- flood mitigation in the Ganges basin;
- improvement of navigation in the basin area;
- control of saline intrusion in the lower Gangetic delta;
- control of pollution by increasing fresh water supply;
- generation of large quantities of cheap hydropower in Nepal. The total installed capacity of the proposed seven Nepalese dams would be 11,500 MW; 42,700 GWh/yr firm energy (ninety five percent dependable) and at least 17,000 GWh/yr secondary energy.<sup>66</sup>

Unfortunately, the Bangladesh proposal for storage dams in Nepal was not considered because India objected to the involvement of a third country (Nepal) in the bilateral negotiations between India and Bangladesh. This India did, despite the fact that in the Side letters (integral part of the 1977 Agreement) were exchanged between the

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64. See GOB, *supra* note 39.

65. *Id.*

66. *Id.*



Governments of India and Bangladesh on November 5, 1977, the Government of India committed as follows:

In the course of the discussions which have taken place between us in connection with the conclusion of the Agreement between Bangladesh and India on the sharing of the Ganges waters at Farakka and on augmenting its flows, the two Governments have reached an understanding to the effect that the words "proposed or to be proposed by either Government", occurring in Article IX in part B of the Agreement, relate to any scheme or schemes which may have been proposed or may be proposed by Bangladesh or India do not exclude any scheme or schemes for building storages in the upper reaches of the Ganges in Nepal. The two Governments have also agreed to take such further steps as may be necessary for the investigation and study of any scheme or schemes.<sup>67</sup>

Over all these years, whenever Bangladesh wanted involvement of Nepal in the discussion on its proposal for augmentation through storages in Nepal, India had avoided the issue on the plea of bilaterlism. Meanwhile India itself went ahead with negotiations with Nepal to harness the Nepalese tributaries of the Ganges under Indo-Nepal joint venture. During December of 1991 and October of 1992 the Governments of India and Nepal entered into Agreements to jointly undertake the following storage dam projects in Nepal:<sup>68</sup>

- Karnali-Chisapani multipurpose project;
- Pancheswar multipurpose project;
- Sapt Kosi high dam projec ;
- Buri Gandaki projec.

In today's world, there is no dispute that the water resources of international rivers are to be shared equitably among the riparian countries. Isolated individual development cannot yield optimal results. Development should be holistic. To that end, regional cooperation is essential. A problem which is multilateral cannot be resolved bilaterally. According to many, a number of social, political and historical inhibitions had been at work obstructing meaningful regional cooperation in management and sharing of common water resources of the Ganges. The integrated development of this common resource remained neglected with inadequate appreciation of the fact that every year lost meant the loss of a productive multiplier through the creation of wealth and employment that would otherwise have been at work.

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67. SIDE LETTER TO NOVEMBER 1977 AGREEMENT BETWEEN THE GOVERNMENT OF BANGLADESH AND INDIA ON SHARING OF THE GANGES WATERS AT FARAKKA AND ON AUGMENTING ITS FLOWS, Dacca (Nov. 5, 1977).

68. See JRC, *supra* note 6.

A significant amount of the monsoon floods of the Ganges which cause widespread damage to lives and property in the co-basin countries could be conserved in the upstream storage sites to mitigate the flood intensities downstream. This, in turn, would have enabled augmentation of the dry season flows of Ganges available at Farakka to satisfy the reasonable water needs of all concerned. In addition, generation of large amounts of hydropower from the storage dams could have eased the energy crisis in the basin area and created more job opportunities by facilitating rapid industrialisation in different parts. The tremendous pressure on fuelwood in the region as an energy source would also have been reduced and forest resources of Nepal in particular could also have been saved. All these, however, did not occur.

The management of a river basin like that of the Ganges is a matter of regional concern because it is a transboundary environmental resource. Environmental degradation in one country is bound to ultimately affect the other co-basin countries in some way or another. As such when the environment of one country is adversely impacted, others cannot and should not look the other way. It becomes the collective obligation of all to tackle the situation and take remedial measures in a concerted manner.

## V. CONCLUSION

Water of the Ganges is too precious a resource to waste when there are millions of poor people dependent on it for their livelihood. It is a tragedy that the people living in the Ganges basin area are still one of the poorest despite the basin's rich endowments. While so much could have been done, achievement in terms of management of the water resources of the Ganges through multilateral cooperation has been practically nil. The potential of the basin is by now fairly well understood by all. While the path of positive riparian cooperation should have been followed towards realisation of the bounty of the Ganges for the benefit of the millions, controversies prevented agreement in the past. Progress towards mutual cooperation had been impeded by mistrust, fear, misperception and myth. In the interest of all, the political and conceptual problems need to be more purposefully addressed especially as the underlying commonality of interests in the Ganges is overwhelming. All concerned should wriggle themselves free of their unenlightened and misplaced national interests. The national interests of one cannot be the sum of losses of the others. There cannot be any alternative to beneficial cooperation toward an enlightened path of positive riparian relations. The December, 1996 treaty between Bangladesh and India on sharing the waters of the Ganges is a great leap forward that would usher in a new era of such positive riparian relations.