

MUHAMMAD MIZANUR RAHAMAN¹

The Ganges water Conflict

A comparative analysis of 1977 Agreement and 1996 Treaty

O conflito de augas do Ganxes

Unha análise comparativa do Acordo de 1977 e o Tratado de 1996

Resumo: Este artigo examina dous tratados entre Bangladesh e India para o compartillamento das augas do Río Ganxes e o aumento do seu fluxo durante as estacións de mais necesidade. Desde a construción da barraxe de Farakka na India, as augas do Ganxes convertéronse na principal chave de conflito entre ambas nacións. Para abordar este conflito, os dous países asinaron durante as tres últimas décadas dous tratados e dous Memorandos de Entendemento, *i.e.* Acordo de 1977, Memorandos de 1982 e 1985 e o máis recente Tratado de 1996 para a división das augas do Ganxes. Despois de ilustrar a evolución histórica dos conflitos e da cooperación hídricos entre as dúas nacións, este artigo repasa as provisións para a xestión e uso compartido do Acordo de 1977 e o Tratado de 1996. En base á análise comparativa entre ambos os textos, este artigo recomenda seis revisións do Tratado de 1996, que posibelmente contribuirían para a resolución do duradouro conflito hídrico do Ganxes, alcanzando a xestión integrada de recursos hídricos na Bacia deste río.

Palabras-clave: Bacia do Ganxes, compartillamento de auga, acordo, conflito, cooperación, xestión integrada de recursos hídricos.

Abstract: *This paper examines two treaties between Bangladesh and India for sharing waters of the Ganges River and augmenting flow during lean season. Since the construction of the Farakka barrage in India, Ganges water became the key source of conflict between the two nations. To address this conflict, over the last three decades, the two countries signed two treaties and two Memorandums of Understanding, i.e. 1977 Agreement, 1982 MOU, 1985 MOU, and latest 1996 Treaty for sharing Ganges water. After illustrating the historical evolution of water conflict and cooperation between the two nations, this paper reviews the water sharing and management provisions of the 1977 Agreement and 1996 Treaty. Based on the comparative analysis of both documents, this paper recommended six revisions of the 1996 Treaty that would likely to contribute towards resolving longstanding water conflict and achieving integrated water resources management in the Ganges basin.*

Keywords: *Ganges basin, water sharing, agreement, conflict, cooperation, integrated water resources management.*

¹ The author would like to thank Dr. Olli Varis, Prof. Pertti Vakkilainen, Abu Raihan M. Khalid and Marko Keskinen for their constructive comments and suggestions. The excellent support of the HUT Water Resources Laboratory and its staff are greatly acknowledged.

INTRODUCTION

The river Ganga or Ganges rises in the Gangotri glacier in the Uttarakashi district of Uttar Pradesh province in India, at an elevation of about 3139 m (Encarta, 2001) above sea level. Many important tributaries including Mahakali, Gandak, Kosi, and Karnali originate in Nepal and China (Tibet). The Ganges river has total length of about 2600 kilometers and the total drainage area is of about 1080000 square kilometers and is shared by China, Nepal, India and Bangladesh. The Ganges basin is located 70°-88°30' east longitude and 21°-31° north latitude (Fig.1).

The temporal and spatial distribution of water resources is one of the main challenges for sustainable water management in the Ganges basin and hence to attain food security and achieve socio-economical development. During the monsoon period, which occurs from June to October, there is abundant water but during non-monsoon months (January-May) the countries become water stressed (Biswas and Uitto, 2001). The Ganges has an average annual flow (1949-1973) rate of 12105 m³/sec and a flow volume of 382 billion cubic meters (bcm). During June-October the average flow is 24526 m³/sec whereas during January-May it is only 2199 m³/sec (Rahaman, 2005a). Thus flooding in monsoon and drought in non-monsoon period is a common natural phenomenon.

The conflict over the Ganges water between Bangladesh and India dates back to 1951 when India decided to construct the Farakka barrage in order to divert water from the Ganges to the Hooghly river (in India) by a 42-kilometer long feeder canal with a carrying capacity of 1133 m³/sec (Abbas, 1984). The barrage started operation in 1975. Since then, the sharing and controlling of the Ganges water became the key source of controversy between these two nations. The two nations signed two treaties in 1977 and 1996 and two Memorandums of Understanding (MOU) in 1983 and 1985 to share Ganges water and to find out long-term solution by augmenting lean season Ganges flow.

This paper has two objectives. Firstly, highlighting the historical evolution of water conflict and cooperation between Bangladesh and India. Secondly, critically analyzing two water sharing agreements, i.e. 1977 Ganges Water Agreement and 1996 Ganges Water Treaty. In conclusion, based on the analysis, this paper recommends six revisions to the 1996 Ganges treaty that would strengthen the scope of the treaty to resolve water conflict and promote cooperation for the long-term solution of the crisis.

flow in Bangladesh measured at Hardinge bridge point decreased substantially during dry season (January-May) (Fig. 2). The average dry season pre-Farakka flow (1934-1975) was 2340 m³/sec, whereas the average dry season post-Farakka flow is only 1236 m³/sec (1975-1995) at Hardinge Bridge during January-May (BMWR, 1996). Bangladesh submitted complaint against the Farakka barrage to the UN General Assembly in 1976. Bangladesh expressed its concern to the Commonwealth Summit held at Cyprus in October 1993. On 23rd October 1995, Bangladesh again raised the issue to 50th UN General Assembly about the misery of Bangladeshi people due to Farakka Barrage (BMWR, 1996: 10). Historical evolution of water conflicts and cooperation between the two nations are presented in Table I.

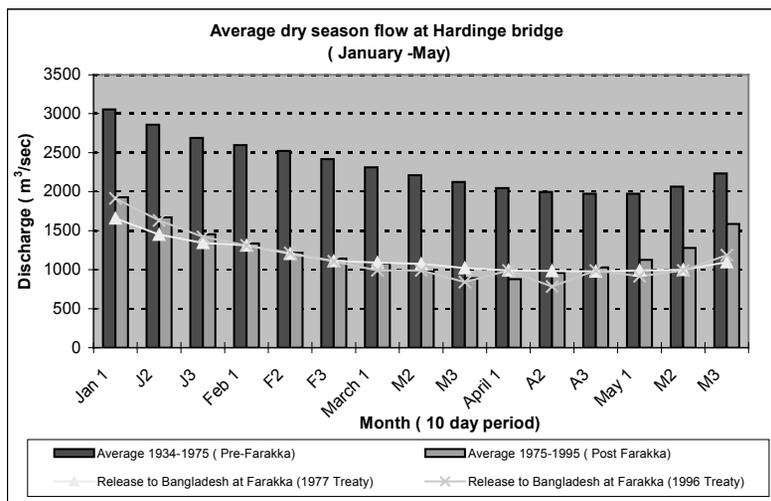


Figure 2. Average 10-day discharge (1934-1995) of the Ganges measured at Hardinge bridge (Bangladesh) and water allocation at Farakka under 1977 Agreement² and 1996 Treaty³. Sources: Data for analysis obtained from Joint Rivers Commission, Bangladesh (cited in BMWR, 1996), 1977 Agreement (Annex-Schedule), 1996 Treaty (Annexure II).

² According to Article II (ii) of the 1977 Agreement, in case the Ganges flow at Farakka reduces substantially Bangladesh will get 80 percent of the water allocated in the treaty. This is widely known as *Guarantee Clause*.

³ Subject to the conditions of the 1996 Ganges Treaty: a) India and Bangladesh each shall receive guaranteed 991 m³/sec of water in alternate three 10-day periods during the period from March 11 to May 10 (Article II and Annexure I), b) if actual

Muhammad Mizanur Rahaman, The Ganges water Conflict * 199

Year	Outcome
1951	Pakistan (Bangladesh after 1971) officially objected India's plan to construct Farakka Barrage on 29 th October 1951.
1961	India officially admitted the unilateral construction of the Barrage on 30 th January 1961.
1972	On 24 th November 1972, India and Bangladesh signed statutes of the Indo-Bangladesh Joint River Commission (JRC).
1974	Farakka barrage construction is completed. In a joint declaration on 16 May 1974, the prime ministers of Bangladesh and India acknowledged (that there was) a need to augment the lean season flow of Ganges to meet the full requirements of both countries and expressed their determination that before the Farakka project would be commissioned they would arrive at a mutually acceptable allocation of the water available during the periods of minimum flow in the Ganges. The declaration authorised Indo-Bangladesh JRC to study schemes relating to the augmentation of the dry season Gan-ges flow and make recommendations to meet the requirements of the both countries.
1975	On 18 th April 1975, Bangladesh allowed India to divert 310-450 m ³ /sec of Ganges water from 21 st April to 31 st May 1975 to test the feeder canal of the Farakka Barrage through a ministerial level declaration. Farakka barrage started operation on 21 of April 1975. On June 1975, Indo-Bangladesh JRC submitted its report in pursuance on the 1974 joint declaration. Bangladesh side suggested augmentation of dry season flow through building storage reservoirs in Nepal and whereas Indian side stressed augmentation through diversion of water from the Brahmaputra river to the Ganges River (Abbas, 1984:42). Neither side agreed on other's proposal.
1976	India continued unilateral diversion of the Ganges flow beyond the stipulated period in the 1975 ministerial declaration throughout the 1976 dry season and withdrew 1133 m ³ /sec of water (full capacity of the feeder canal) at Farakka. Bangladesh raised the issue to the UN. On 26 th November 1976, UN General Assembly adopted a consensus statement, which directed both countries to urgently negotiate a fair and expeditious settlement of the Farakka problem to promote the well being of the region (UN, 1976).
1977	Upon the direction of the UN, India and Bangladesh signed Ganges Water Agreement on 5 th November 1977 for the duration of 5 years.
1982	7 th October 1982, a Memorandum of Understanding (MOU) was signed between the two countries for sharing dry season flow of Ganges at Farakka in 1983 and 1984. This MOU is followed by the understanding reached between the Prime Minister of India, Indira Gandhi, and the President of Bangladesh, H.M. Ershad, at the Delhi Summit on November 1982.
1985	There was no agreement for 1985 dry season. The President of Bangladesh and the Prime Minister of India discussed the issue during the Commonwealth Summit at Nassau, Bahamas in October 1985 and agreed to sign a MOU for Ganges water sharing at Farakka. On 22 nd November 1985 another MOU was signed for three years (1986-1988), which expired on 31 st May 1988.

availability corresponds to the average flows of the period 1949-1988 (Annexure II), c) if the flows at Farakka is above 1145 m³/sec (Article II).

1986	On 29-31 October, 1986 a team of experts from Bangladesh and India officially approached to Nepal regarding the potential water storage projects at upstream of the Ganges basin in Nepal. The meeting ended without any outcome.
1988	1985 MOUs expired. No agreement for the period 1988-1996.
1993	Bangladesh raised the issue at Commonwealth Summit held at Cyprus in October 1993.
1995	On 23 rd October 1995, Bangladesh again raised the issue to 50 th UN General Assembly about the misery of Bangladeshi people due to the unilateral water diversion at Farakka Barrage.
1996	An agreement between Bangladesh and India on sharing the Ganges water at Farakka was signed on 12 th December 1996 for the duration of 30 years.
2005	In the 36 th Indo-Bangladesh JRC meeting, held on September 2005, Bangladesh again proposed to have tripartite talks involving Nepal for building water reservoirs in Nepal in order to augment the dry season flow of the Ganges.

Table 1. Chronology of water conflicts and cooperation between Bangladesh and India along the Ganges River.

ANALYSIS OF THE 1977 AGREEMENT AND 1996 TREATY

In 1977 and 1996, the two countries signed two treaties to solve the long-standing Farakka water conflict between the two nations. But as of today Farakka remains a major source of dispute between the two nations. This section analyzes the 1977 Agreement and the 1996 Treaty.

Upon the direction of the 31st United Nations General Assembly (UN, 1976), the first 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 was signed on 5th November 1977 at Dhaka, for the duration of five years. Section A of the agreement (Article I-VII) deals with the arrangements for sharing the Ganges waters at Farakka. According to that Article II (i), the Ganges water sharing at Farakka from the first of January to the 31st May every year will be with reference to the quantum shown in column 2 of the Schedule (Table II) which is based on 75% availability calculated from the recorded flows of the Ganges at Farakka from 1948 to 1973⁴. The water was divided between Bangladesh and India in an overall ratio of about 60 percent for Bangladesh and 40 percent for India (Table II).

⁴75 percent availability represents the flow magnitude that can be expected to be equaled or exceeded 75 percent of time of the specified period (Subramanya, 1991:136).

Article II (ii) states that India shall release waters to Bangladesh by 10-day periods in quantum shown in column 4 of the Schedule (Table II). It also mentions that if the actual availability of water at Farakka during a 10-day period is higher and lower than the quantum shown in column 2 of the Table II it shall be shared in the proportion applicable for that period. Article II (ii) further states that if during a particular 10-day period, the flow at Farakka comes down to such a level that the share of Bangladesh is lower than 80 percent of the value shown in column 4 of the Schedule (Table II), the release to waters to Bangladesh during that 10-day period shall not below 80 percent of the value shown in column 4. Thus this clause guaranteed Bangladesh a minimum of 80 percent of its share during each period whatever low the flow of the Ganges may be during that period. This is widely known as *80 percent guarantee clause*.

1	2	3	4	5
Period	Flow reaching Farakka (based on 75 percent availability from observed data (m ³ /sec)	Withdrawal by India (m ³ /sec)	Release to Bangladesh (m ³ /sec)	Ratio India: Bangladesh
Jan: 1-10	2789	1133	1657	41:59
11-20	2541	1090	1451	43:57
21-31	2336	1133	1345	49:51
Feb: 1-10	2244	934	1310	42:58
11-20	2095	892	1204	43:57
21-28	1982	871	1111	44:56
Mar: 1-10	1847	757	1090	41:59
11-20	1798	722	1076	40:60
21-31	1727	707	1020	41:59
Apr: 1-10	1671	680	991	41:59
11-20	1572	588	984	37:63
21-30	1557	580	977	37:63
May: 1-10	1600	609	991	38:62
11-20	1678	678	998	40:60
21-31	1855	757	1097	41:59

Table 2. Schedule for water sharing at Farakka- 1977 Agreement⁵.

Article IV establishes a Joint Committee to observe and record at Farakka the daily flows below Farakka Barrage and in the Feeder canal in

⁵ All water flow data in Table II, III and IV were originally in Cusecs (cubic feet per second). The data were converted to Cumecs (cubic meters per second). 1 m³/sec = 35.315 cusecs.

India, as well as Hardinge Bridge point in Bangladesh. According to Article VII the Joint Committee is responsible for implementing the water sharing arrangements and examining any difficulty arising out of the implementation of the sharing arrangement and of the operation of the Farakka Barrage.

Article VII provides a mechanism for the settlement of disputes. It mentions that any difference or dispute regarding the water sharing arrangements if not resolved by the Joint Committee shall be referred to a panel of equal number of Bangladeshi and Indian experts nominated by the two governments. If the dispute still remains the two governments shall meet urgently at the appropriate level to resolve it by mutual discussion and failing that by such other arrangement as they may mutually agreed upon.

Section B of the agreement (Article VIII-XI) deals with the long-term arrangement for augmenting the Ganges water flow at Farakka. Article IX instructed Indo-Bangladesh JRC to *“carry out investigation and study of schemes for augmenting the dry season flow of the Ganges, proposed or to be proposed by either Government with a view to finding a solution which is economical and feasible”*. It also instructed JRC to submit recommendations to two governments within a period of three years. The agreement empowers Indo-Bangladesh JRC by giving the key responsibility to find out the long-term solution of the Ganges water scarcity during non-monsoon season. Unfortunately, Bangladesh and India failed to attain any agreement on the augmentation of the dry season flow of Ganges at Farakka during the stipulated period.

Section C (Article XII -XV) deals with the review mechanism and duration of the agreement. Article XII states that during the period for which the agreement continues to be in force, the quantum of waters agreed to be released to Bangladesh at Farakka shall not be reduced.

The agreement was expired in November 1982, but was not renewed after its expiry. On 7th October 1982 MOU⁶ was signed between the two countries for sharing dry season flow of Ganges in 1983 and 1984. There was no agreement for 1985 dry season. On 22nd November 1985 another MOU was signed for three years, which expired on 31st May 1988. The water sharing arrangement of these two MOU was almost same as 1977 Agreement, however the 80 percent guarantee clause under the 1977 Agreement was not included in either of the MOUs. For dry seasons from 1989 to 1996 there was no water sharing agreement.

⁶ Agreement concluded at the administrative level is known as Memorandum of Understanding (MOU).

On 12th December 1996, the two governments signed the most recent treaty for sharing Ganges waters at Farakka during the dry season (1st January to 31st May). This treaty is valid for 30 years. Article II, Annexure I of the 1996 Ganges treaty establishes the formula for water sharing of the Ganges at Farakka during the dry season. Annexure II provides an indicative schedule of the sharing arrangement based on 40 years (1949-1988) 10-day period average availability of water at Farakka.

Article II (i) of the treaty defines the sharing arrangement of water between Bangladesh and India. It mentions, "The sharing between India and Bangladesh of the Ganga/Ganges waters at Farakka by ten day periods from the 1st January to the 31st May every year will be with reference to the formula at Annexure I and an indicative schedule giving the implications of the sharing arrangement under Annexure I is at Annexure II". Table III and IV below show the arrangements indicated in the Annexure I and II respectively.

Availability at Farakka (m ³ /sec)	Share of India	Share of Bangladesh
1982 or less	50%	50%
1982 to 2124	Balance of flow	991 m ³ /sec
2124 or more	40,000 cusecs	Balance of flow

Table 3. Water sharing formula of the 1996 Treaty (Annexure 1)⁷.

If actual availability corresponds to average flows of the period 1949 to 1988, the implication of the formula in Annexure I (Table III) for the share of each side is:

1	2	3	4	5
Period	Average of total flow 1949-88 (m ³ /sec)	India's share (m ³ /sec)	Bangladesh's share (m ³ /sec)	Ratio India: Bangladesh
Jan: 1-10	3045	1133	1912	37: 63
11-20	2766	1133	1633	41:59
21-31	2553	1133	1420	44:56

⁷ Subject to the condition that India and Bangladesh each shall receive guaranteed 991 m³/sec of water in alternative three 10-day periods during the period March 1 to May 10. According to paragraph 3 of the Article I(ii), in the event flow at Farakka falls below 50,000 cusecs in any 10-day period, the two governments will enter into immediate consultations to make adjustments on an emergency basis, in accordance with the principles of equity, fair play and no harm to either party.

Feb:	1-10	2445	1133	1312	46:54
	11-20	2347	1133	1214	48:52
	21-28	2240	1133	1107	51:49
Mar:	1-10	2107	1116	991	53:47
	11-20	1952	961	991*	49:51
	21-31	1832	991*	841	54:46
Apr:	1-10	1789	798	991*	45:55
	11-20	1774	991*	783	56:44
	21-30	1727	736	991*	43:57
May:	1-10	1907	991*	916	52:48
	11-20	2084	1093	991	52:48
	21-31	2318	1133	1185	49:51

Table 4. Indicative schedule for water sharing at Farakka (Annex II, 1996 Treaty).
* Three ten-day periods during which 991 m³/sec shall be provided.

According to the 1977 Agreement and 1996 Treaty, proportion of water sharing between Bangladesh and India from January 1- May 31, are about 60:40 and 52:48 respectively (Table II, IV). In comparison with 1977 Agreement, Bangladesh's share decreased about 8 percent under the 1996 Treaty (Salman, 1998). It is worth noting that for the three critical non-monsoon months (March 1-May 31), the share of Bangladesh has decreased from about 61 percent under the 1977 Agreement to about 50 percent under the 1996 Treaty (Table II, IV).

Water allocated to Bangladesh in 1996 Treaty (Column 4 of the Table IV) has been found to be approximately 50 percent less than the pre-Farakka average flow at Hardinge Bridge point of Bangladesh, which means this treaty is unlikely to make any noticeable difference in solving the water crisis in the dry season in the south-western part of Bangladesh (Fig. 2; Rahaman, 2005a; Tanzeema & Faisal, 2001).

In Annexure II of the 1996 Treaty, the flow at Farakka was calculated on the basis of the average flows at Farakka for the period 1949 to 1998. In 1977 Agreement, water sharing was based on 75 percent availability of flow at Farakka from 1948 to 1973. Consequently, the average Ganges flows at Farakka of the under the Treaty (Column 2 of the Table IV) for each 10-day period exceeds the Ganges flows (based on 75 percent availability) at Farakka under the 1977 Agreement (Column 2 of the Table II) by a margin of 9 percent for each such period (cf. Salman, 1998). This indicates that the 1996 Treaty assumed a higher level of water availability (on average 12.26 percent higher for the period January 1 -May 31) than the 1977 Agreement (Table II, IV).

Unlike Article II of the 1977 Agreement, the 1996 Treaty does not provide any minimum guaranteed flow for (downstream) Bangladesh if the flow at Farakka reduces substantially. Article 11(ii) states, "Every effort would be made by the upper riparian to protect flows of water at Farakka as in the 40-years average availability as mentioned above". However, the treaty did not elaborate and define the term 'every effort'. Thus, if the flow at Farakka reduces substantially due to upstream abstraction, India is not under any obligation to protect the flow. Hence, without any clear obligation to control the upstream abstraction of the Ganges flow e.g., Uttar Pradesh, Bihar, and West Bengal, and no minimum guaranteed flow for Bangladesh, the water sharing according to the Annexure I, II becomes very much dependent on the will of the upstream users of Farakka.

Moreover, according to Article II (iii), if the flow at Farakka falls below 1145 m³/sec in any 10-day period stipulated in the Treaty, no water sharing arrangement exists. Bangladesh and India will sit immediately to decide equitable sharing, but no time frame for such meeting is mentioned. Hence, in the absence of a minimum guarantee clause, the indicative schedule of Annexure II (which is subject to the conditions of Article II and Annexure I) of the 1996 Ganges Treaty does not indicate the entitlement in terms of absolute volume of water for each country on a day-to-day basis.

The Treaty does not provide clear dispute resolution mechanisms. Article VIII states that if joint committee fails to resolve conflict arising out of the implementation of the Treaty it should be referred to Indo-Bangladesh JRC. If the difference or dispute still remains unresolved, it shall be referred to the two governments, which shall meet urgently at the appropriate level to resolve it by mutual discussion. What level of a government does it refer to and what is the time frame for dispute settlement are not specified in the Treaty. In addition, the Treaty does not bind any party to resolve the dispute if disagreements persist (cf. McGregor, 2000).

Unlike the 1977 Agreement, the 1996 Treaty does not include any arrangement for long-term solution of the dry season water scarcity, i.e. augmentation of the Ganges flow (cf. Salman, 1998; McGregor, 2000). Long-term solution of the water conflict between Bangladesh and India lies on augmenting the Ganges flow during lean season (January –May) (Abbas, 1984; Crow *et al.*, 1995; Rahaman, 2005a). Preamble and section B of the 1977 Agreement (Article VIII-XI) recognized this issue and provided mechanisms for augmenting the Ganges flow.

For augmenting the Ganges flow the cooperation of other riparian countries of the Ganges basin, i.e. Nepal and China are vital. Collective water resources management approach involving all riparian states would reduce the water shortage during the dry season and flood during the monsoon and ensure regional development (Rahaman, 2005a). Unfortunately, the 1996 Treaty does not provide any mechanism to approach other riparian countries of the Ganges basin for finding out long-term sustainable solution of the current crisis and for integrated management of the basin.

Article X of the 1996 Treaty provides the provision for reviewing and adjustment of the water sharing arrangement. Article XI stipulates that, "in the absence of mutual agreement on adjustments following review as mentioned in Article X, India shall release downstream of Farakka Barrage, water at a rate not less than 90 percent (ninety percent) of Bangladesh's share". This provision allows India to reduce the release to Bangladesh by 10 percent in case of disagreement on adjustments of the water sharing arrangement. On the contrary, Article XII of the 1977 Agreement assured 100 percent of Bangladesh share according to the treaty under all circumstances.

1996 Treaty does not offer any authority or responsibility to the Indo-Bangladesh JRC for implementing the treaty. Considering the fact that JRC is the only formal institution for dealing with transboundary water issues between the two nations, it weakens the role of the Indo-Bangladesh JRC.

The 1996 Treaty approves the theory of equitable allocation and obligation not to cause significant harm of international law through the inclusion of the principles of equity, fairness and no harm in Articles II, IX and X (Rahaman, 2005b). The inclusion of these principles are certainly the major breakthrough of the 1996 Treaty that would in turn reduce conflict and promote cooperation. Article IX states that "Guided by the principles of equity, fairness and no harm to either party, both the Governments agree to conclude water sharing Treaties/Agreements with regard to other common rivers". This indicates that both countries are committed for water sharing of the shared rivers through agreement and cooperation (Rahaman, 2005b). This is a positive development for water cooperation that was not included in the 1977 Agreement.

CONCLUSION

The preceding sections of the paper drew the chronology of water conflicts and cooperation between Bangladesh and India. It comparatively examines the 1977 Agreement and the 1996 Treaty for sharing water of the Ganges River at Farakka (India) and augmenting flow during lean season. Based on the analyses presented in this paper, following modifications/ revisions of the 1996 Treaty, according to the scope of the Article X, would reduce water conflict and promote cooperation between the two nations and contribute towards achieving integrated water resources management along the Ganges basin:

- Inclusion of a *minimum guarantee clause* for Bangladesh. This will ensure a minimum flow for downstream Bangladesh, in case of substantial reduction of the Ganges flow at Farakka due to upstream abstraction.
- Revision of the Annexure II of the treaty to share water on the basis of 75 percent availability of flow at Farakka rather than average of the total flow.
- Inclusion of an arrangement to investigate and study the schemes regarding the long-term solution through augmenting dry season flow of the Ganges River.
- Inclusion of provision providing clear responsibility and role for Indo-Bangladesh JRC in the operation, implementation and review of the treaty.
- Inclusion of an arbitration mechanism for dispute settlement.
- Inclusion of a provision for multilateral cooperation involving all riparian of the Ganges basin, i.e. Nepal, India, Bangladesh for the integrated management of the basin.

REFERENCES

- Abbas, B.M. (1984). *The Ganges Water Dispute*. Dhaka: University Press Limited.
- Bangladesh Ministry of Water Resources (1996). *Adverse impacts on Bangladesh due to withdrawal of dry season Ganges flow at Farakka and upstream*. Dhaka: Ministry of Water Resources.
- Biswas, A.K.; Uitto, J.I. (2001). Preface. In Biswas, A.K.; Uitto, J.I. Eds. *Sustainable Development of the Ganges-Brahmaputra-Meghna Basins*. Tokyo: UN University Press, pp. xi-xiv.
- Crow, B.; Lindquist, A.; Wilson, D. (1995). *Sharing the Ganges: The Politics and Technology of River Development*. Dhaka: University Press Limited.
- Encarta (2001). *Encarta Interactive World Atlas 2001*. USA: Microsoft Corporation.

208 * Muhammad Mizanur Rahaman, The Ganges water Conflict

McGregor, J. (2000). The Internationalisations of Disputes over Water: The Case of Bangladesh and India [online]. *Australasian Political Studies Association Conference*, 3rd-6th October, Canberra: ANU. Available at [access 03.17.2006]: <<http://apsa2000.anu.edu.au/confpapers/mcgregor.rtf>>.

MWRI (2005). Official website of the Ministry of Water Resources, Government of India. Available [access 03.17.2006]: <<http://wrmin.nic.in/projects/postind.htm>>.

Postel, S.L.; Wolf, A. T. (2001). Dehydrating Conflict. *Foreign Policy*, September 18.

Rahaman, M.M. (2005a). Integrated Ganges Basin Management: Conflicts and Hope for Regional Development. *Submitted*.

Rahaman, M.M. (2005b). The potential of international water laws towards achieving integrated Ganges basin management. In Mathur, G.N.; Chawla, A.S. Eds. *Proceedings of XII World Water Congress: Water for sustainable development - towards innovative solutions*, New Delhi, 22-25 November, Vol. 3. New Delhi: International Water Resources Association and Central Board of Irrigation and Power, India, pp. 173-186.

Salman, S.M.A. (1998). Co-Management of Resources: the Case of the Ganges River. *Conference on Water: Dispute Prevention & Development*, October 12-13 [online]. Center For the Global South, Washington College of Law, American University, Washington, DC. Available [access 01.12.2006]: <<http://gurukul.ucc.american.edu/maksoud/water98/present1.htm#paper2>>.

Tanzeema, S.; Faisal, I.M. (2001). Sharing the Ganges: A critical analysis of the water sharing treaties. *Water Policy*, 3(1), pp. 13-28.

United Nations (1976). *Situation arising out of the unilateral withdrawal of the Ganges waters at Farakka: Consensus statement*, adopted by the United Nations General Assembly, Thirty First session, Eightieth meeting, Agenda item 121, 26 November 1976.

Subramanya, K. (1991). *Engineering Hydrology*. New Delhi: Tata McGraw-Hill Publishing Company Limited.

*

Muhammad Mizanur Rahaman is currently working as a researcher at the Water Resources Laboratory, Helsinki University of Technology. He has been awarded Master's of Science in Technology and Licentiate of Science in Technology from Helsinki University of Technology respectively in 2003 and 2005. His research interests are integrated water resources management, transboundary water conflict, water laws, and global water policies. E-mail: mizanur.rahaman@hut.fi