

COOPERATION ON EASTERN HIMALAYAN RIVERS

Opportunities and Challenges



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Under the auspices of
Bangladesh Unnayan Parishad (BUP), Dhaka
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1

Introduction

This book presents the nine studies conducted jointly by Bangladesh Unnayan Parishad (BUP), Dhaka, Centre for Policy Research (CPR), New Delhi, and Institute for Integrated Development Studies (IIDS), Kathmandu as a part of Phase II of the initiative launched by the three institutions in 1990 focusing on regional cooperation in the harnessing of the eastern Himalayan rivers. The sequential arrangement of the chapters corresponds to the original study design except that study number 2 (on water-based integrated GBM regional development) has been moved to position 9 (chapter 10 in this book). The reason is that while the other studies deal with particular aspects, this study provides a framework for a future work programme (research, analysis and action).

The GBM Region

The Ganges-Brahmaputra-Meghna (GBM) river system is perhaps the second largest in the world (next only to the Amazon) serving Bangladesh, Bhutan, China (Tibet Region), India and Nepal. It carries an annual average runoff of over 1,250 billion cubic metres (BCM) and its drainage area extends over an area of 1.75 million sq. km. The arable land in the GBM region is over 79 million ha, and over 558 million people live in it. Details are given in Table 1.

**Table 1: GBM Region
(Some salient details)**

<i>Particulars</i>	<i>Ganges</i>	<i>Brahmaputra</i>	<i>Meghna</i>	<i>GBM</i>
Drainage area (in 1000 sq. km.)	1,080	580	85	1,745
Estimated population (1996) (in millions)	427	82	49	558
Arable land (in mha)	65.8	9.3	4.0	79.1

Brief profiles of the three major rivers constituting the GBM system are given below.

The Ganga/Ganges¹

The Bhagirathi, the traditional source of this river, rises from the Gangotri glacier in the Himalaya, India at an elevation of about 7,010m. It is joined by the Alakananda at Deva Prayag and thereafter the river is known as the Ganga. From Hardwar to Allahabad—a distance of about 720 km—it flows in a generally south/south eastern direction. Starting from the Uttarkashi district of Uttar Pradesh, the river practically covers the whole of northern India between the Himalayas and the Vindhyas except Punjab and Jammu & Kashmir. The Ganga is joined by a number of tributaries on the right and left banks in Uttar Pradesh and Bihar. The Ram Ganga, the Gomati, the Ghagra, the Gandak, the Bagmati and the Kosi are the important left bank tributaries, and the Yamuna and the Sone are the important right bank tributaries. The Ghagra (Karnali in Nepal), the Gandak and the Kosi which flow from Nepal contribute a significant part of the flows in the Ganga particularly in the dry season.

After its confluence with the Kosi, the Ganga continues its eastward flow in Bihar for another 40 km and as it enters West Bengal it swings round the Rajmahal hill range. The delta of the river can be said to start soon thereafter, below

1. The river is called Ganga in India and Ganges in Bangladesh. In this book both have been used as contextually appropriate.

Farakka. From about 16 km below Farakka, it forms the common boundary between India and Bangladesh for about 140 km. Downstream of Farakka the river divides into two arms, one flows eastward into Bangladesh as the Padma (Ganges) and the other flows southwest and becomes the Hooghly. The river then flows eastwards inside Bangladesh and joins the Brahmaputra at Goalundo. Bhagirathi/Hooghly takes off in India about 40 km below Farakka while the Gorai, the Arial Khan, the Kumar, the Mathabhanga are other important distributaries in Bangladesh. The combined flow of the Ganges and the Brahmaputra continues under the name of Padma till it joins the Meghna near Chandpur.

The drainage area of the Ganga/Ganges system is 1,080,000 sq. km. of which 861,000 sq. km. lie in India, 140,000 sq. km. in Nepal and 46,000 sq. km. in Bangladesh with the balance lying in Tibet. The length of the river from the source to the sea along the Bhagirathi-Hooghly route in India is about 2,525 km. The distance from the source to Goalundo is about 2,528 km. The average annual flow in the river as recorded at Farakka in India (1948–1973) is around 380 BCM and as recorded at Hardinge Bridge in Bangladesh around 383 BCM.

The culturable area in the Ganga/Ganges basin is estimated to be about 65.8 million ha, of which 60.2 mha is in India. The basin is also densely populated particularly in the lower reaches, and it is estimated that the present population (1996) is about 427 million.

The Brahmaputra

The Brahmaputra rises in the Great Glacier in the Kailash range of the Himalaya, at about 5,150m in the Tibet region of China and is locally named the Tsangpo. It flows eastward through southern Tibet for some 1,700 km., generally parallel to the main range of the Himalaya and is joined by many tributaries.

Beyond Pe (altitude 2,950m) the river abruptly turns northeast and north and flows in a succession of rapids between the high mountains of Gyala Pari and Namche Barwa (7,756m) and turns south and southwest to emerge from the foothills under the name, first of Siang and then Dihang.

in Arunachal Pradesh in India. Near Sadia town the Dibang and the Lohit join the river and thereafter it is known as the Brahmaputra.

During its course, the river is joined by many tributaries both from the north and the south. The principal northern tributaries are the Subansiri, the Kameng, the Dhansiri, the Manas, the Champamati and the Sunkosh. The main south bank tributaries are the Noa Dihing, the Buri Dihing, the Disang, the Dhansiri and the Kopili. Throughout its course in India, the Brahmaputra is braided and is very wide (up to 18 km. in the widest stretch), with some well defined nodal points where the width of the river is narrow and within fairly stable banks.

Swinging round the spurs of the Garo hills near Goalpara, the river enters Bangladesh and flows southwesterly for another 270 km until it joins the Ganges at Goalundo. Many tributaries join the Brahmaputra in this reach, of which the principal ones are the Dudhkumar, Dharla and the Teesta. Below the confluence of the Teesta the old channel of the Brahmaputra branches off the left bank. From here to Goalundo the river is called the Jamuna. The united stream of the Brahmaputra and the Ganges beyond Goalundo continues to flow southeast under the name of the Padma. At Chandpur, 105 km. below Goalundo, the Padma is joined by the Meghna on the left.

The Brahmaputra river from its source in Tibet up to Goalundo is about 2,817 km. long, of which 1,625 km lie in Tibet, 918 km. in India and the balance in Bangladesh. The total drainage area of the river is 580,000 sq. km., of which 293,000 sq. km. is in Tibet, 195,000 sq. km. in India, 45,000 sq. km. in Bhutan and 47,000 sq. km. in Bangladesh. The average annual flow at Bahadurabad (in Bangladesh) is around 620 BCM.

It is estimated that the culturable area in the Brahmaputra basin is around 9.3 million ha, mostly in India and Bangladesh. The estimated present population (1996) in the Brahmaputra basin is around 82 million, with more than half living in Bangladesh.

The Meghna

The Barak river, the headstream of the Meghna, rises in the hills of Manipur state in India at an elevation of 2,900m. It flows south, winding its way through the hills for 250 km before it takes a sharp turn at Tipaimukh and flows north. At Lakhipur it emerges into the plains and starts flowing west, in a meandering course. Near the India-Bangladesh border, the Barak bifurcates into the Surma and the Kushiara, both of which enter Bangladesh. The Surma flows along northern Sylhet and is joined by a number of tributaries from the hills. The Kushiara receives the waters of the north-flowing tributaries like the Singla, the Langai, the Manu, and the Khowai.

The Surma and the Kushiara join at Markuli after which the united stream is called the Kalni, which flows in a southerly direction. Near Kuliarchar, the Ghorautia (which carries the flows of the Someswari, the Kangsa, the Baulai and the Mogra) joins in and thereafter the river is called the Meghna. From there the Meghna flows southwest to meet the Padma (which carries the combined flows of the Brahmaputra and the Ganges) at Chandpur. Between Kuliarchar and Chandpur the Titas and the Gumti join from the right, and the Lakhya and Buriganga from the left. Below Chandpur the combined river is known as the Lower Meghna and it soon becomes a wide and deep estuary. It enters the Bay of Bengal through four principal mouths, the Tetulia, the Shahbazzpur, the Hatia and the Bamni.

The Meghna from its source flows for about 900 km up to Chandpur, of which the first 564 km. lie in India and the rest in Bangladesh. The distance between Chandpur and the sea is about 130 km. The total drainage area of the Meghna is 85,000 sq. km., of which 49,000 sq. km. lie in India and 36,000 sq. km. in Bangladesh. The average annual discharge of the Meghna (at Bhairab Bazar) upstream of its confluence with the Padma is around 150 BCM.

The culturable area in the Basin is assessed at 4 million ha, lying in India and Bangladesh. The present (1996) population is about 49 million people, the majority of whom are in Bangladesh.

BUP/CPR/IIDS Initiative

By way of introduction, the activities carried out in Phases I and II of the project are briefly noted below.

Phase I

Initiated in 1990, the first phase was brought to fruition in 1994, with the publication of three 'national' volumes, one by each institution, and a common 'consensus' book or regional volume entitled *Converting Water into Wealth: Regional Cooperation in Harnessing the Eastern Himalayan Rivers*. The regional volume was simultaneously published from Delhi, Dhaka and Kathmandu. It ended with a 'resume of possibilities' of inter-country cooperation for the benefits of all. During this phase, a number of seminars were held in Dhaka, Delhi and Kathmandu to review and disseminate the findings. The regional volume has found a wide readership within and outside the region.

Phase II

Phase II began soon after the completion of Phase I in so far as BUP and IIDS were concerned, but for certain reasons CPR formally began Phase II on July 1, 1996. The programme of work for Phase II has been two-fold: (i) dissemination of the ideas and proposals generated in Phase I as well as those emerging in Phase II to people concerned with water resources development and management, uses, policy formulation and inter-country relations including officials, politicians, academics, intellectuals, media persons, and the public in general—a total of six dissemination conferences involving academics, politicians, journalists and others concerned, two in each country, have been held, as planned; and (ii) further studies on nine of the themes identified in the regional volume of Phase I. These were:

1. Indo-Bangladesh Sharing of the Lean Season Flows of the Ganga at Farakka: Possible Augmentation of those Flows.
2. Water-Based Integrated Development of the GBM Region—(entry point: water; but to cover a wider area).
3. Quality of Water in GBM Region.

4. Coordinated Operation of the two Barrages on the Teesta.
5. Desirability and Techno-Economic Feasibility of an Eastern Region Energy Grid.
6. Indo-Nepal-Bangladesh Cooperation in Flood Disaster Management.
7. Dam Safety, Environment Aspects, Displacement, Rehabilitation, etc.
8. Formulating an Outline Plan for Studying Seismicity in Tectonically Active Himalayan Regions (a 3 or 4 country study).
9. Techno-Economic Assessment of an Inland Water Transport System.

With reference to the first of the nine subjects identified for investigation in Phase II, it will be noticed that while there is a chapter on the augmentation of the lean season flows of the Ganga at Farakka, there is none on the sharing of the flows. This is because the Ganges water-sharing issue was resolved by the signing in December 1996 by the Prime Ministers of India and Bangladesh of the Ganges Waters Sharing Treaty. However, it may not be out of place to mention here that the BUP-CPR-IIDS study did in fact make a modest contribution towards that highly commendable development. The Ganges Treaty offers Bangladesh the opportunity of exploring the feasibility of constructing a Barrage on the Ganges in order to meet the water demands in the Ganges Dependent Area and thereby redressing the environmental degradation in the southwest of the country. The Treaty also gives India the benefit of having resolved a long-standing dispute with a neighbour, while ensuring a fair share to itself (India) of the existing flows of the Ganga at Farakka. Another important development in 1996 was the signing of the Mahakali Treaty between India and Nepal. Although the CPR/BUP/IIDS forum did not play a direct role in this process, it did help improve the atmosphere for cooperation in the region and may, therefore, have been a modest contributory factor to this development as well. The group has since been holding informal and non-official discussions relating to certain issues which have emerged in the course of the operation of the Treaty. Efforts to find constructive solutions to these

issues are still proceeding. The texts of the Ganges and Mahakali Treaties are reproduced in Appendices I and II respectively for ready reference.

What the Book Offers

Chapter 11 provides a resume of the findings of the nine studies. It is important to mention here that the studies and conclusions presented in this volume are those on which an agreement was reached among the BUP, CPR and IIDS research teams. This volume has built on the modest contribution made in the first phase and, it is believed, advances the cause of GBM regional cooperation somewhat further. Much more needs to be done towards widening and deepening cooperation in the region, in the interest of its teeming millions.

Coming out as it does at a time when the regional (relations) environment remains very much characterized by the 'window of opportunity' that opened up in the wake of the signing of the Ganges and Mahakali Treaties, the book is expected to act as a catalyst for more intensified Track II efforts to help promote and strengthen GBM regional cooperation and to encourage governments (Track I) to set sail, taking the winds of change now blowing in favour of cooperation in this region, in their strides towards an integrated regional development.

2

Possibilities of Augmenting the Lean Season Flows of the Ganges

Background

The Ganges generally runs along the international boundary between Bangladesh and India for nearly 140 km (87.5 miles) from about 16 km (10 miles) below Farakka in West Bengal. In Bangladesh, the Ganges joins the Brahmaputra at Goalundo, and joins with the Meghna near Chandpur before the combined flow empties into the Bay of Bengal. About 40 km (25 miles) below Farakka, the Ganges' distributary—the Bhagirathi—takes off; it is also the recipient of the diverted water from the Farakka Barrage and is known as the Hooghly in its lower course.

The length of the Ganges river from its source to the mouth of the Meghna is 2,528 km (1,570 miles). The basin is inhabited by over 427 million people including about 34 million in Bangladesh (1996 estimate). The Ganges receives 71 per cent of the dry season and 41 per cent of the total annual flows from its left bank tributaries, which flow down from Tibet and Nepal. A major characteristic of the Ganges flow is abundance of water in the monsoon season (often causing floods) and shortage of water in the dry season. Indeed, the dry season shortage is the key element in the Ganges water-sharing issue between Bangladesh and India.

The utilization of the waters of the Ganga/Ganges and its tributaries in the countries of the Ganges-Brahmaputra-Meghna (GBM) region did not become a cause of concern till around the mid-twentieth century. In 1947, the partition of