BANGLADESH: TRANSBOUNDARY RIVERS PROBLEMS AND PROSPECTS

by

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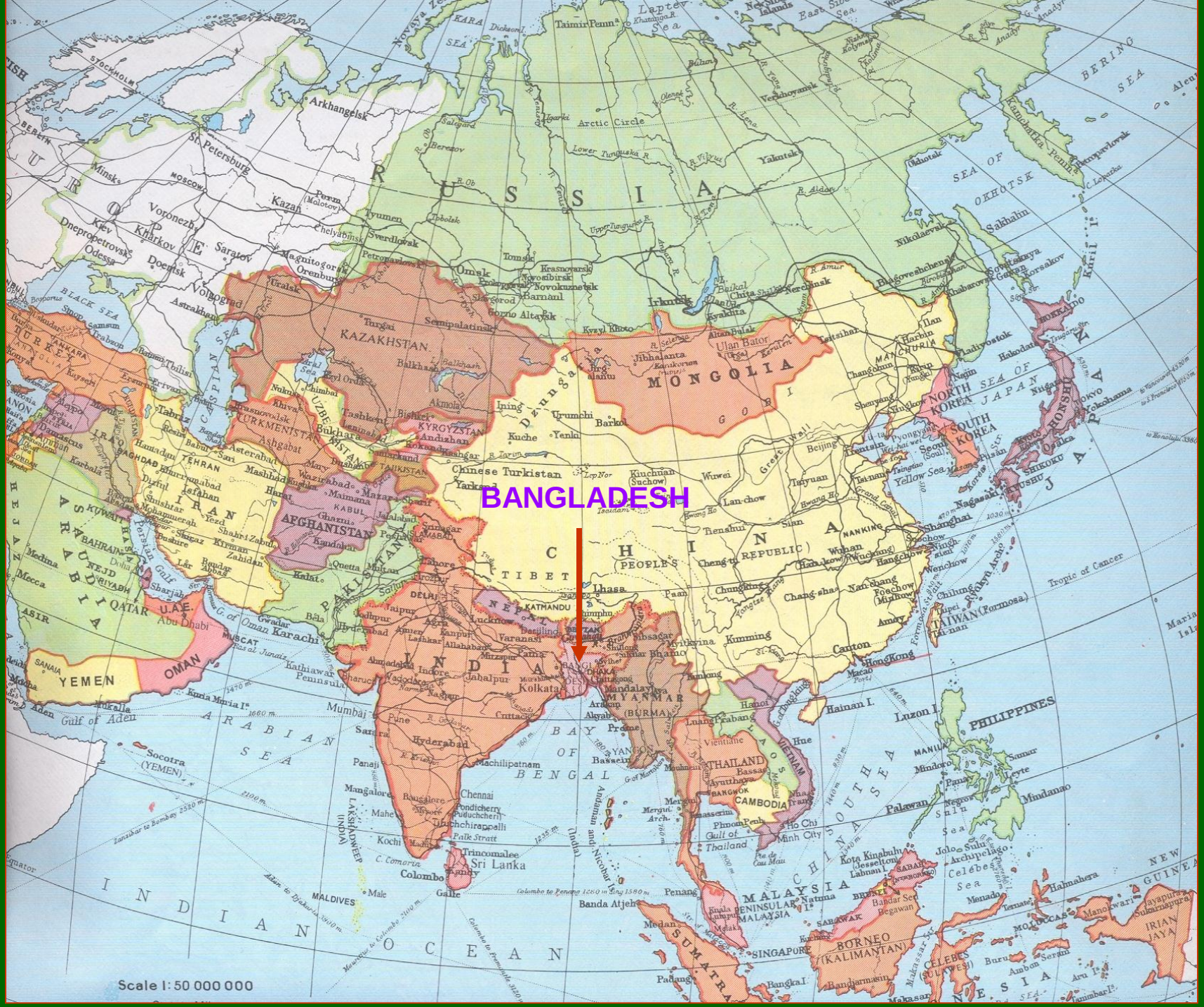

BANGLADESH
RUSSIA
KAZAKHSTAN
MONGOLIA
CHINA
INDIA
PAKISTAN
AFGHANISTAN
IRAN
IRAQ
SAUDI ARABIA
YEMEN
OMAN
U.A.E.
QATAR
BAHRAIN
KUWAIT
MYANMAR
THAILAND
CAMBODIA
MALAYSIA
SINGAPORE
BORNEO (KALIMANTAN)
PHILIPPINES
Sri Lanka
MALDIVES
Arctic Circle
Tropic of Cancer
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
Scale 1: 50 000 000

GENERAL INFORMATION ON BANGLADESH

- Total area of Bangladesh: 147,570 km^2
- Population: about 146.60 million
- 80% of the population live in rural areas
- The Topography of Bangladesh is generally flat. Most of the areas lie within 20m above MSL
- 80% floodplains, terraces 8% & 12% hills
- River and inland water bodies: 6.7 %
- Forest Cover: 17%
- Bangladesh enjoys a sub-tropical monsoon climate. Out of six seasons in a year, summer, monsoon and winter are predominate.
- Temperature in winter falls as low as 5º C , during summer the mean is about 30ºC and occasionally rises above 40º C.
- Normal annual rainfall: 1200 mm in the extreme west and as high as 5800 mm in the northeast. About 80% occurs in monsoon (Jun-Oct)

Socio-economic aspects

- Agriculture support the vast majority of Bangladesh population, accounting for 32% of GDP, 13% of exports, and 60% of employment.
- Net cultivable area (NCA) is 8.53 Mha
- Irrigable area is 7.56 Mha.
- 5.00 Mha is currently irrigated
- Present cropping intensity is 183%.
- Of the total NCA, 35% is single cropped, 49% double cropped and 16% triple cropped.

WATER AVAILABILTIES AND DEMANDS

Total water resources in Bangladesh including ground water : about 1297 BCM

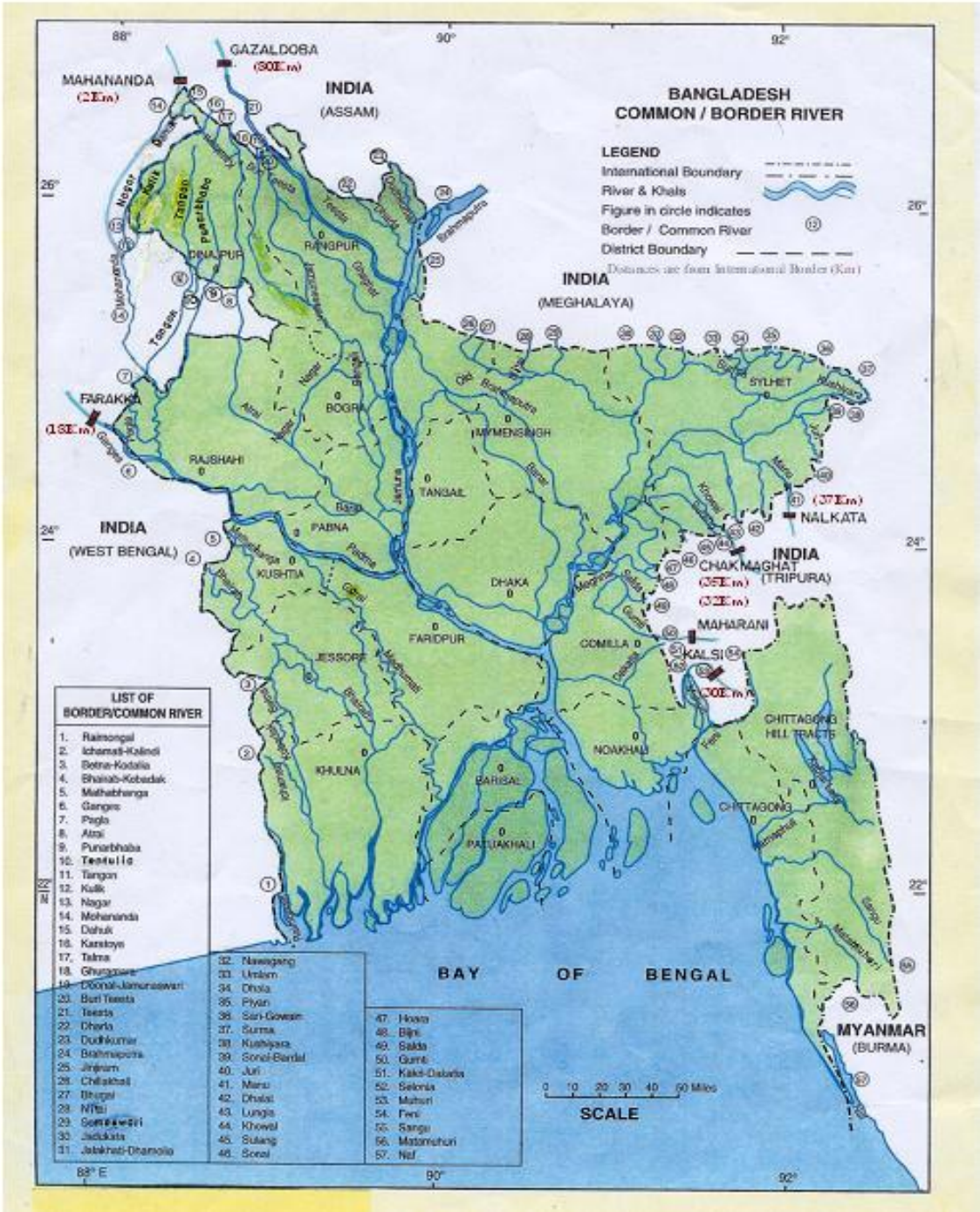
Cross border surface water inflow: 1124 BCM

More than 80% occurs during monsoon when Bangladesh does not need so much (Jun-Oct)

Availability during dry season (Jan-Apr) is only 88 BCM while it needs 147 BCM

Being the lowest riparian of the Major Himalayan Rivers, Bangladesh has no control over the huge cross-boundary flows and because of flat topography it also can not store the huge monsoon water

Transboundary Rivers of Bangladesh



Bangladesh is a great delta formed by the three mighty Himalayan Rivers: the Ganges, the Brahmaputra and the Meghna.

There are more than 400 rivers in Bangladesh, most of which are tributaries/distributaries of these three mighty rivers.

Out of 400 rivers, 57 are trans-boundary.

54 enter from India and 3 from Myanmar.

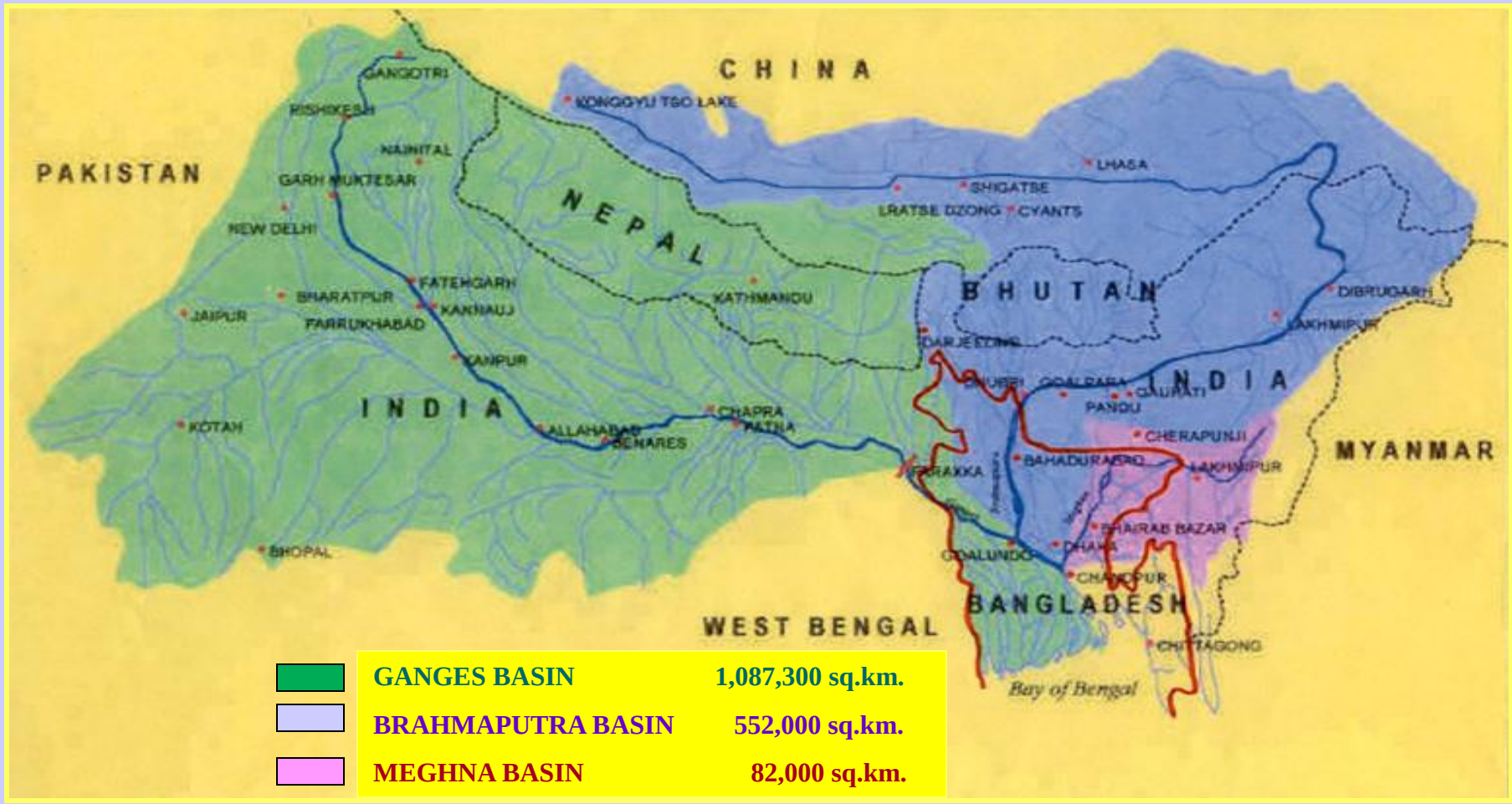
Bangladesh and India, like history and heritage also share the flows of more than fifty rivers which are common to the two countries.

Bangladesh faces floods during the wet season and scarcity of water during dry season.

The Ganges, the Brahmaputra and the Meghna River systems drain a total catchment area of about 1.72 million sq km through Bangladesh into the Bay of Bengal.

Out of this large catchment area, only 7% lies within Bangladesh.

The other co-riparian countries are India, Nepal, Bhutan and China.


CHINA
PAKISTAN
NEPAL
BHUTAN
INDIA
INDIA
MYANMAR
BANGLADESH
WEST BENGAL
Bay of Bengal
GANGOTRI
RISHIKESH
NAINITAL
GARH MUKTESAR
NEW DELHI
JAIPUR
BHARATPUR
FATEHGARH
KANNAUJ
FARRUKHABAD
KANPUR
KOTAH
BHOPAL
ALLAHABAD
BENARES
CHAPRA
PATNA
KONGGYU TSO LAKE
LHASA
SHIGATSE
KATHMANDU
DARJEELING
SILIGURI
GOALPARA
GAUHATI
PANDU
CHERAPUNJI
BAHADURABAD
LAKHIMPUR
DIBRUGARH
BHAIRAB BAZAR
DHAKA
CHANDPUR
CHITTAGONG
GOALUNDO
GANGES BASIN 1,087,300 sq.km.
BRAHMAPUTRA BASIN 552,000 sq.km.
MEGHNA BASIN 82,000 sq.km.

Catchment Areas of Major Rivers

Rivers	Total Catchment Area (Sq. Km.)	Catchment Area (Sq.Km.)				
		India	Nepal	Bhutan	China	Bangladesh
Brahmaputra	552000	195000	-	47000	270900	39100
Ganges	1087300	860000	147480	-	33520	46300
Meghna	82000	47000	-	-	-	35000
	1721300 (100%)	1102000 (64.02%)	147480 (8.57%)	47000 (2.73%)	304420 (17.69%)	120400 (7%)

Main Features of the Major Rivers

	Brahmaputra	Ganges	Meghna
Length of river (km)	2,900	2,500	912
Length within Bangladesh (km)	260	240	452
Highest recorded discharge (cumec)	102,534 at Bahaurabad (1998)	76,000 at Hardinge Bridge (1987)	19,800 At Bhairab Bazar
Lowest recorded discharge (cumec)	2,860 at Bahadurabad (1971)	2675 at Hardinge Bridge (1993)	Tidal

Ganges, Brahmaputra and Meghna Rivers


C H I N A
T I B E T
N E P A L
B H U T A N
I N D I A
BANGLADESH
Mt. K2
Mt. Broad Peak
Mt. Gasherbrum I
Mt. Nanga Parbat
Indus R.
Shyok R.
Indus R.
Singye Khambab (Indus) R.
Chenab R.
Langchhen Khambab (Sutlej) R.
Mt. Kailash
Mansarovar Lake
Rakshas Lake
PONG DAM
BHAKRA DAM
Beas R.
Sutlej R.
Ravi R.
Yamuna R.
Rishikesh
Hardwar
DELHI
Mahakali R.
Sarada R.
Karnali R.
Gandak R.
Ghagara R.
Ganga R.
Agra
Kanpur
Allahabad
Varanasi
Patna
Ganga R.
FARAKKA BARRAGE
Khursela
Chambal R.
Sindh R.
Betwa R.
Son R.
Hoogly R.
Calcutta
SUNDARBANS
DHAKA
Meghna R.
Silchar
Brahmaputra R.
Guwahati
Tsangpo (Brahmaputra) R.
LHASA
Mt. Namcha Barwa
Dihang R.
Sadiya
Dibrugarh
Subansiri R.
Mt. Kangto
Burhi Dihing R.
Manas R.
Torsa R.
Teesta R.
Kosi R.
Mt. Everest (Sagarmatha)
Mt. Lhotse
Mt. Cho Oyu
Mt. Annapurna I
Mt. Manaslu
Mt. Sishapangma
Mt. Makalu
Mt. Kanchenjunga
THIMPHU
KATHMANDU
Mt. Dhaulagiri
GREATER HIMALAYA
TRANS HIMALAYA
GANGDISE RANGE
MIDDLE HIMALAYA
SHIVALIK RANGE / CHURIA HILLS (OUTER HIMALAYA)
PIR PANJAL RANGE
ARRAVALLI RANGE
SATPURA-MAIKAL RANGE

Ganges River

The Ganges rises from the Gangotri glacier in the Himalayan at an elevation of about 7010 meter near the Indo-China border.

The length of the main river is about 2500 km.

The rivers from Nepal contribute about 71% of the dry season flows and 41% of the total annual flows of the Ganges.

The Ganges Basin has an area of 1087300 sq.km. spread over India (860000 sq.km), Nepal (147480 sq.km.), China (33520 sq.km) and Bangladesh (46300 sq.km).

Treaty on Sharing of The Ganges Waters

12 December, 1996

A Treaty for sharing the Ganges waters at Farakka was signed between Bangladesh and India in December 12, 1996 for a period of 30 years.

Main Features of the Treaty

Treaty is for 30 years covering the period 01 January to 31 May each year with sharing to an agreed formula

Availability at Farakka	Share of India	Share of Bangladesh
70,000 cusecs or less	50%	50%
70,000 - 75,000 cusecs	Balance of flow	35,000 cusecs
75,000 cusecs or more	40,000 cusecs	Balance of flow

Subject to the condition that India and Bangladesh each shall receive guaranteed 35,000 cusecs of water in alternate three 10-day periods during the period March 11 to May 10.

The Treaty has provided an opportunity to Bangladesh for development and management of it's land and water resources in the Ganges dependant areas of the country by building a barrage across the Ganges.

Brahmaputra River

Originates in the northern slopes of the Himalayan range.

Catchment lying in China, Bhutan, India and Bangladesh.

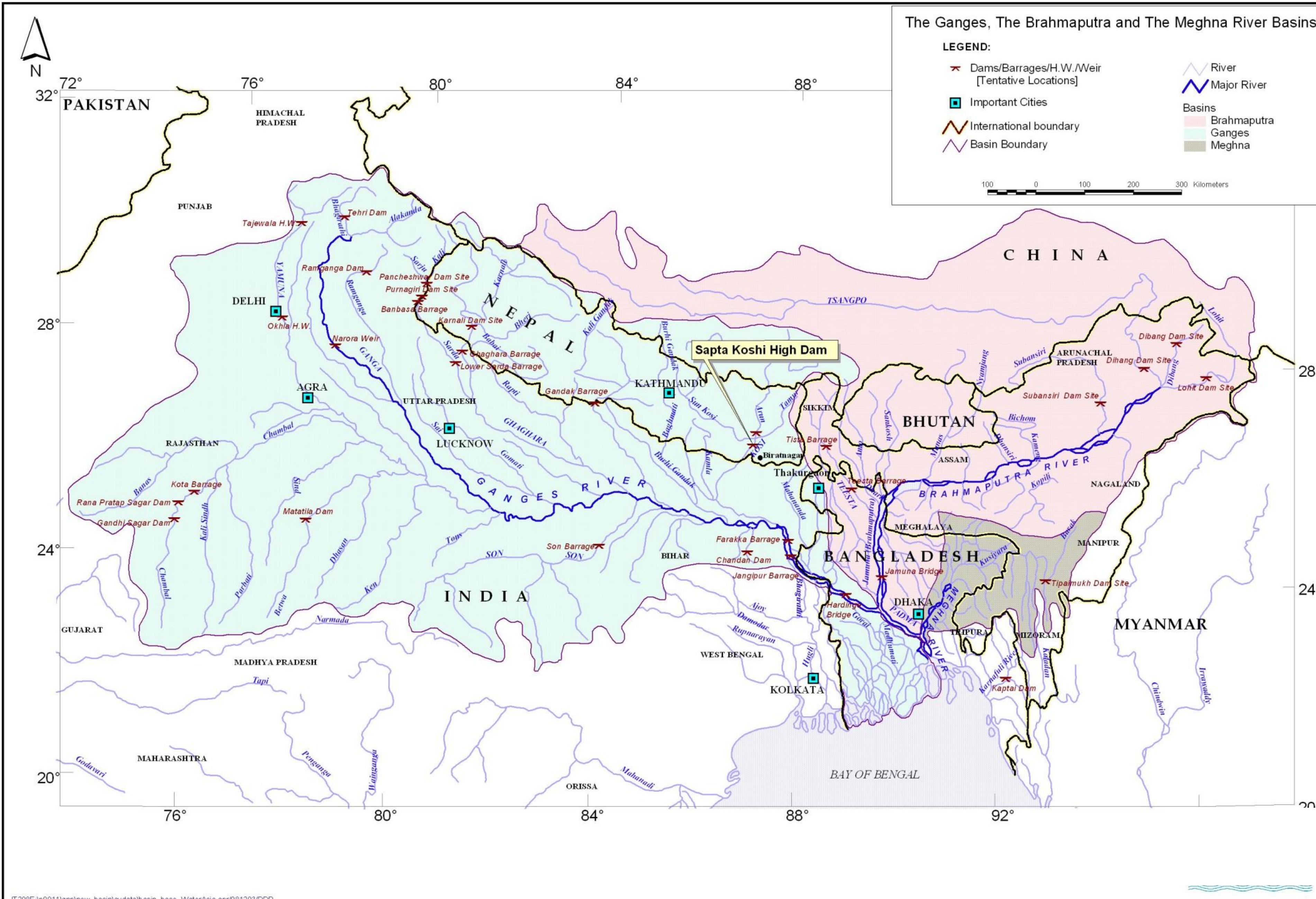
Rising in Tibet (China) at an elevation of 5,150 meters.

Total length: 2,900 km

In Bangladesh: 270 km

Total catchment area of 552,000 sq. km

China	270,900 sq.km
Bhutan	47,000 sq. km
India	195,000 sq.km
Bangladesh	39,100 sq. km (7.08%)


The Ganges, The Brahmaputra and The Meghna River Basins
LEGEND:
Dams/Barrages/H.W./Weir [Tentative Locations]
Important Cities
International boundary
Basin Boundary
River
Major River
Basins
Brahmaputra
Ganges
Meghna
100 0 100 200 300 Kilometers
N
72° 76° 80° 84° 88° 92°
32° 28° 24° 20°
PAKISTAN
HIMACHAL PRADESH
PUNJAB
DELHI
AGRA
RAJASTHAN
GUJARAT
MADHYA PRADESH
MAHARASHTRA
ORISSA
UTTAR PRADESH
LUCKNOW
BIHAR
WEST BENGAL
KOLKATA
INDIA
NEPAL
KATHMANDU
CHINA
BHUTAN
SIKKIM
ASSAM
ARUNACHAL PRADESH
NAGALAND
MANIPUR
MEGHALAYA
TRIPURA
MIZORAM
BANGLADESH
DHAKA
MYANMAR
BAY OF BENGAL
Sapta Koshi High Dam
Biratnagar
Thakurgaon
GANGES RIVER
BRAHMAPUTRA RIVER
MEGHNA RIVER
PADMA
TSANGPO
YAMUNA
GANGA
GHAGHARA
SON
Tehri Dam
Tajewala H.W.
Ramganga Dam
Pancheshwar Dam Site
Purnagiri Dam Site
Banbasa Barrage
Karnali Dam Site
Okhla H.W.
Narora Weir
Ghaghara Barrage
Lower Sarda Barrage
Gandak Barrage
Kota Barrage
Rana Pratap Sagar Dam
Gandhi Sagar Dam
Matatila Dam
Son Barrage
Farakka Barrage
Chandan Dam
Jangipur Barrage
Hardinge Bridge
Jamuna Bridge
Tista Barrage
Teesta Barrage
Tipaimukh Dam Site
Kaptal Dam
Subansiri Dam Site
Dibang Dam Site
Dihang Dam Site
Lohit Dam Site
Bhagirathi
Alakanda
Sarju
Kali
Karnali
Ramganga
Sarda
Babai
Bheri
Rapti
Gomati
Kali Gandaki
Burhi Gandak
Bagmati
Sun Kosi
Arun
Tamur
Kosi
Kamla
Budhi Gandak
Mahananda
Chambal
Banas
Kali Sindh
Sind
Parbati
Betwa
Dhasan
Ken
Tons
Narmada
Tapi
Godavari
Penganga
Wainganga
Mahanadi
Ajoy
Damodar
Rupnarayan
Hugli
Bhagirathi
Gorai
Madhumati
Jamuna
Teesta
Sankosh
Manas
Subansiri
Bichom
Kameng
Kopili
Siyom
Dibang
Lohit
Barak
Kusiyara
Karnafuli River
Kaladan
Chindwin
Irrawaddy
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Meghna/Barak River

The Barak, headstream of the Meghna rises in the hills of Manipur in India. Near the Indo-Bangladesh border, the Barak bifurcates into two: the Surma and the Kushiyara.

The Surma and Kushiyara again join together near Ajmiriganj in Bangladesh.

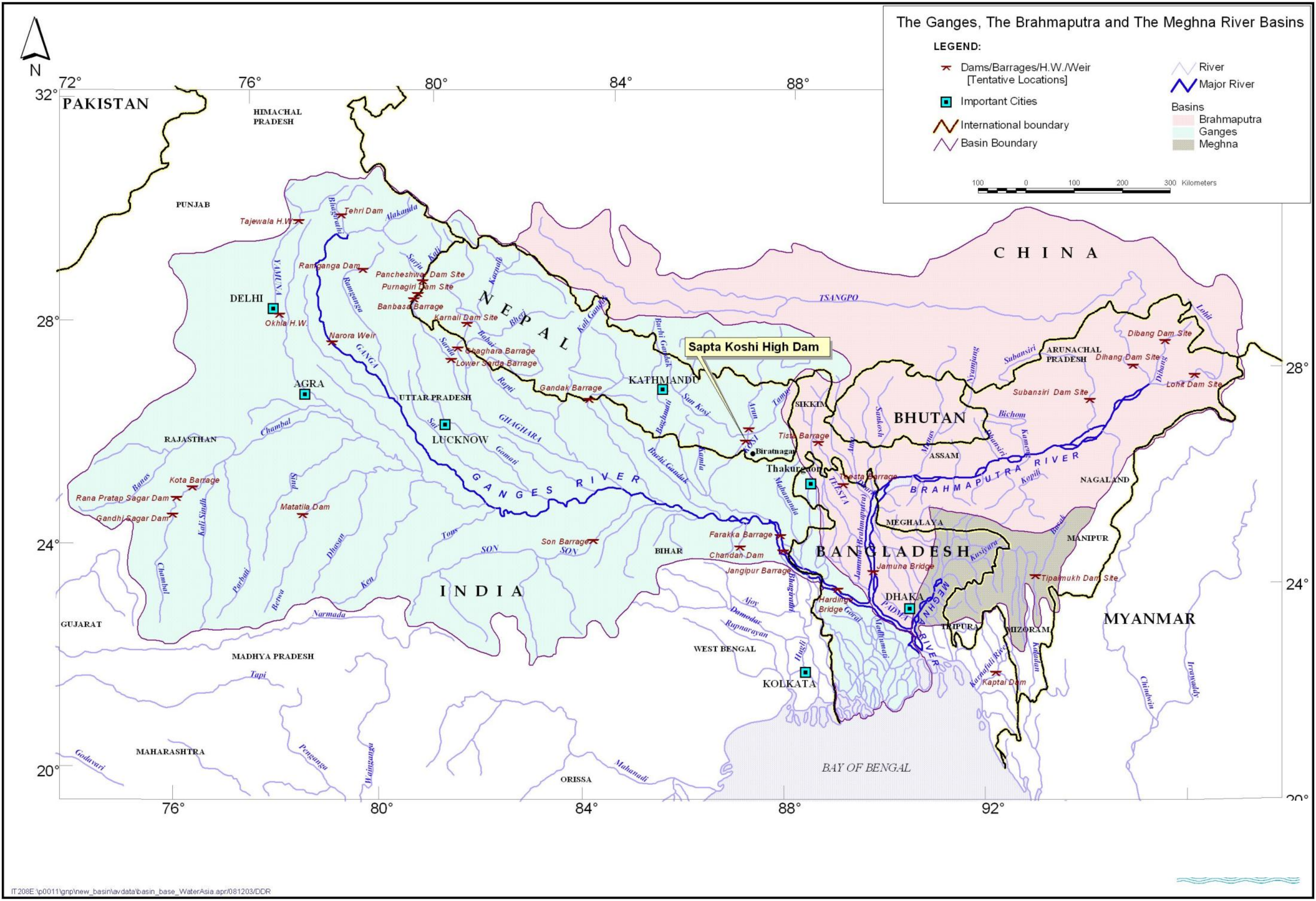
The combined flow takes the name of Meghna at this point and then flows in a south-westerly direction to meet the Padma at Chandpur. It drains the hills of Assam, Meghalaya and Tripura States in India and the north-eastern part of Bangladesh.

The total catchment area of Barak/Meghna is 82,000‘ sq.km

India: 47,000 sq.km

Bangladesh: 35,000 sq. km

About 43% of this total catchment area lies in Bangladesh.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Dibang Dam Site
Dihang Dam Site
Lohit Dam Site
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OPPORTUNITIES OF JOINT COLLABORATION AND BENEFITS SHARING

- Hydro-power generation
- Augmentation of dry season flows
- Flood moderation
- River erosion
- Fisheries
- Forestry
- Navigation
- Environment

POTENTIALS

Hydropower (flat country, almost no potential)

Flow augmentation during dry season

(no storage, no potential)

Flood management: Two-third (2/3) of the area of Bangladesh would be flood free

Hydropower Potential of Eastern Himalayan Region

(Ganges, Brahmaputra, Meghna/Barak)

Nepal	**42,000 MW so far identified (theoretical potential 83,000 MW)**
Bhutan	**23,000 MW**
India	**76000 MW (Eastern Himalayan Region only)**

Nepal's theoretical hydro potential has been assessed as 83,000

Projects of about 43,000 MW have so far been identified

Flow Augmentation

To augment the Ganges flows, the tributaries in Nepal are the most effective sources as their dry season and annual contributions at Farakka are 71 and 41 percent respectively.

Ganges Basin: about 5325 cumec

Brahmaputra Basin: about 4250 cumec (not well quantified)

Way Forward

Bangladesh, India, Nepal and Bhutan- four countries of the Eastern Himalayan Region offer vast opportunities for optimal water resources development and management through collaborative efforts.

The key to prosperity in the region is Integrated Water Resources Management at river basin level.

Establish sharing and long-term transboundary cooperation relying on sound legal and institutional arrangements such as joint basin governing institution.

Undertake joint projects and share benefits

Costs of benefit to be quantified jointly based on authentic data.

THANK YOU