Gorai River and its Environmental Flow: Problems, opportunities and threats

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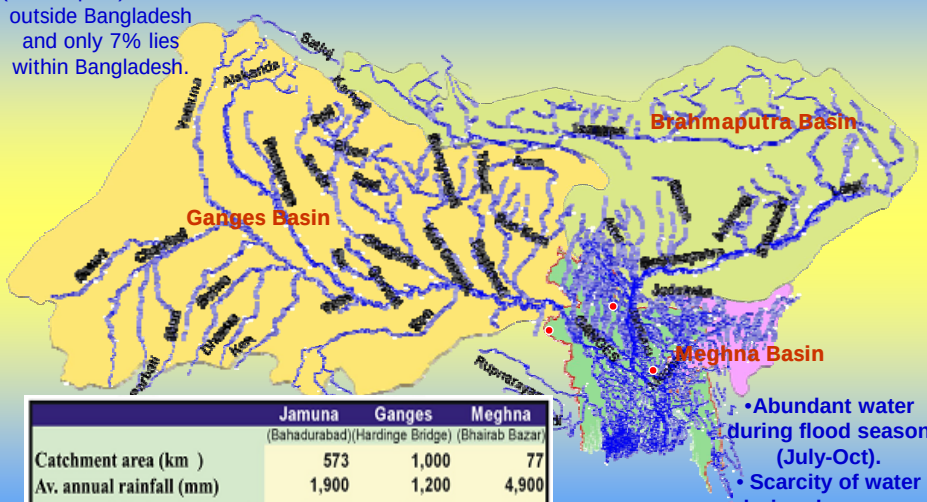
River Ecosystem in Bangladesh

- Bangladesh is a **great delta** formed by the **World's mighty Himalayan Rivers- the Ganges, the Brahmmaputra and the Meghna** which has combined peak discharge in the flood season of **over 180,000 cumec** –the second highest in the world after the Amazan.
- Water carry about **2 billion tonnes of sediment each year.**
- All discharge flow over Bangladesh to Bay of Bengal during rainy season.
- There are **more than 300 rivers in Bangladesh**, most of which are tributaries/distributaries of the three rivers systems.
- **Out of 300 rivers, 57 are transboundary; 54 enter from India and 3 from Myanmar.**
- The **World Heritage –the Sundarban** is situated in Bangladesh.

The Ganges, the Brahmmaputra and the Meghna river Basins -All flow over Bangladesh

•97 % of total basin (1600 sq km) area lie outside Bangladesh and only 7% lies within Bangladesh.

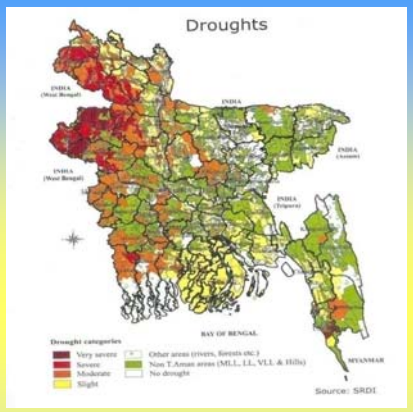


	Jamuna (Bahadurabad)	Ganges (Hardinge Bridge)	Meghna (Bhairab Bazar)
Catchment area (km)	573	1,000	77
Av. annual rainfall (mm)	1,900	1,200	4,900
Av. annual discharge (cumec)	20,000	11,000	4,600
Max. discharge (cumec)	100,000	78,000	20,000
Sediment transport (m ton/yr)	590	550	13

•Abundant water during flood season (July-Oct).
• Scarcity of water during dry season (December -May)

Flood is a common phenomenon in Bangladesh

Drought Problem in Bangladesh



Bangladesh faced serious drought in 1979, 1981, 1982, 1989 in recent years

From Nov. 1998 to April 1999 practically no rain for 150 days at a stretch.

During 1950-1979 drought affected 20% of the country

During 1994- 95 drought adversely affected STW'S, LLP'S and traditional irrigation systems.

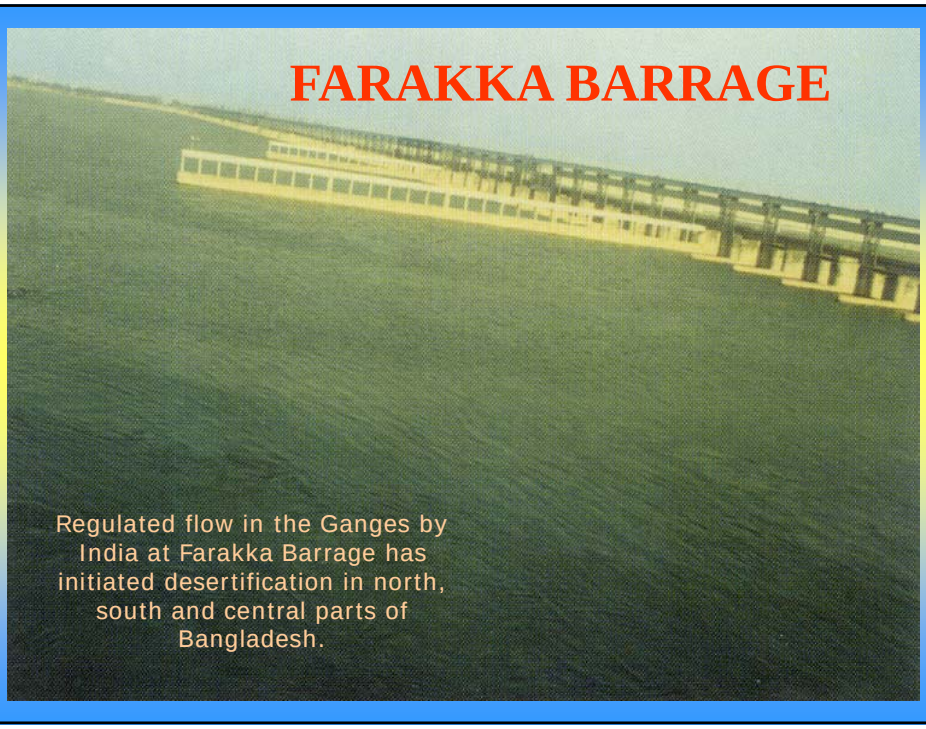
Out of 1200000 irrigation tubewells, 400000 every year go under suction limit in March-April (dry period) and become out of order.

Present food demand is 2 crore 70 lac tons and the future demand of food is 4 crore 15 lac tons by 2015.

Irrigation demand will increase by many folds.

Gorai River

FARAKKA BARRAGE

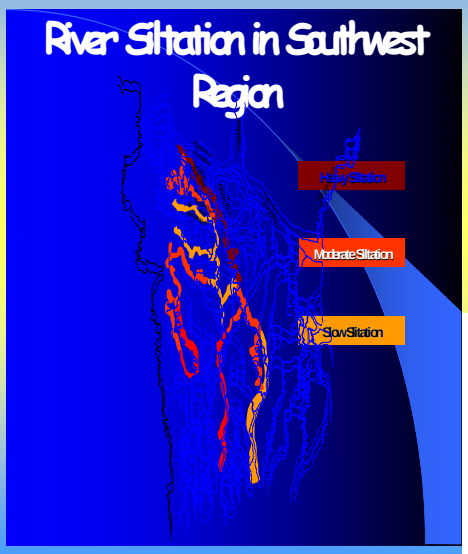


Regulated flow in the Ganges by India at Farakka Barrage has initiated desertification in north, south and central parts of Bangladesh.

Low fow in Gorai river and its consequences

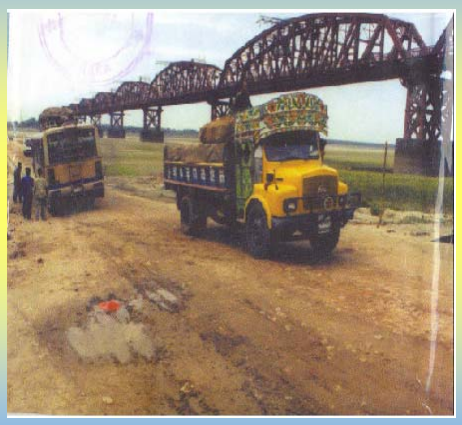
- Both wet and dry season flow in Gorai river has been decreased significantly after construction of Farakka barrage by India.
- The decrease in flow of Gorai river has affected agriculture, forestry, fisheries, livestock and caused salinity intrusion in both surface and ground water and water pollution.
- Such low flow in Gorai has increased siltation at Gorai mouth and Mongla port (an economic zone) and intensified flood and cyclones.
- It has affected the Sundarban mangrove forest –the World Heritage site.
- The present flow in Gorai is about 5000 m3/s peak. Any further decrease may cut off Gorai river from the Ganges.
- The natural dry season flow was cut off completely in 1992 and by dredging the flow was restored in 1998. But it dried up again when dredging was discontinued.
- Due to low flow in Gorai many development projects like Sundarban Biodiversity project are being hampered.

River Siltation



Silted Gorai River

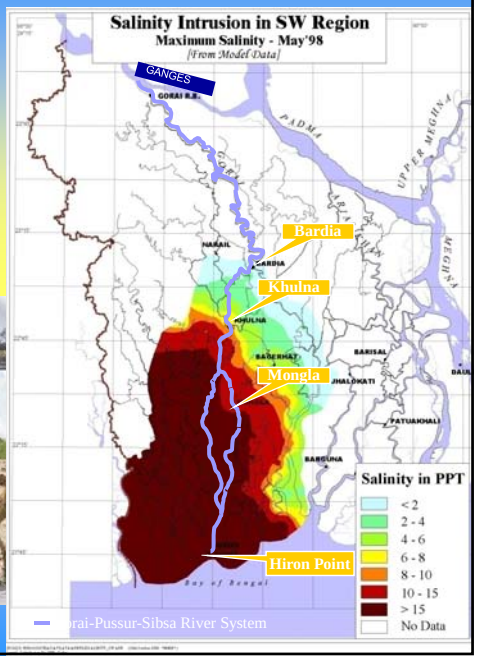
Ganges at Hardinge Bridge during dry season



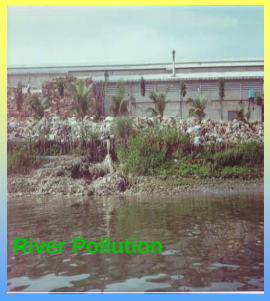
The Gorai River –the main off take of the Ganges become totally dry during dry season

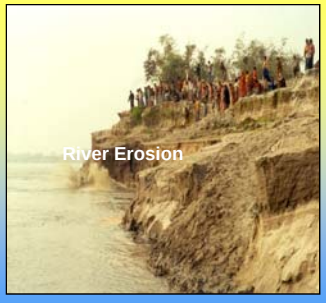
Salinity Intrusion in the coastal region and its effects

Sundarban

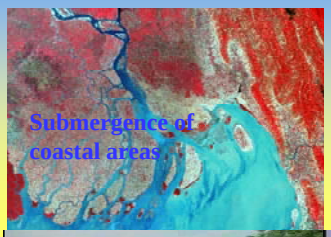


Other Water Related Problems





Climate Change is major threat



Threats

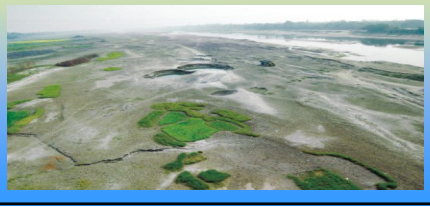
- Sea Level rise
- Increase in evaporation
- Increase in snow melt in Himalayas
- Increase in rainfall in monsoon
- Water scarcity in dry season

Government's Initiative

Due to lack of regular dredging, and high silt load from upper riparian Rivers, most of the rivers have been silted up.
The Government of Bangladesh has undertaken a plan costing of US$ 1.71 billion for dredging of 310 rivers all over the country to bring back navigability, control floods and ensure proper irrigation through water conservation in dry season.

Government has already started dredging of Padma and Buriganga river. The projects are the pilot capital dredging of river system in Bangladesh (first phase) worth Tk 1,445.51 crore, Buriganga recovery project worth Tk 1,514.95 crore, purchasing of dredgers and ancillary equipment for dredging rivers with a cost of Tk 1,593.68 crore and coordinated irrigation, extraction and flood control project worth Tk 378.52 crore.

"Gorai river recovery project (second phase)" worth Tk 942.15 crore has already begun.
Government has taken an initiative to construct Ganges Barrage.

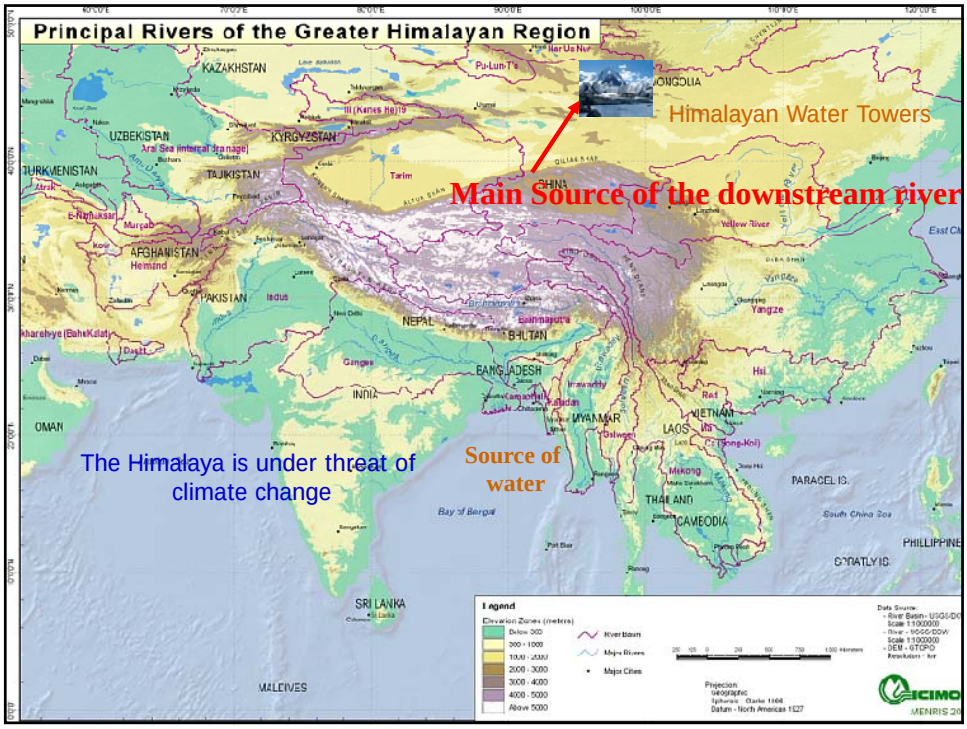


The Himalayas is under threat of climate change

The Glaciers in Himalayas - a source of of captive water feeds most of the downstream major perennial river systems (the Ganges, the Brahmmaputra, the Meghna and the Indus) in the region crossing Bangladesh, India, Nepal and Pakistan and is considered the lifeline for approximately 10 per cent of the world's population.

The Himalayan glaciers have been melting at an unprecedented rate in recent decades and this trend may cause major changes in freshwater flow regimes downstream and is likely to have a dramatic impact on drinking water supplies, biodiversity, hydropower, industry, agriculture and others, with far-reaching implications for the people of the region and the earth's environment.

One result of glacial retreat - glacial lake outburst flood (GLOF) — and the results can be catastrophic to the downstream riparian areas. Such disasters often cross boundaries; the water from a lake in one country threatens the lives and properties of people in another.



Only Bilateral water cooperation exist in the region

The sharing of the riparian river water has been a bone of contention between India, Bangladesh & India and Nepal since past 50 years

- **Kosi River Agreement signed April, 1954**
- **Trisuli Agreement, Nov, 1958**
- **Gandak Project and Power Agreement, 1959**
- **Mahakali Integrated Development Treaty, Jan, 1996**
- **Indus Water Treaty between India and Pakistan in 1960. (through mediation by the World Bank)**
- **Ganges Water Treaty, Dec, 1996 (The only Treaty of India with Bangladesh)**

Annexure- I

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.

Long Term Solution: Need for Regional Cooperation

- Sound basin wide catchments management is an essential long-term strategy to combat the threat to floods, droughts, inland navigation; meet energy demand and preserve the ecosystem in the region. And it needs both structural and non-structural measures.
- Due to seasonal variation having abundance of water during monsoon and little water during dry season, harnessing of the bounty of this water is very essential which requires storage of monsoon flows over space and time when and where required within a framework of sustainable development.
- The sediment load in the rivers in the region, which is largely the consequence of geomorphologic processes in the upper catchments, tends to increase with the progressive removal of vegetative cover on slopes. Soil conservation and reforestation in the upper catchments of Nepal and India as well as within Bangladesh could help substantially reducing sedimentation.

Benefits of Regional Cooperation

Flow Augmetation

Net potential 5339 **188000 cusec**

Flood Management
Flood Forecasting

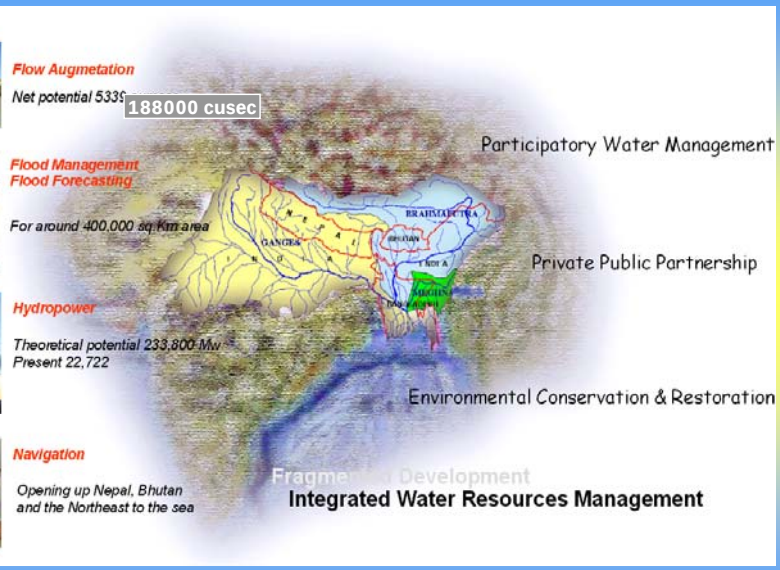
For around 400,000 sq Km area

Hydropower

Theoretical potential 233,800 Mw
Present 22,722

Navigation

Opening up Nepal, Bhutan and the Northeast to the sea



Augmentation of the dry season Ganges Flows

- **Owing to the seasonal variability of water volume in the G-B-M river systems, the dry season flows of the G-B-M rivers particularly of the Ganges are inadequate to meet the combined needs of the region.**

- **As early as 1974, the Prime Ministers of India and Bangladesh had recognized the need for augmentation of the dry season Ganges flows. The Ganges Water Sharing Treaty of 1996 also includes a provision for the two governments *'to cooperate with each other in finding a solution to the long term problem of augmenting the flows of the Ganges during the dry season.***

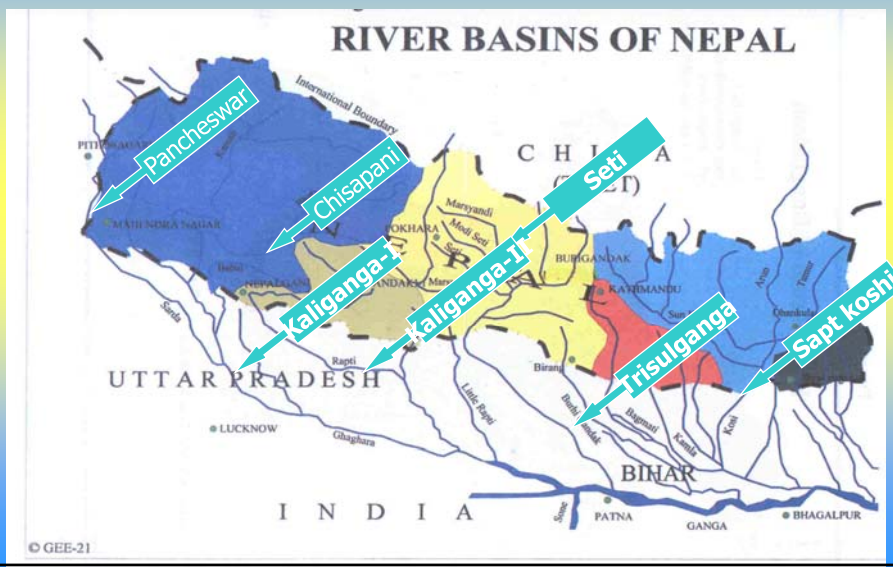
❖ **One possible option for substantial augmentation of the Ganges which, could benefit Nepal, India and Bangladesh, would be to construct large storages on the Ganges tributaries originating in Nepal.**

Contd..

- On the basis of studies, in 1983 Bangladesh proposed construction of seven large storage reservoir at Chisapani, Kaligandaki-1, Kaligandaki-2, Trisulganga, Seti, Saptokosi and Pancheswar in Nepal which could augment the dry season flows of the Ganges by 1670 cumecs (built at normal height) and 5385 cumecs (with the storage reservoir at Chisapani, Trisulganga, Seti and Saptokosi built above normal heights). Studies indicated that construction of the proposed storage reservoir are technically feasible. Moreover, the storage reservoirs would produce enormous amounts of hydro-electricity that could meet the power demands of the region.

Seven feasible Dam sites in Nepal for water Conservation

(Koshi, Trisulganga, Kaligandak-I, Kaligandak-II, Seti,Chisapani, Pancheswar)



- A highly favourable project from this perspective is the Sapta Kosi High Dam in Nepal, the revived third phase of the original Koshi project.
- The Kosi Dam will have a significant storage that should provide both North Bihar (India) and Bangladesh Flood Cushion and augment dry season flows after meeting Nepal's full irrigation requirements so that Bangladesh can get increased additional share of water (around 50000 cusec) during dry season as per provision of flow augmentation under Indo_Bangladesh Water Treaty signed in 1996.

Contd..

- Nepal would also be the sole beneficiary of generating about 30000 MW hydropower and selling to India and Bangladesh. A Regional Power Grid can transfer the hydropower to all the regional countries at a cost cheaper than produced from conventional source of energy.
- All the three countries India, Nepal and Bangladesh need to work together to develop such a great potential of flow augmentation during dry season and prospects of hydropower generation in the Ganges river basin.
- To foster regional cooperation in the Ganges River Basin, a Supra national organisation like Ganges River Basin Commission (GRBC) may be formed to reap the benefits of such transboundary river basin management.

Navigation Improvements in the G-B-M River Basins

=>As a landlocked country, Nepal has a vital interest in securing access to the sea through the rivers. The establishment of links with the inland water transport networks of India and Bangladesh would provide Nepal access to Kolkata (India) and Mongla (Bangladesh) ports.

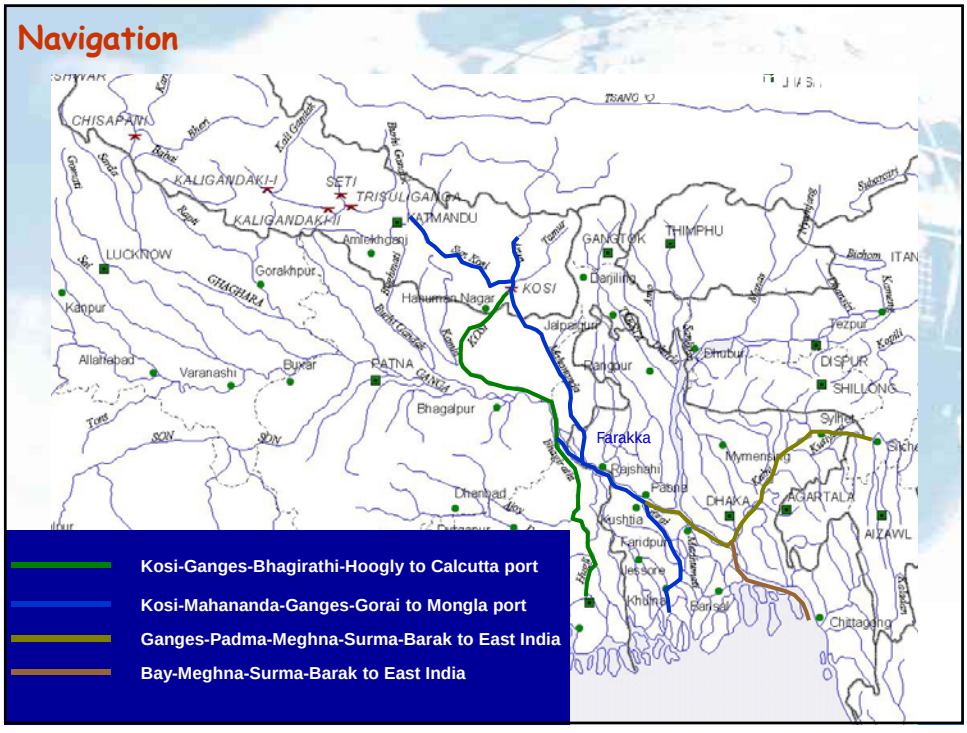
=>Potential exists for the development of water transport in Nepal in all the three major rivers (Karnali, Gandaki and Koshi) which are tributaries to the Ganges. Concentration of high dam schemes on these rivers would improve the navigability in these channels.

=>The Karnali has the maximum potential for navigation –all the way from the Indo-Nepalese border to the confluence with the Ganges.

=>The Gandak is an important waterway serving central Nepal and has the navigation potential for eastern Uttar Pradesh and eastern Bihar states of India for linking it with India's National Waterway No. 1 in the Ganges running from Allahabad to Haldia, below Kolkata.

=>The maintenance and further development of navigable depth, navigational aids and terminal facilities would enhance the navigation potential in the GBM region.

=>India and Bangladesh have a bilateral protocol, renewed every two years for using the Ganges-Brahmmaputra-Meghna rivers for water transit between West Bengal and Assam. An old route during the British days can also be revived in the Ganges connecting Aricha and Rajbari in Bangladesh with Murshidabad and Alahabad passing through Farakka lock gate by ensuring the year round navigational flow in the Ganges.These routes –not optimally used at present could improve their potentials through channel improvement, better pilottage and navigation aids and standardization of rules and regulations. A dedicated willingness to integrate the water ways network in the G-B-M region would benefit all the countries in the long run.



Inland Water Route

a) Inland water Transit with the following routes

1. Kolkata-BojBoj-Diamond Harbour-Mongla-Chalna-Barisal-Chadpur-Aricha-Sirajganj-Chilmari-Doikhali-Gauhati
2. Kolkata-Meghna-Daudkandi-Bhairab-Fenchuganj-Sherpur-Jokiganj-Karimganj-Pandu (near Gauhati)
3. Dhaulian (downstream to Farakka)-Rajshahi (53 km length used for transportation of bolders but stopped for lack of draft during dry season)
4. For oil transportation

   Shilghat-Gauhati-Baghabari

b) Inter Country Inland Water Traffic

1. Kolkata-Bojboj-Narayanganj, av. yearly traffic 7 Lac tons

c) **New Opportunity for Inland Navigation**

1) If lock gate is put in Jangipur barrage, the following route could be revived: Aricha-Rajshahi-Jangipur----Bhagirathi – Farakka -- Murshidabad --Alahabad

2) Mizorum-Monipur-Kaptai using Karnaphuli river u/s & d/S and using land route from Kaptai to Chittagong port

World Bank's Recent Initiative
The Abu Dhabi Dialogue

- It's an ongoing dialogue on South Asia Water Cooperation among senior political, government, academic, non-government and civil society members from 7 countries - Afghanistan, Bangladesh, Bhutan, China, India, Nepal & Pakistan
- The First Meeting of Abu Dhabi Dialogue held in Abu Dhabi in September, 2006.
- The Second Meeting of Abu Dhabi Dialogue held in Bangkok in July 2007
- The Third Abu Dhabi Dialogue held in Singapore from 23-35 July, 2008

A Consensus Vision' : "A cooperative & knowledge-based partnership of states fairly managing & developing the Himalayan River systems to bring economic prosperity, peace & social harmony, & environmental sustainability from the source to the sea." (Derived from the statement of India PM speech, July 2007)

- Initial actions agreed:
  - Action 1. Maintain and expand the Dialogue.
  - Action 2. Launch a coordinated communication and outreach agenda.
  - Action 3. Conduct coordinated research & training activities.

Abu Dhabi Knowledge Forum

- The Abu Dhabi Group Knowledge Forum held at Singapore from 25-27 July, 2008 facilitated by the ICIMOD, Nepal.
- This is a follow up of the 4th Assessment Report of IPCC which identified the lack of current knowledge on climate change impacts on water resources in the greater Himalayan region.
- Objective of this knowledge forum:
  - Establish a "knowledge-based partnership of states" to fulfill knowledge gaps on climate change impacts on water resources in the greater Himalayan region.
  - Develop mechanisms for sharing of data & information in the region.
  - Sharing practical experiences of coping with special challenges of the Rivers of the Greater Himalayas.

World Bank Meeting Experts of Bangladesh to share their experience in water resource management in Bangladesh.

•There is no dearth of water expertise .
•It need the initiatives of the political governments of the region for cooperative water resources management.
•World bank will facilitate it as a honest broker.

The Way Forward

- Huge potential in the region
- There is no lack of expertise in South Asian countries.
- Initiatives must be taken by the national governments.
- India must have to come forward to support this regional transboundary river basin cooperation rather being a hydro-hegemon.