

## **Economical and Social Barriers to Water Related Data Availability in the Bangladesh Context**

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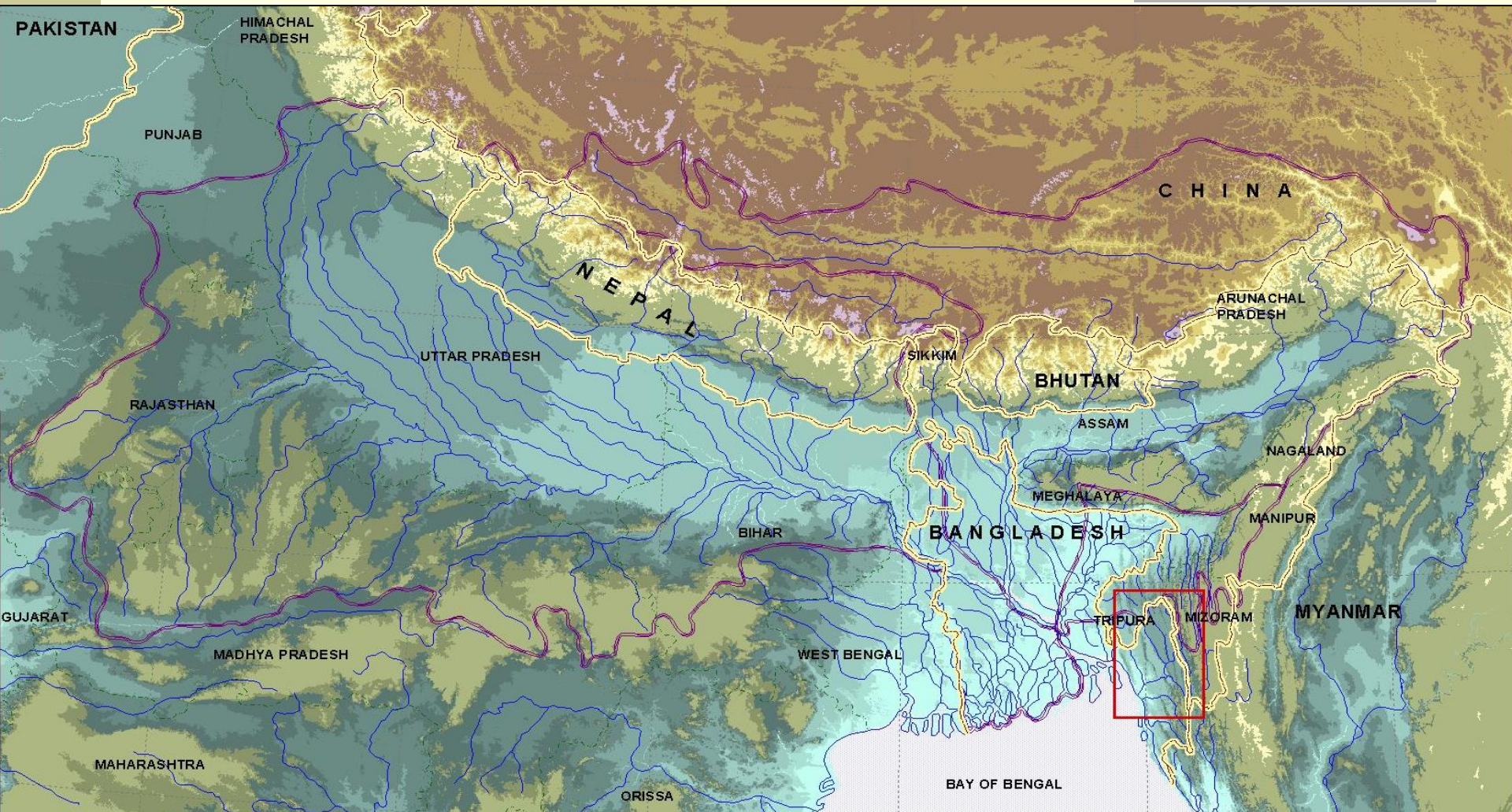
**21<sup>st</sup> March 2009, Istanbul, Turkey**

# Structure of the Presentation

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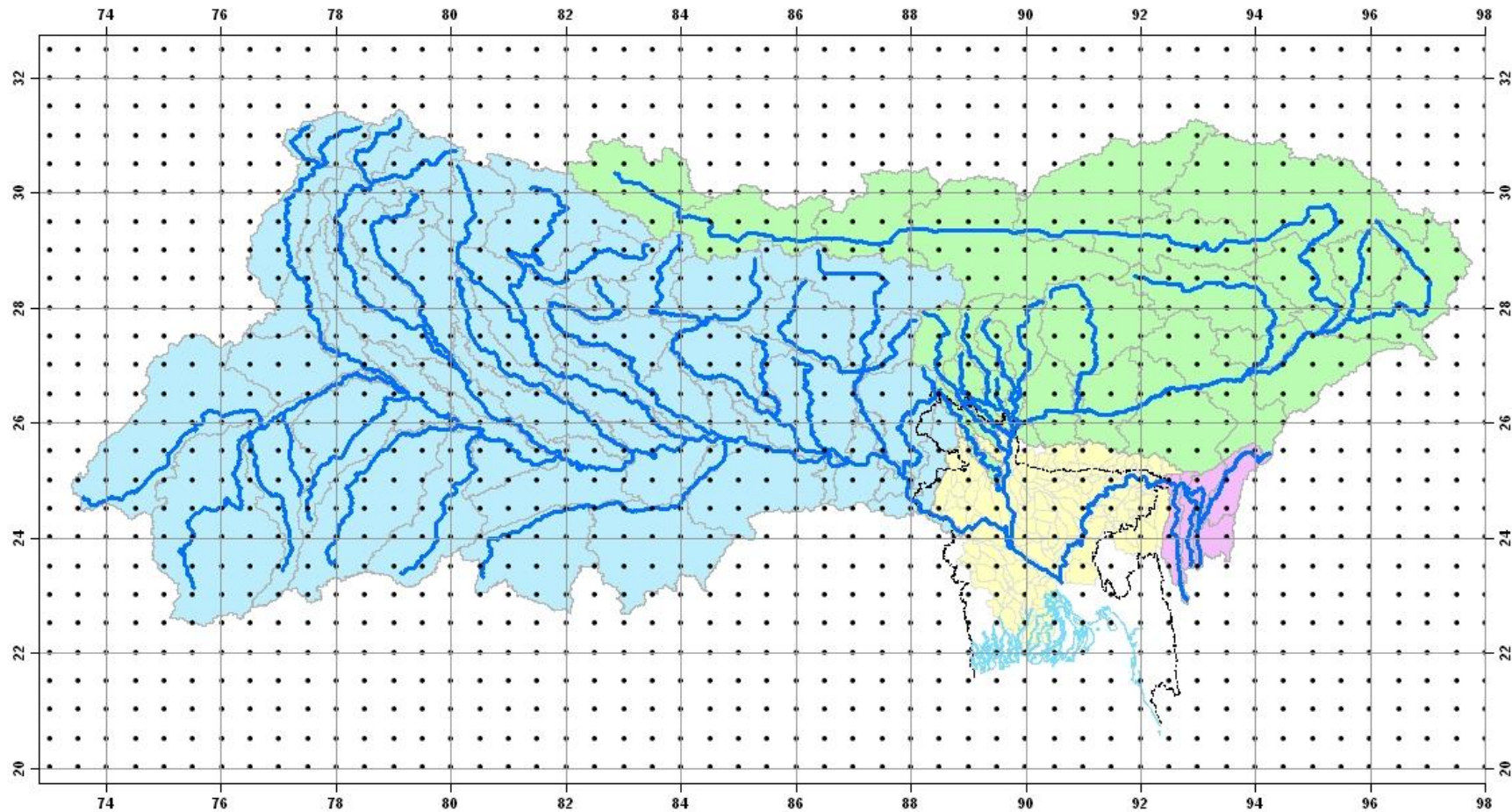
- Bangladesh in the Regional Context
- Necessity of Water Related Data at Basin Level for Natural Hazards Management
- Present Water Related Data Collection in Bangladesh
- Present Water Related Data Exchange in the GBM Basins for Flood Management
- Existing Economic and Social Barriers for Data Exchange in the GBM Basins
- Way Forward

# Bangladesh in the Regional Context





# GBM BASIN



## Legend

- GCM 0.5 deg satellite data

## Catchment

### BASIN

- Ganges
- Brahmaputra
- Meghna

- GBM basin river network
- Catchment Bangladesh
- Coastline
- International Boundary

Hydrological Modelling for Impact of  
Climate change on Agriculture

Map of GBM basin showing locations  
of meteorological data



300  
Kilometers



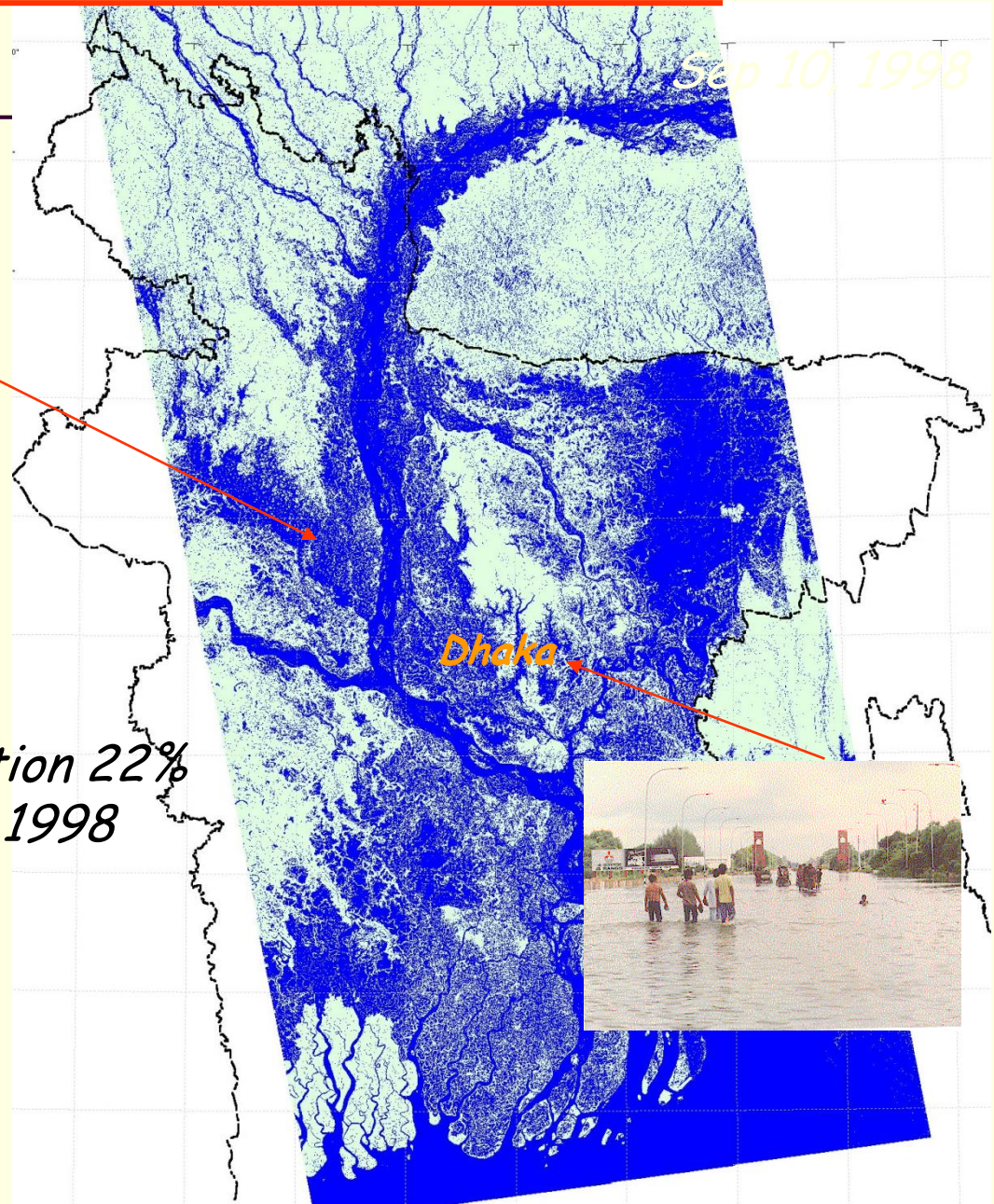


# Bangladesh - A Land of Hazards



## *Flood*

*Average annual inundation 22%  
68% area inundated in 1998*



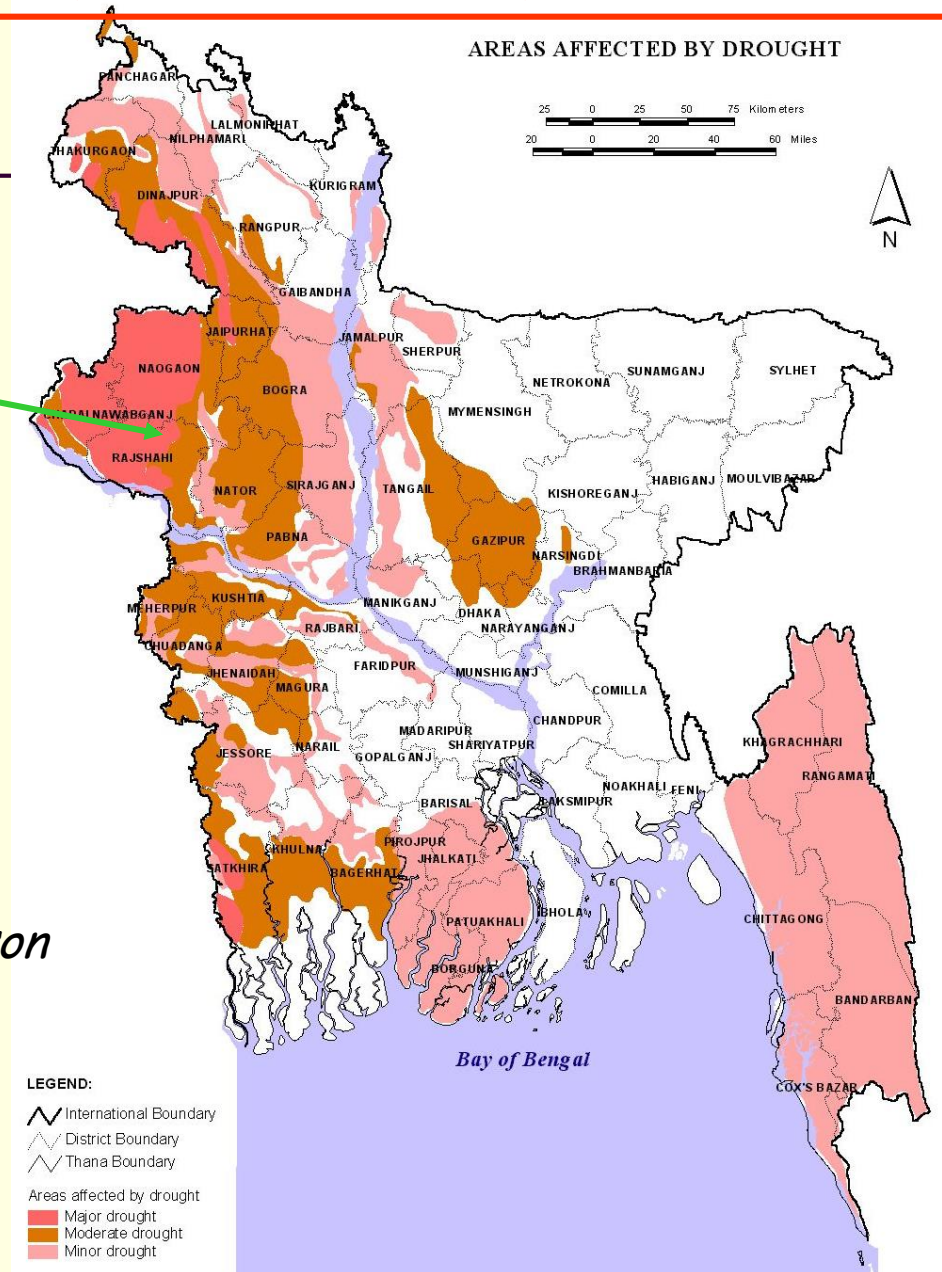


# Bangladesh - A Land of Hazards



## Water Stress

*About 1/4<sup>th</sup> of the country suffer water stress in dry season*





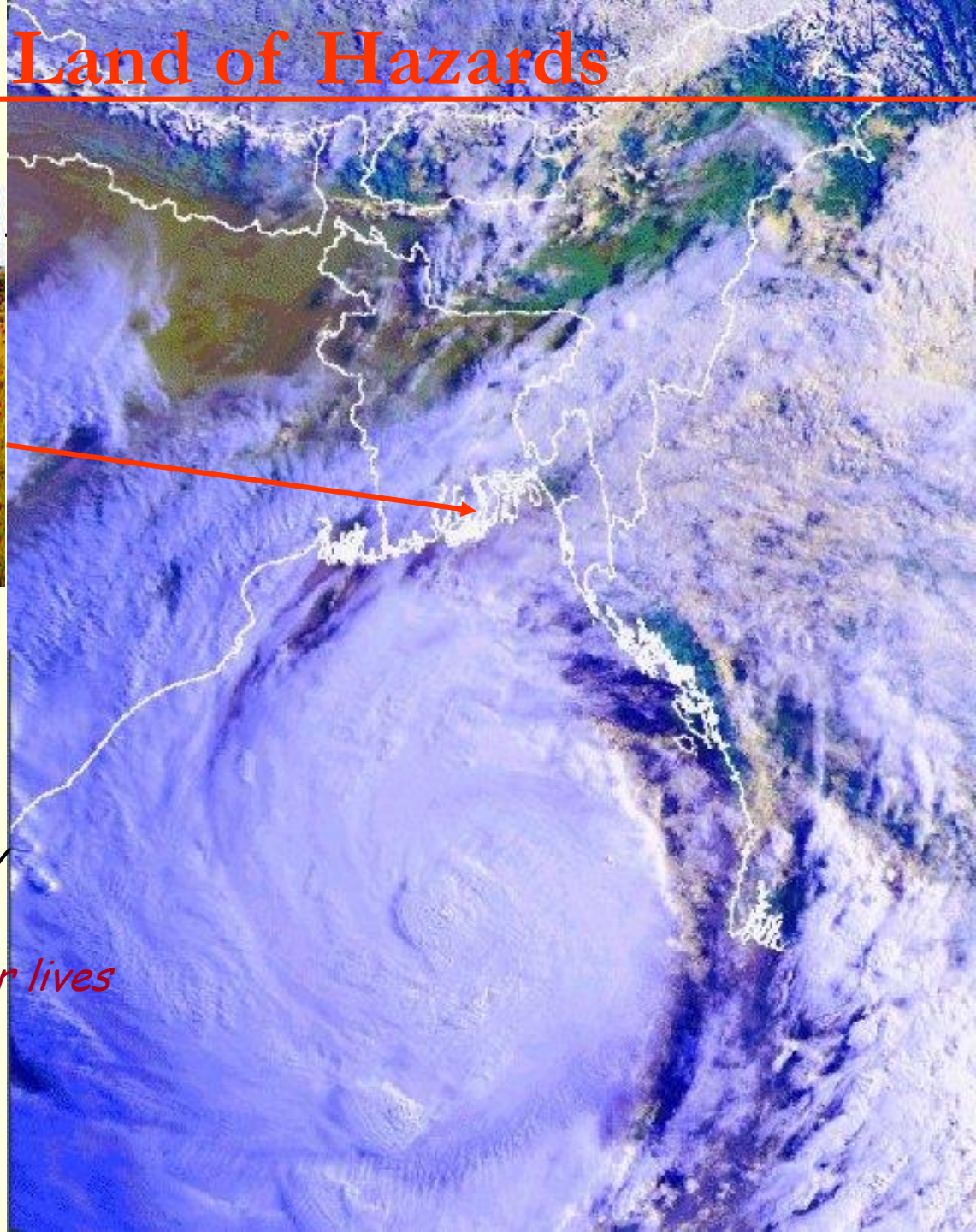
# Bangladesh - A Land of Hazards



## *Cyclone*

*About 1/4<sup>th</sup> of the country  
susceptible to tidal surges*

*In 1970, 300,000 people lost their lives*



# Water Related Data Requirement at GBM Basin Level for Disaster Management

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## GBM Basins Water Related Data

Temperature  
change

Precipitation  
change

Glacier  
melt

Water Level &  
Discharge

## Water ~ Land Sector

Flooding

Drought

Salinity  
intrusion

Cyclonic  
surge

River  
erosion



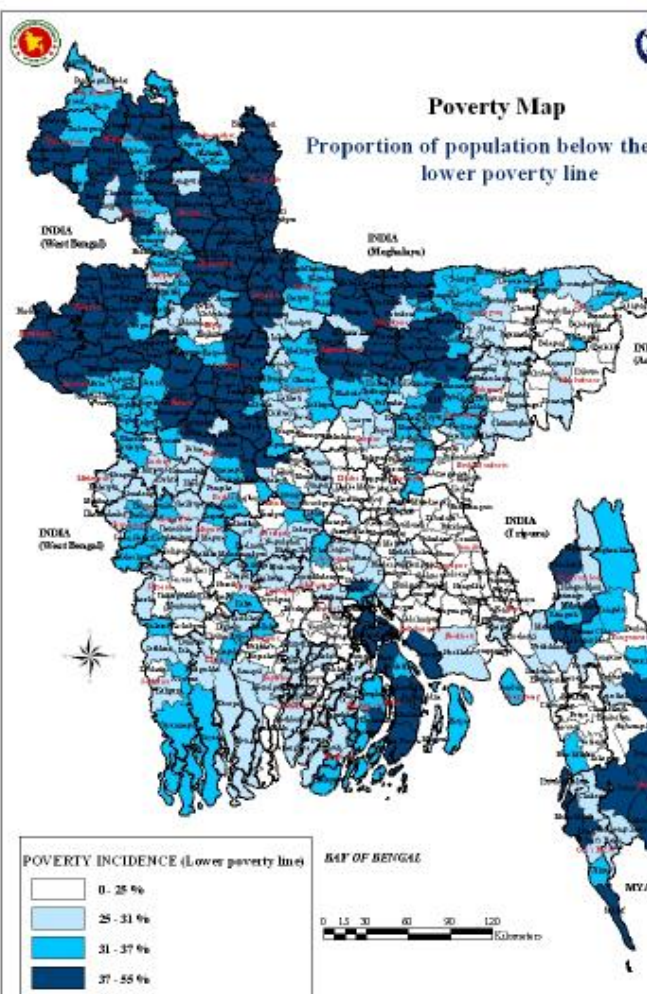
# Causes of Vulnerability of Bangladesh

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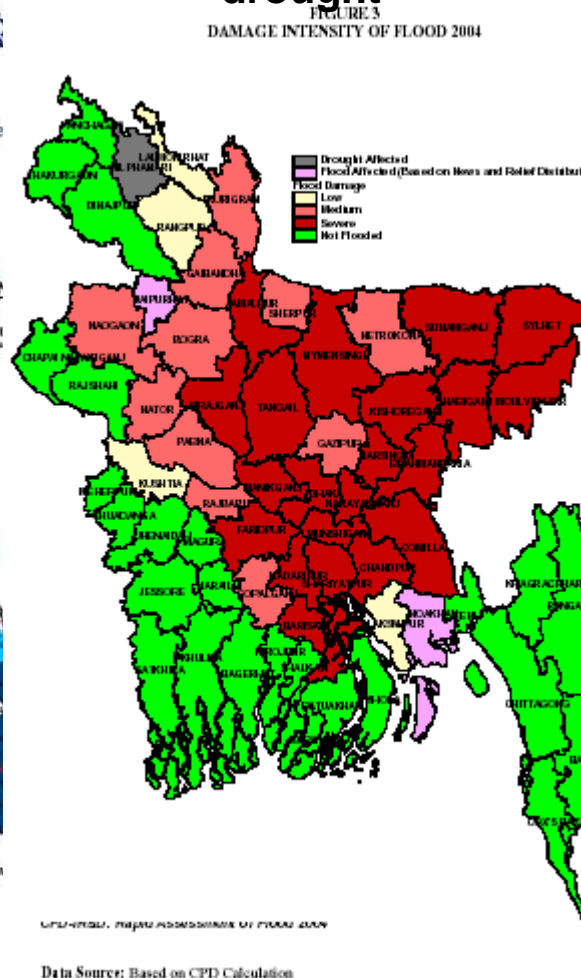
- Low lying flat country
- Draining the GBM basin flow generated from 1.75 million sq. km
- Covering only 7-10% of total area
- With huge water bodies
- 75% of annual rainfall occurs during monsoon
- 10% during post monsoon and winter
- Agriculture is dependant on surface and groundwater irrigation
- Salinity intrusion during dry season due to lack of freshwater flow
- Drainage problems are severe in the coastal areas due to sedimentation
- Cyclonic surge impose flooding in the coastal low lying areas
- Flood Control Infrastructure Fragile

# Poor People Affected by Flood and Drought

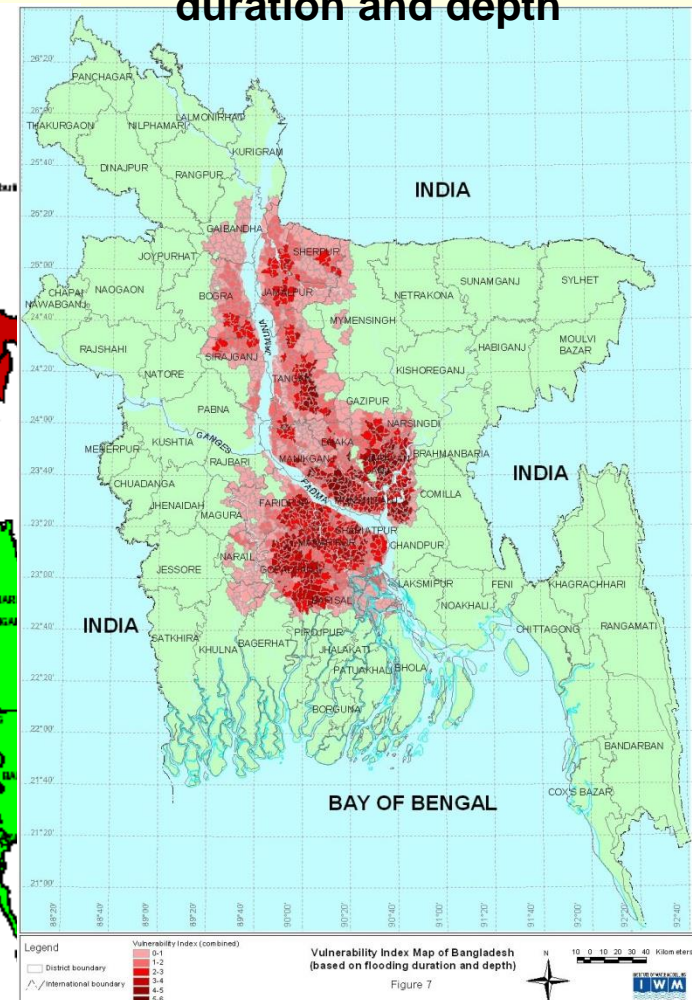
## Poor people concentration



## Areas affected by flood & drought



## Areas affected by flood duration and depth

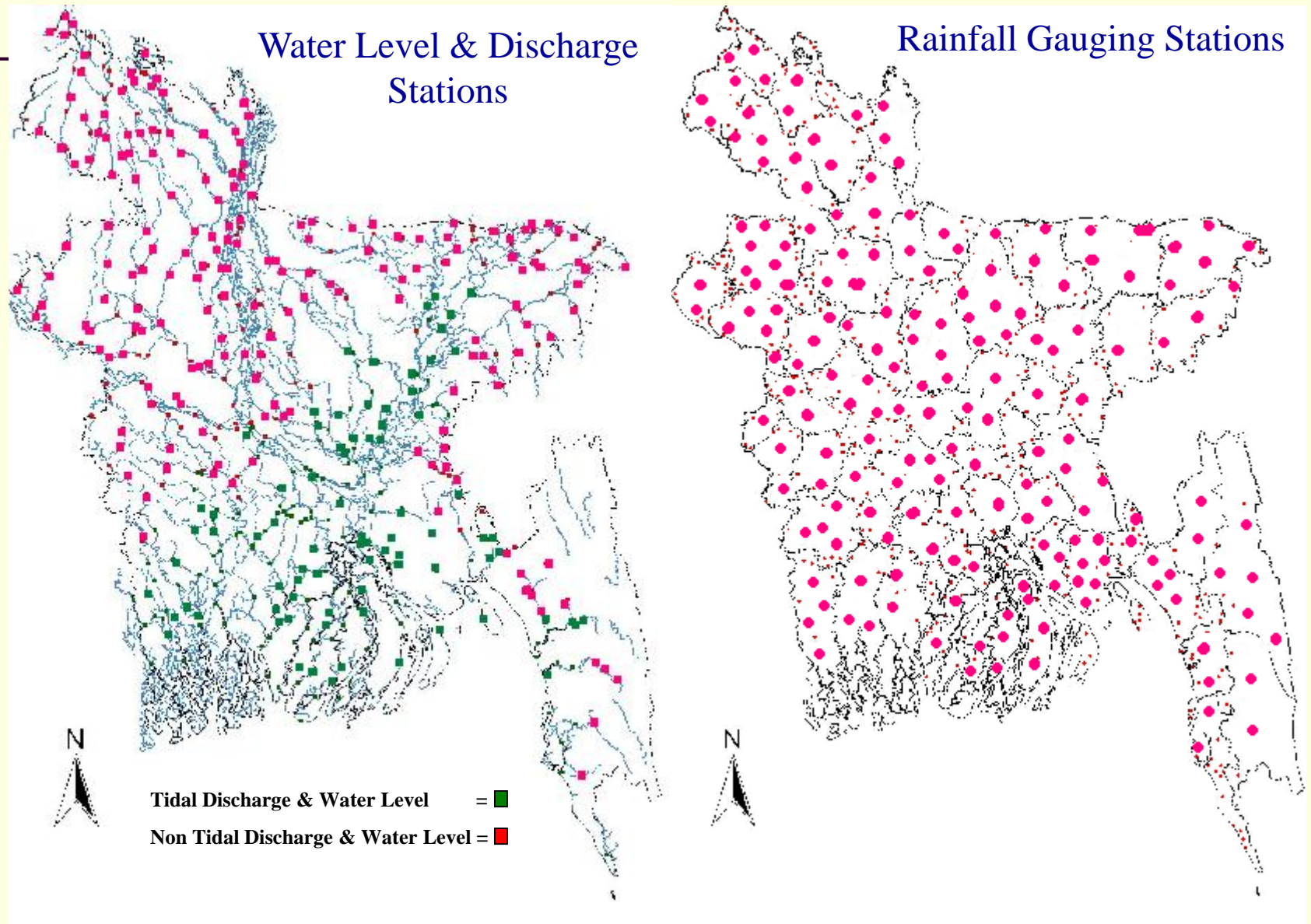




# Hydrological Stations in Bangladesh

<b>Sl. No.</b>	<b>Data Type</b>	<b>No. of Stations</b>	<b>Frequency</b>
<b>1</b>	<b>Non Tidal Water Level Gauge</b>	<b>215</b>	<b>5 times in a day</b>
<b>2</b>	<b>Tidal Water Level Gauge</b>	<b>128</b>	<b>5 times in a day</b>
<b>3</b>	<b>Discharge Station</b>	<b>108</b>	<b>Weekly, Fortnightly, Alternately in Major Stations occasionally.</b>
<b>4</b>	<b>Rainfall Stations</b>	<b>268</b>	<b>Daily</b>
<b>5</b>	<b>Auto Rainfall Station</b>	<b>23</b>	<b>Continuously</b>
<b>6</b>	<b>Evaporation Station</b>	<b>39</b>	<b>Daily</b>
<b>7</b>	<b>Meteorological Station</b>	<b>3</b>	<b>Daily</b>
<b>8</b>	<b>Sediment Discharge Station</b>	<b>26</b>	<b>Along the discharge</b>

# Data Collection Network





# Hydro-meteorological Data from India

Sl. No	Station Name	River	Mode of Communication
1	Badarpur	Barak	Point to Point by SSB radio
2	Amarpur	Gumti	Do
3	Manu	Kailashawar	Do
4	Gojaldoba	Teesta	Do
5	Domohoni	Teesta	E-mail/FAX
6	Gugumari	Dudkumar	Point to Point by SSB radio
7	A.P.Ghat(Silchar)	Barak	Do
8	Jalhhdhaka	Darla	Do
9	Guwahati	Brahmaputra	E-mail/FAX
10	Pandu	Brahmaputra	Do
11	Goalpara	Brahmaputra	Do
12	Dhubri	Brahmaputra	Do
13	Farakka	Ganges	Do

# Hydro-meteorological Data from Nepal

Sl. No	River Name	Data	Data Time	Remarks
1	Raptinadi-Kusum	RF , Water level	Daily Rain data, Hourly Water level data	Data is received at email <a href="mailto:ffwc05@yahoo.com">ffwc05@yahoo.com</a> , <a href="mailto:ffwc@ffwc.gov.bd">ffwc@ffwc.gov.bd</a>
2	Narayani Narayanhat	RF, Water level	Daily Rain data, Hourly Water level data	
3	Sapta Kashi Chatara	RF, Water level	Daily Rain data, Hourly Water level data	
4	Kankai-Mainachuli	RF, Water level	Daily Rain data, Hourly Water level data	

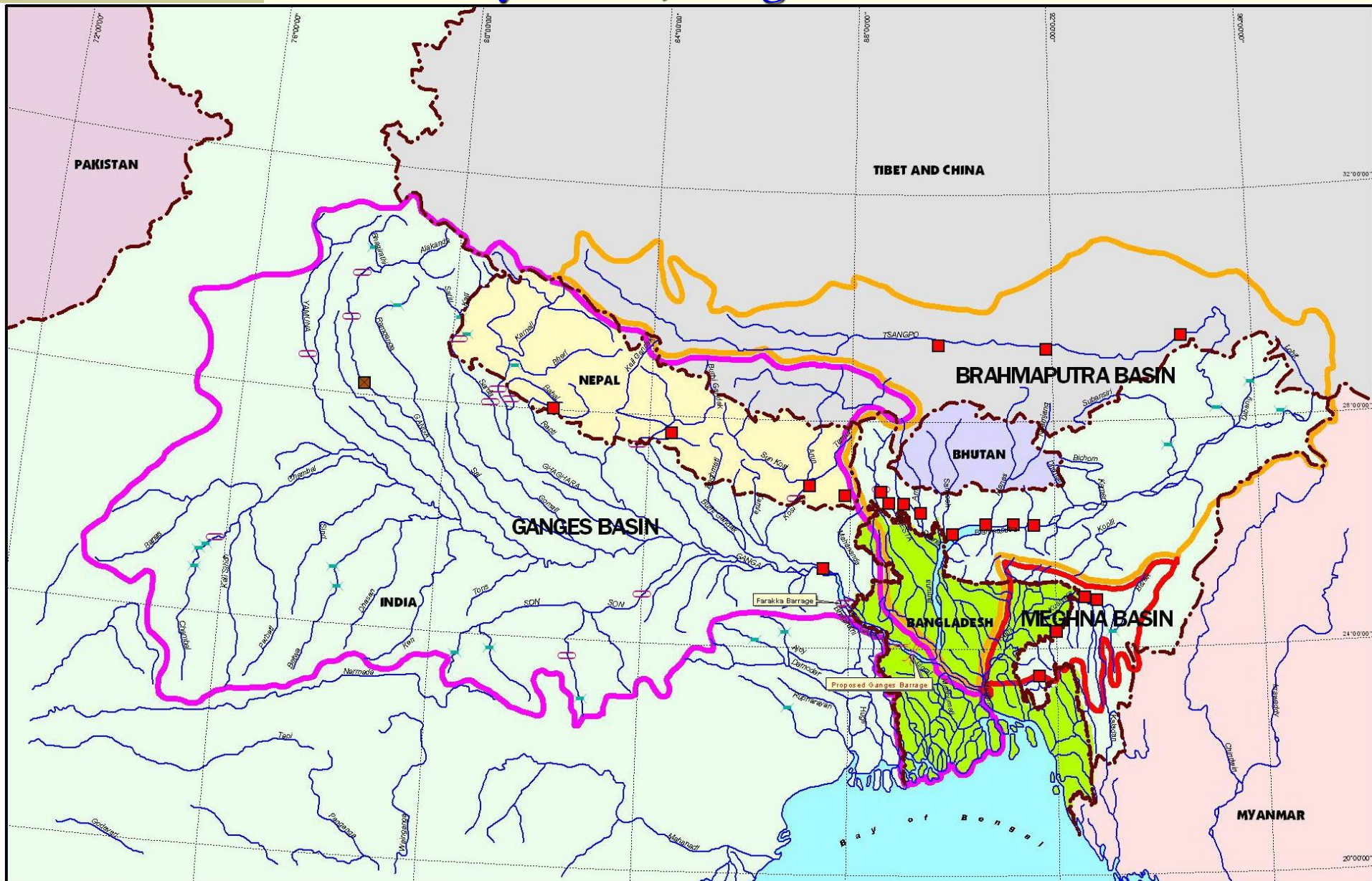


# Hydro-meteorological Data from China

Sl. No	River Name	Station	Data	Frequency	Remarks
1	Yar Lung Zhangbo	Nugesha	RF, WL,Q	Twice in a day	Data is received regularly at email ffwc05@yahoo.com
2	Yar Lung Zhangbo	Yang Cun	RF, WL, Q	Twice in a day	
3	Yar Lung Zhangbo	Nu Xia	RF, WL,Q	Twice in a day	

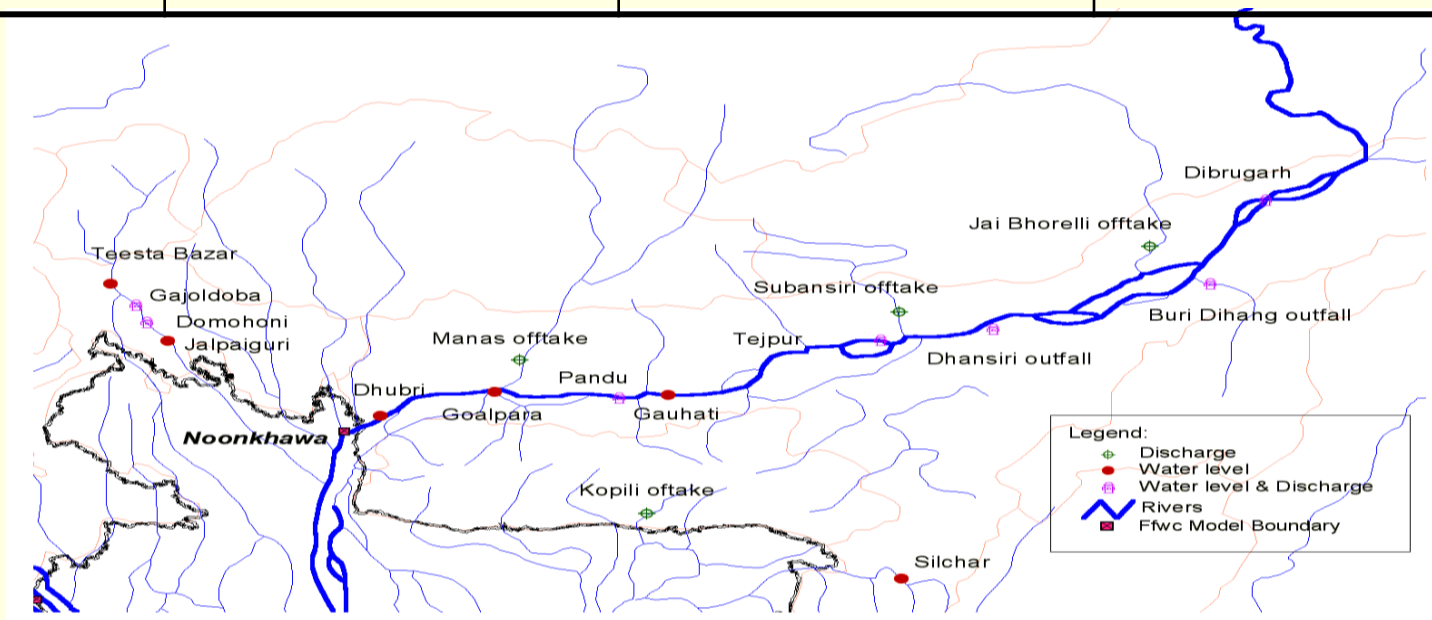
# Hydrometric Data Received from Upstream Countries

By FFWC, Bangladesh



# Lead-time (travel time) with proposed up-stream data

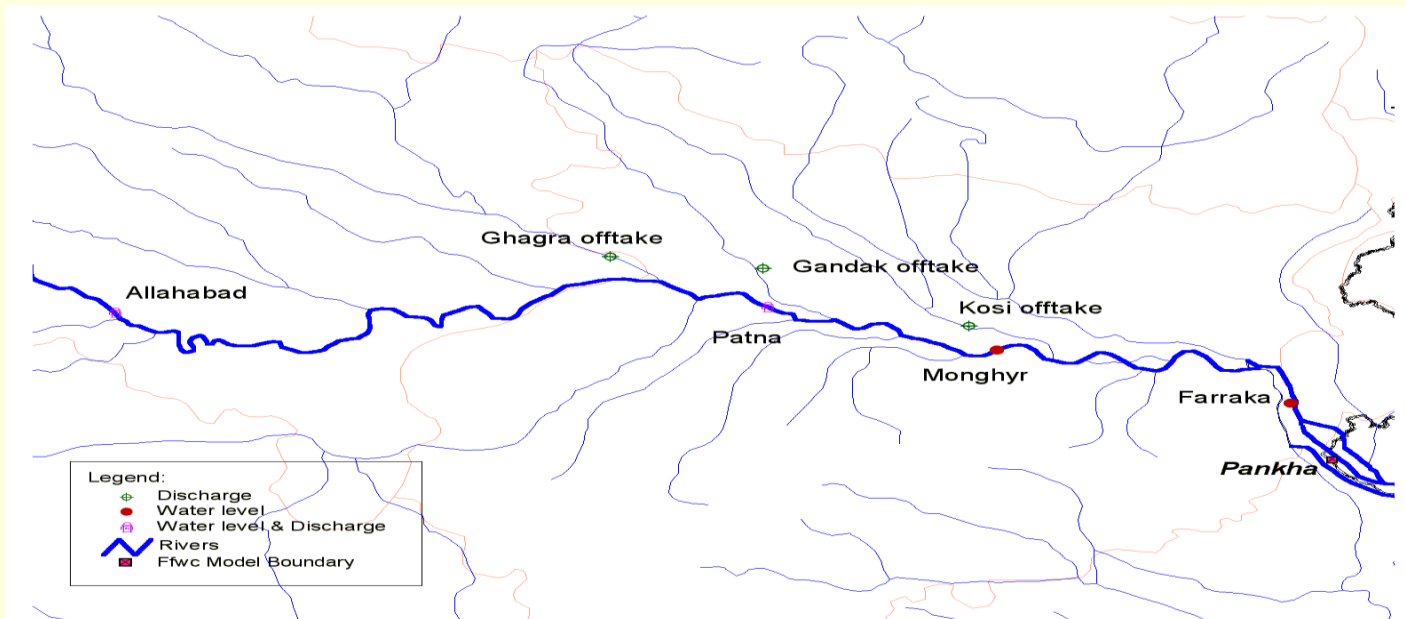
Station	Proposed station	Distance (approx.)	Travel Time (approx.)
Noonkhawa	Dibrugarh	550 Km	76 hrs.
	Tejpur	300 Km	41 hrs.
	Gouhati	180 Km	25 hrs.
	Goalpara	90 Km	12 hrs.
	Dubri	25 Km	3.5 hrs.





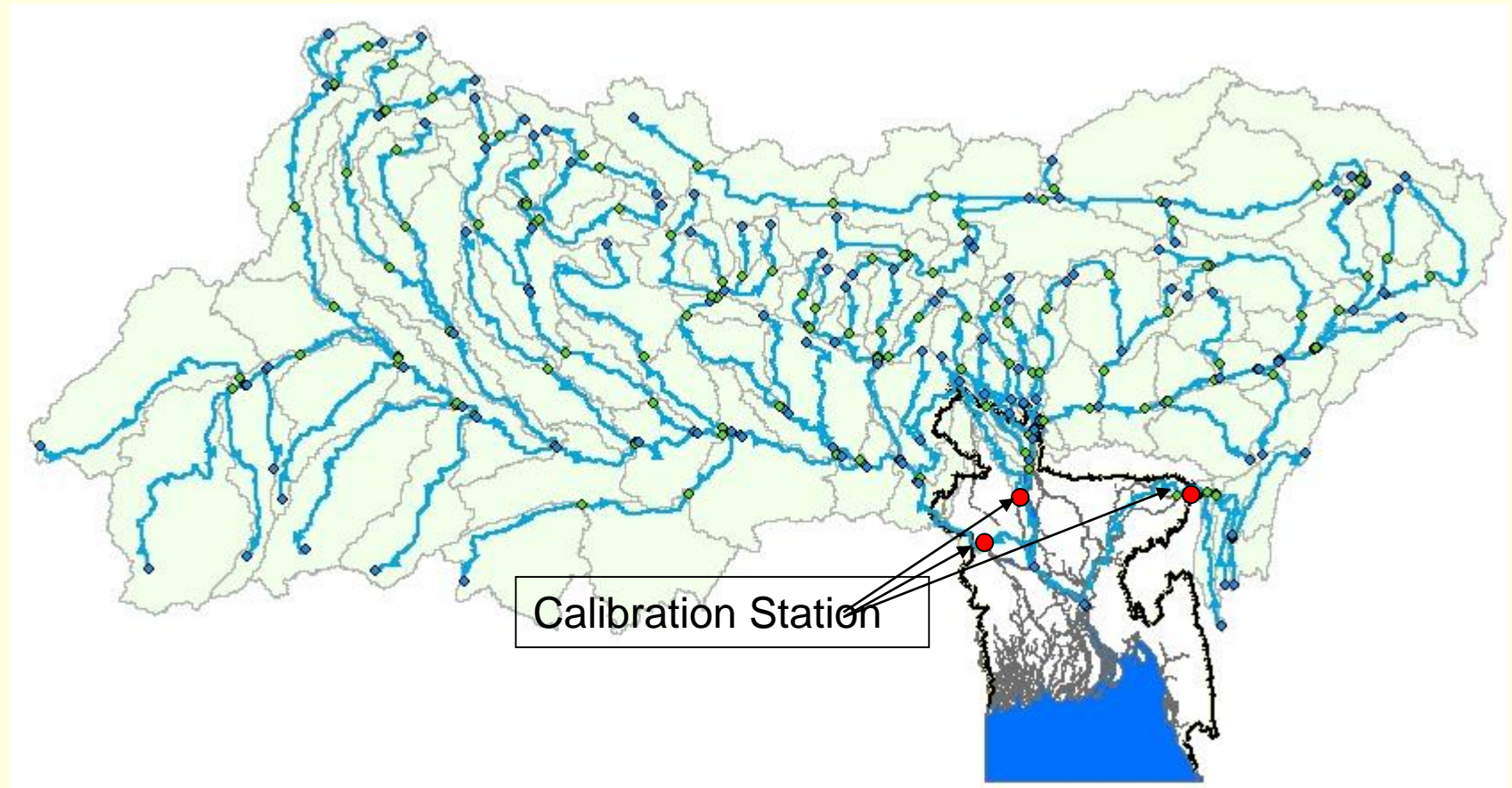
# Lead-time (travel time) with proposed up-stream data

Station	Proposed station	Distance (approx.)	Travel Time (approx.)
Pankha	Allahabad	800 Km	130 hrs.
	Patna	350 Km	57 hrs.
	Monghyr	230 Km	37 hrs.
	Farakka	32 km	5 hrs.



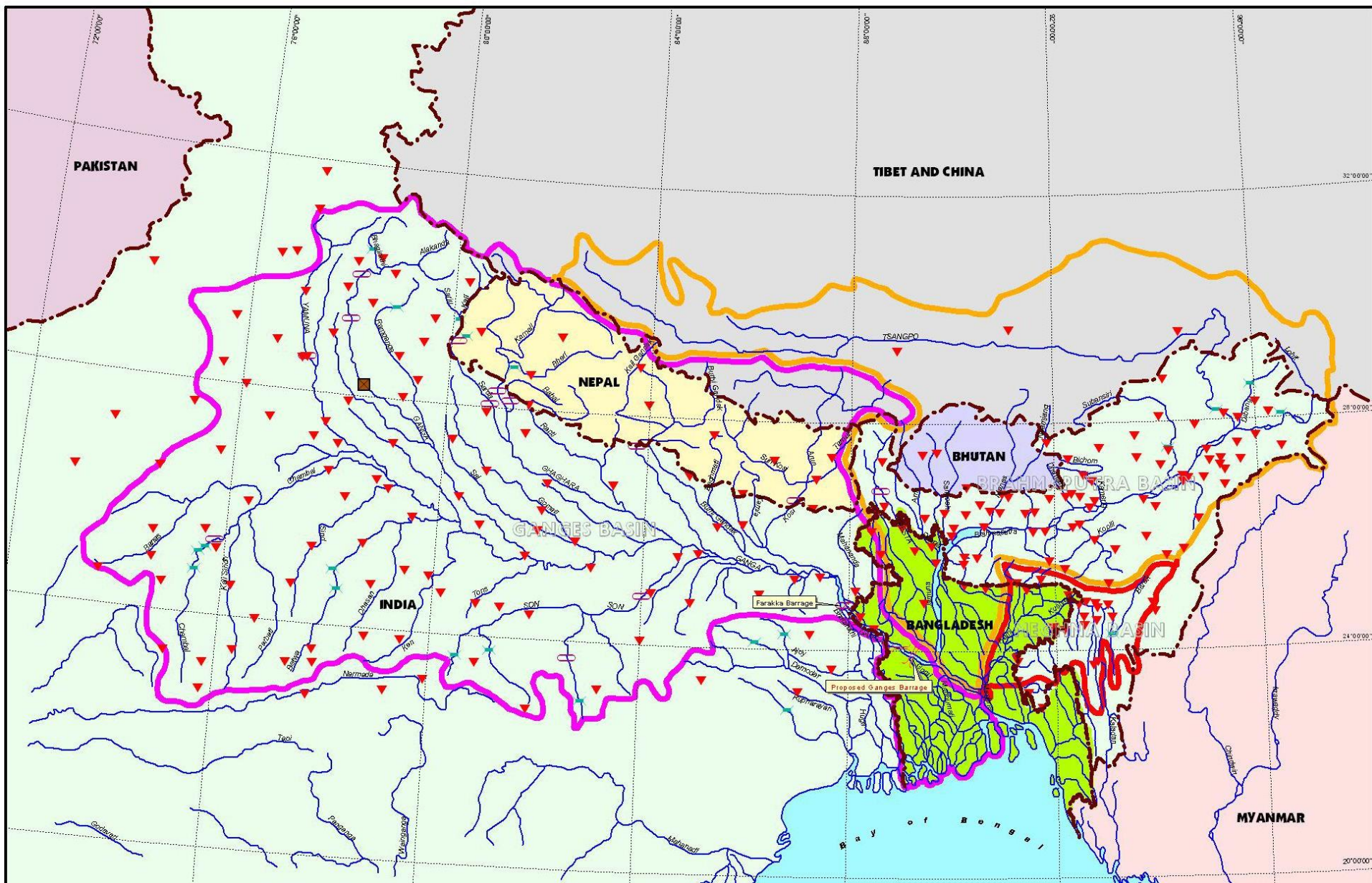
# GBM Basin Model:

- Software - MIKE BASIN Platform developed by DHI, Denmark
- Hydrometric data - Satellite & Ground measured
- Topographic data – SRTM Land Level Data
- Calibration – ongoing with measured data within Bangladesh
- Validation – to be done





# Rainfall Stations: Data collected from different websites

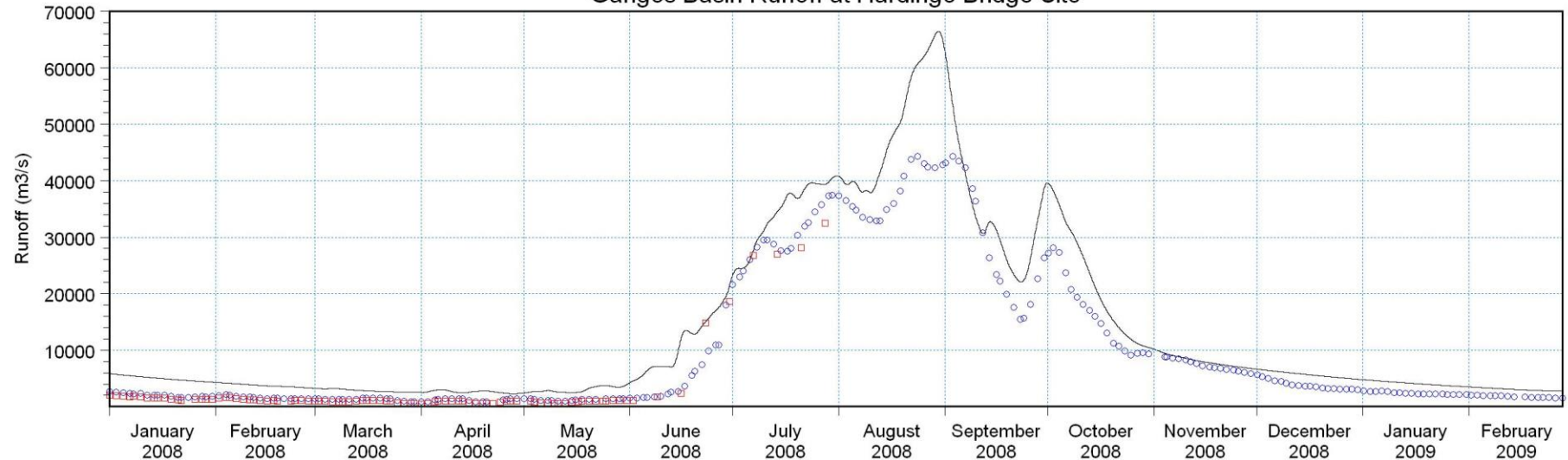




# Result of Basin Model

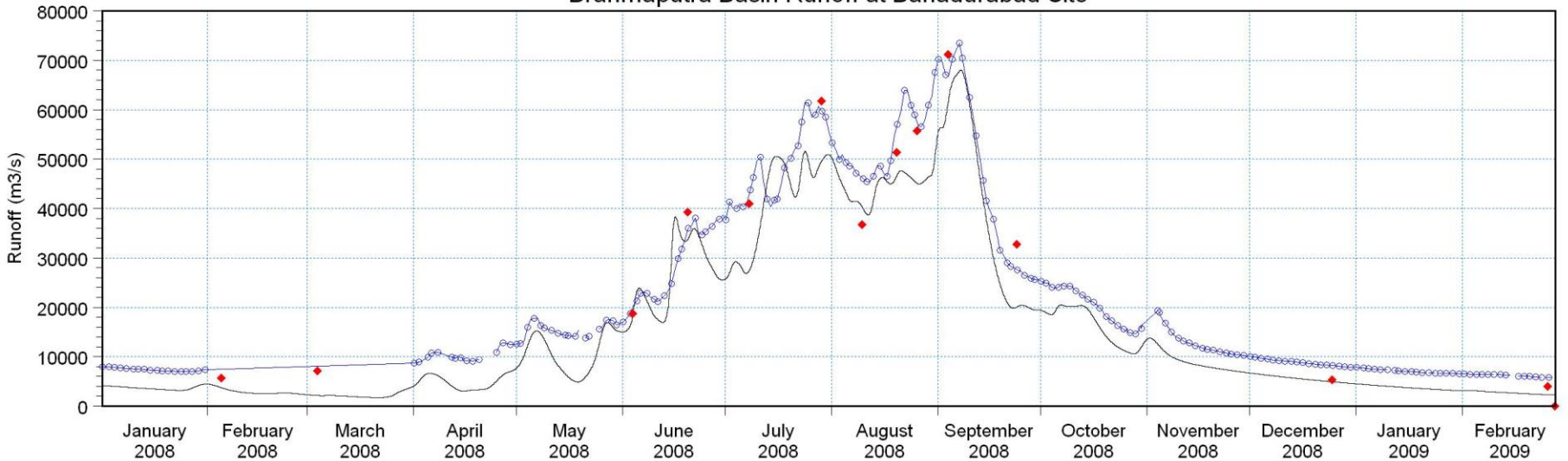
Simulated Q at Hardingebridge [m<sup>3</sup>/s] —  
Rated Q at Hardingebridge [m<sup>3</sup>/s] ○ ○  
Measured Q at HardingeBridge [m<sup>3</sup>/s] □ □

Ganges Basin Runoff at Hardinge Bridge Site



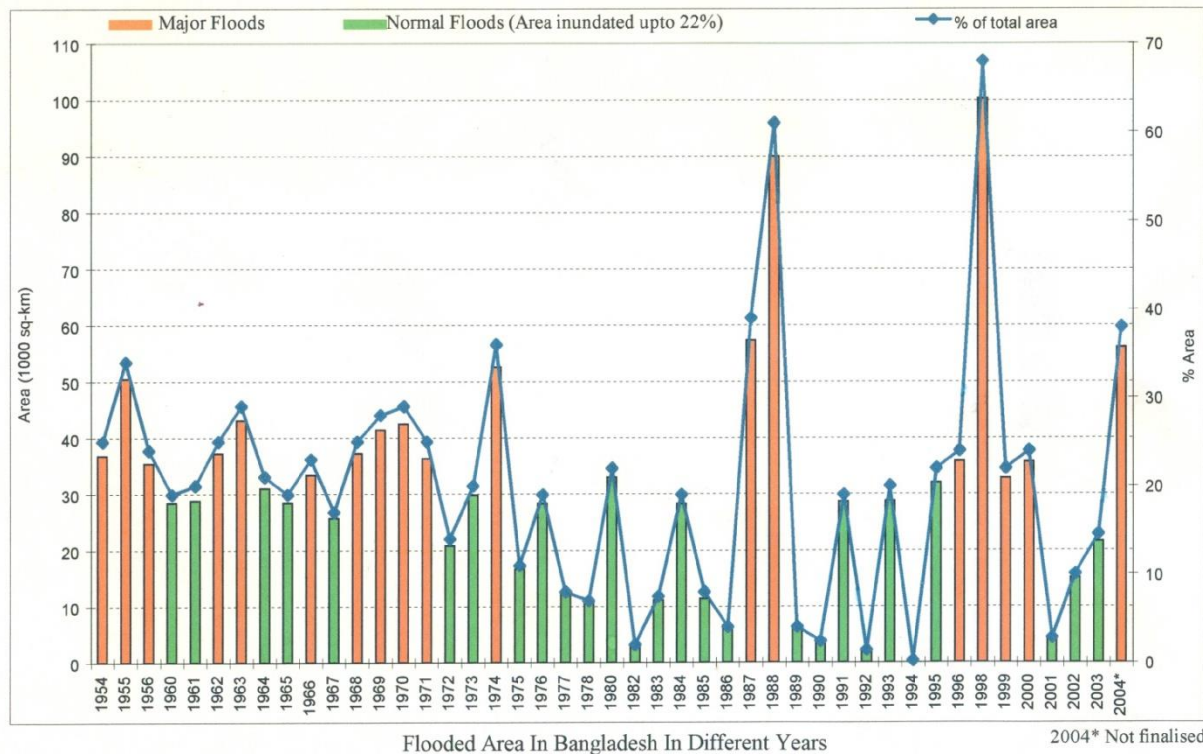
Simulated Q at Bahadurabad [m<sup>3</sup>/s] —  
Rated Q at Bahadurabad [m<sup>3</sup>/s] ○ ○  
Measured Q at Bahadurabad [m<sup>3</sup>/s] ◆ ◆

Brahmaputra Basin Runoff at Bahadurabad Site



# Frequent Flood Occurrence

- Higher inter annual variation in area flooded
- Reduction in areal coverage of moderate flooding events



# Economic and Social Barriers to Data Availability ~ Bangladesh Context

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## ***Economic Barriers***

- Cost of Data
- Technology for Data Transfer/Retrieval
- Spatial and Temporal Distribution of Data

## ***Social Barriers***

- Sensitivity of Data
- Political Will
- Bureaucracy
- Trust
- Data as a Negotiating Tool
- Capability



# Way Forward

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- Regional Cooperation under UN Agencies
- Water Related Data Website for GBM Basins Countries
- GBM Basins Commission
- Inter-Governmental Cooperation
- Water Resources Planning taken on Regional Perspective

# Water a Medium of Cooperation in GBM Basins



## *Flow Augmentation*

Net potential 5339 cumecs



## *Flood Management Flood Forecasting*

For around 400,000 sq.Km area



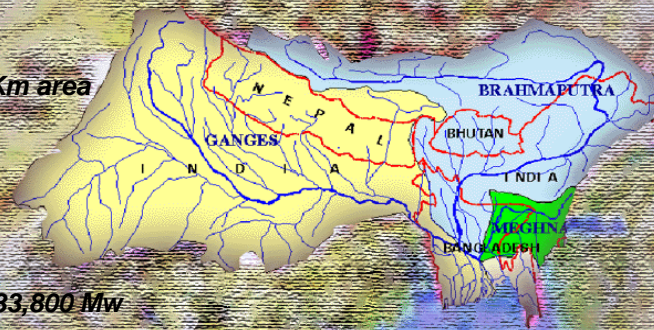
## *Hydropower*

Theoretical potential 233,800 Mw  
Present 22,722



## *Navigation*

Opening up Nepal, Bhutan  
and the Northeast to the sea



Participatory Water Management

Private Public Partnership

Environmental Conservation & Restoration

Fragmented Development  
Integrated Water Resources Management

*Thank you for your attention*