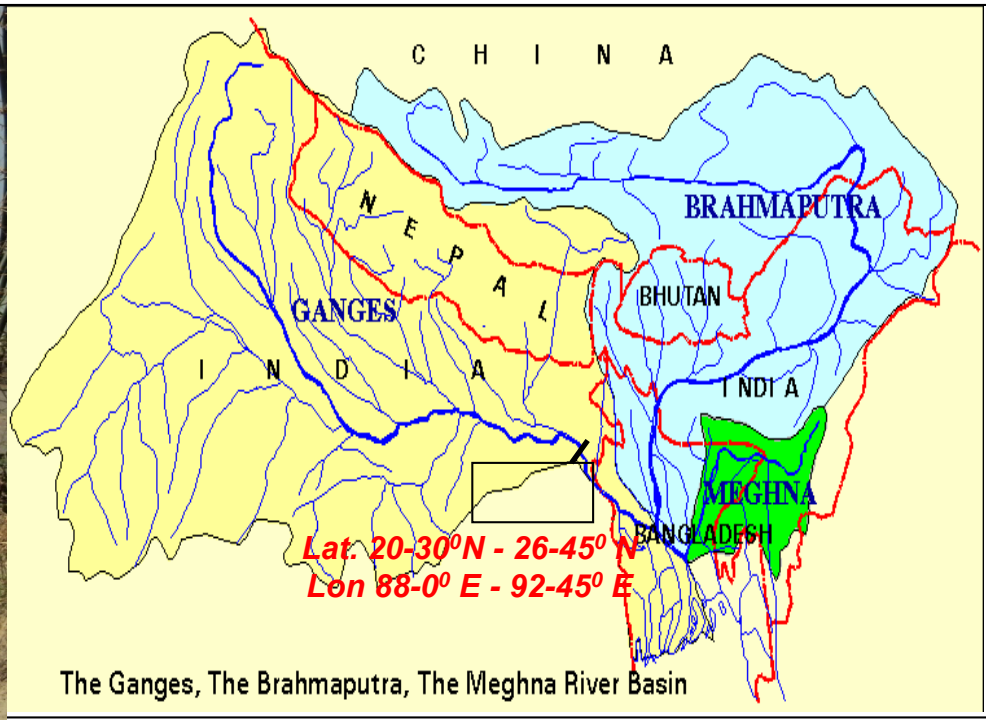
Climate Change Effects on Flooding: a case study of flood, 2012 in Mighty Brahmaputra-Jamuna River at Bogra District.



SWAT International Conference, 2018

Md. Ariful Islam
Date: 21-09-2018

Content of Presentation

- Flood Vulnerability of Bangladesh
- Causes of flood
- Types and Effects of floods
- Study Area
- Data collection and Analysis
- Flood' 2012 at Bogra District by Brahmaputra-Jamuna River.
- Climate Change Impact on Flooding
- Conclusion and Recommendations

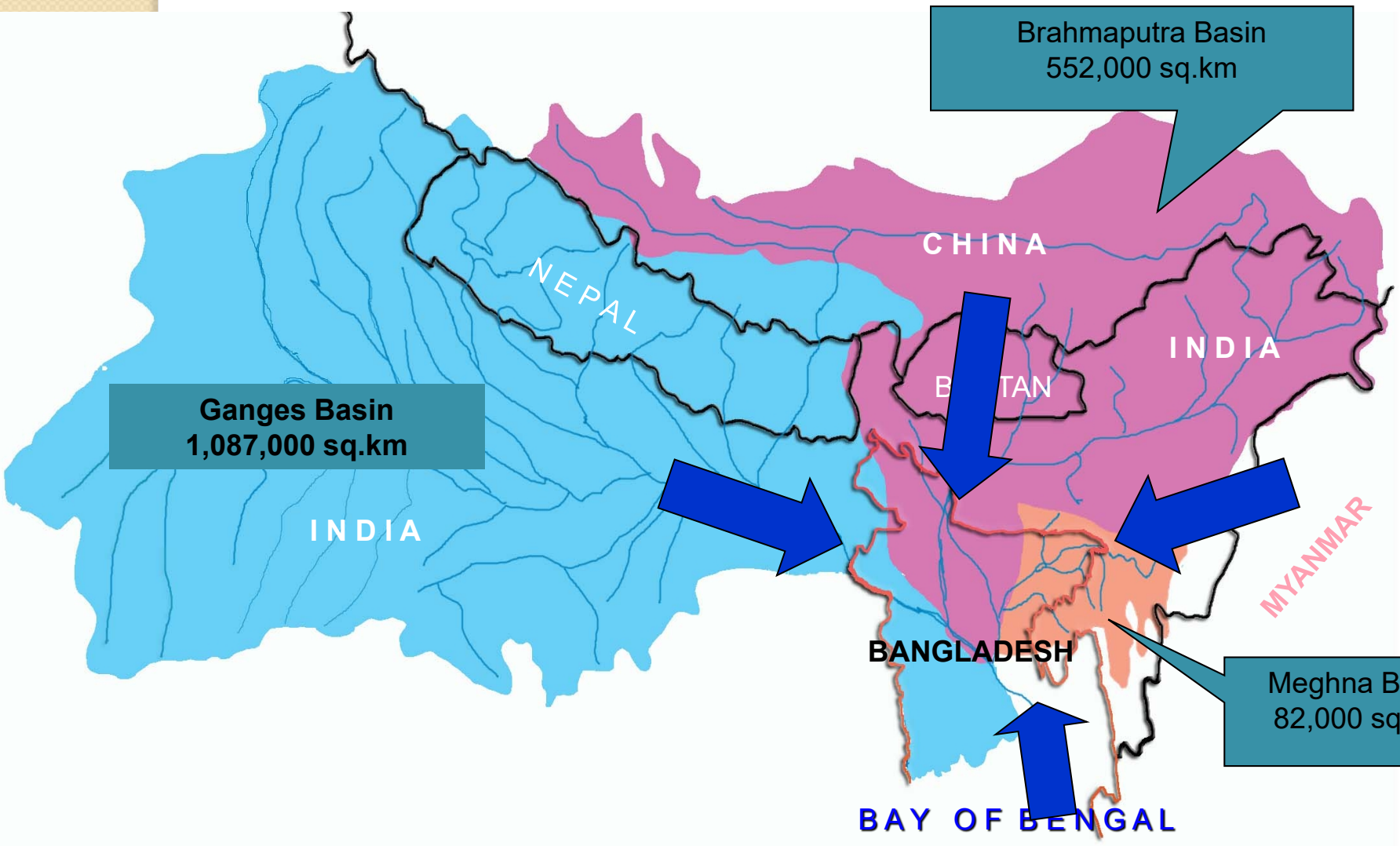
Floods in Bangladesh

- Flood occurs in Bangladesh regularly
- Being low-lying country, average 22% area is flooded every year
- In case of severe flood, 66% area inundated
- 1954,’55,’74,’87, ’88,’98, 2004 & 2007 floods were catastrophic

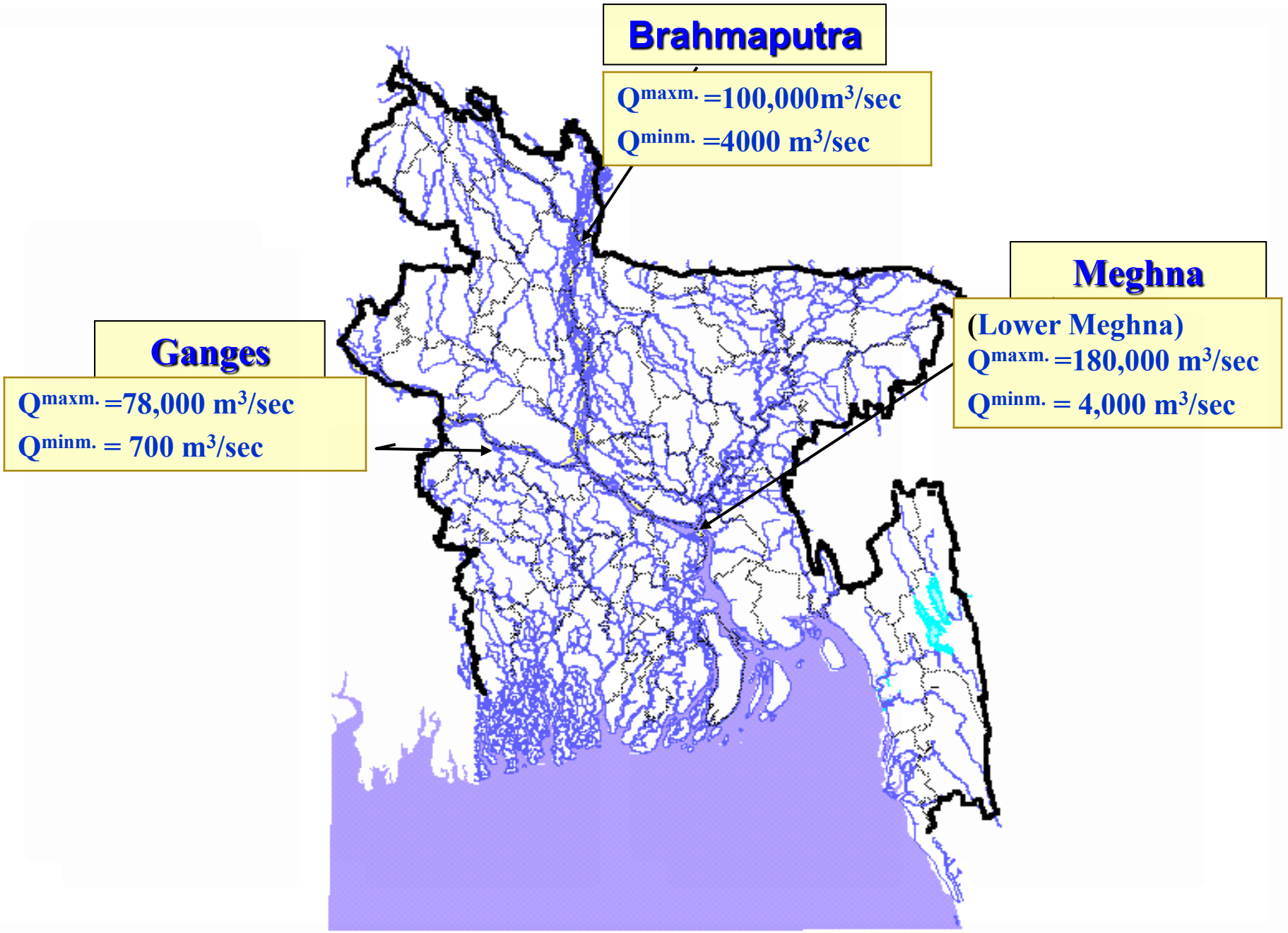
Flood problems in Bangladesh

- Flood problem in Bangladesh is extremely complex due to this country is an active delta.
- It has extensive flood plains into which about 1.7 million sq. km drain.
- Too much water during monsoon & too little in dry season
- More than 90% of discharge comes from out side of Bangladesh
- No control over 58 transboundary rivers
- High rainfall in three to four months
- Flat Topography, Salinity Intrusion, Siltation

Bangladesh rivers receive runoff from a catchment of 1.72 million sq. km, around 12 times its land area

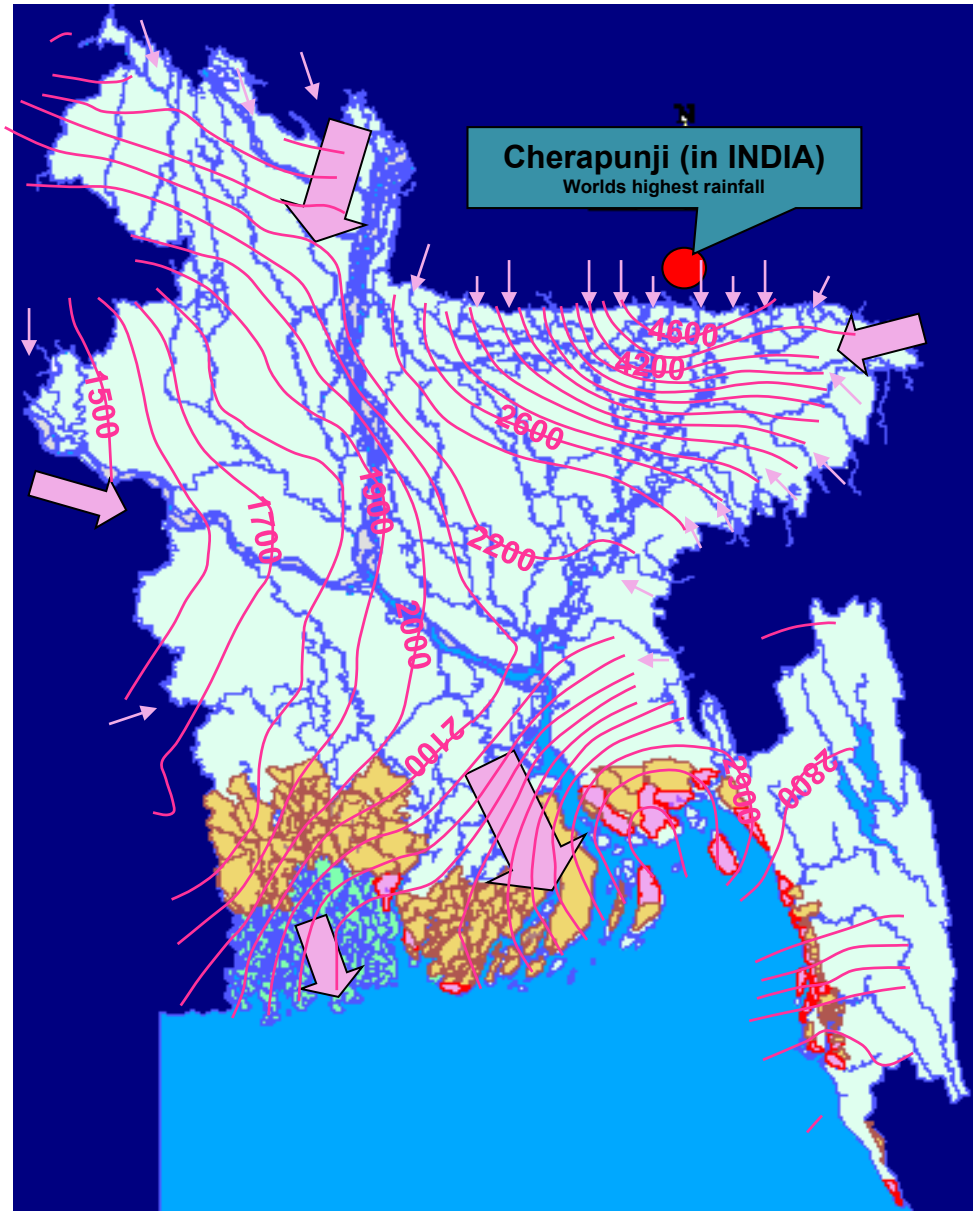


RIVER SYSTEMS OF BANGLADESH



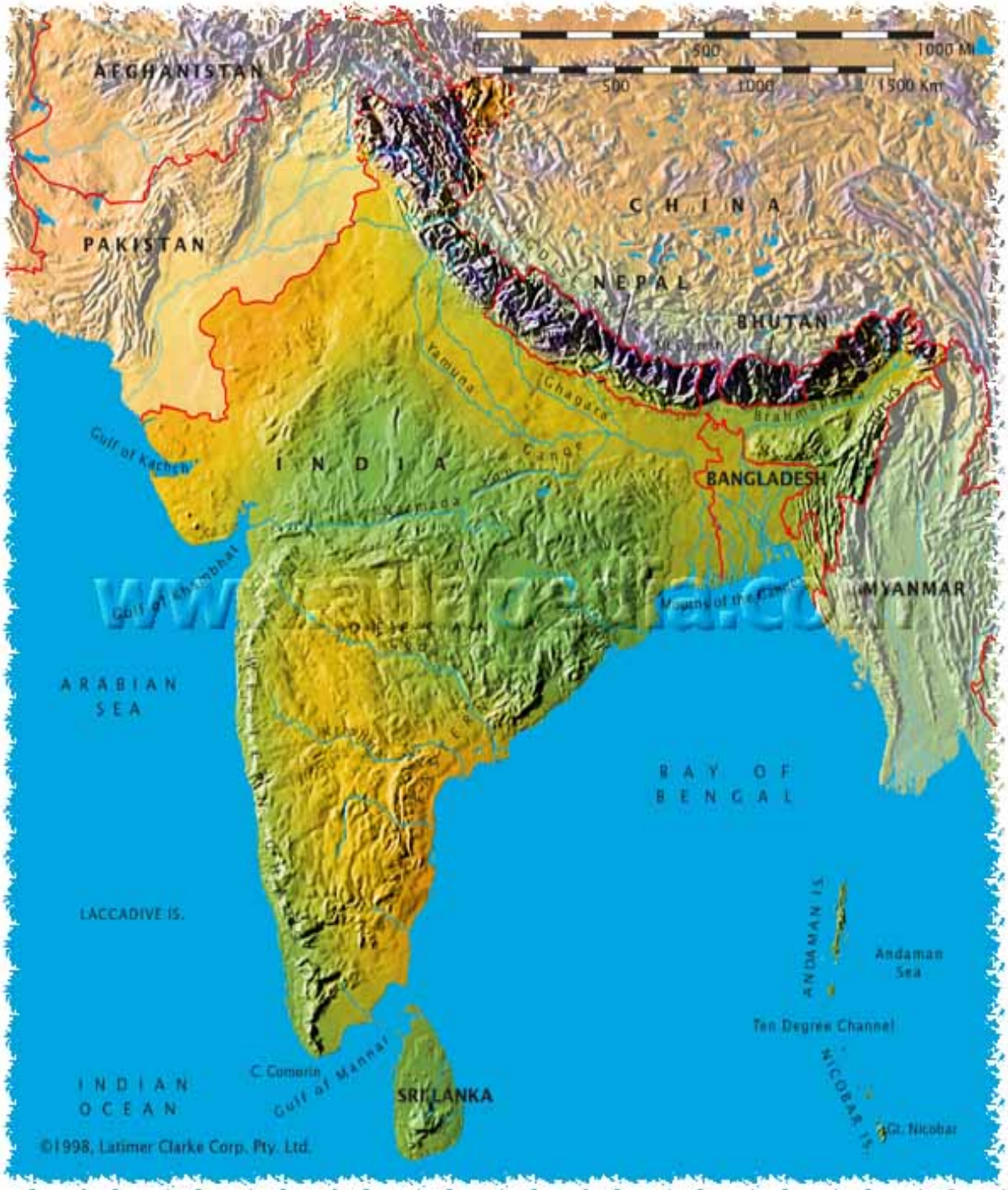
A riverine country with 310 rivers

- Total river length : 24,000 km
- Annual Avg. Rainfall: 1200mm in NW to 5500mm in NE
- Trans-boundary rivers : 58 nos. - 55 from India and - 3 from Myanmar.



Causes of floods

- Unique Geographical Location
- Excessive run-off from u/s
- Confluence of three major rivers
- Low topography
- River siltation
- Sea swell during monsoon
- Low gradient in major river
- Climate change impact
- Man made causes



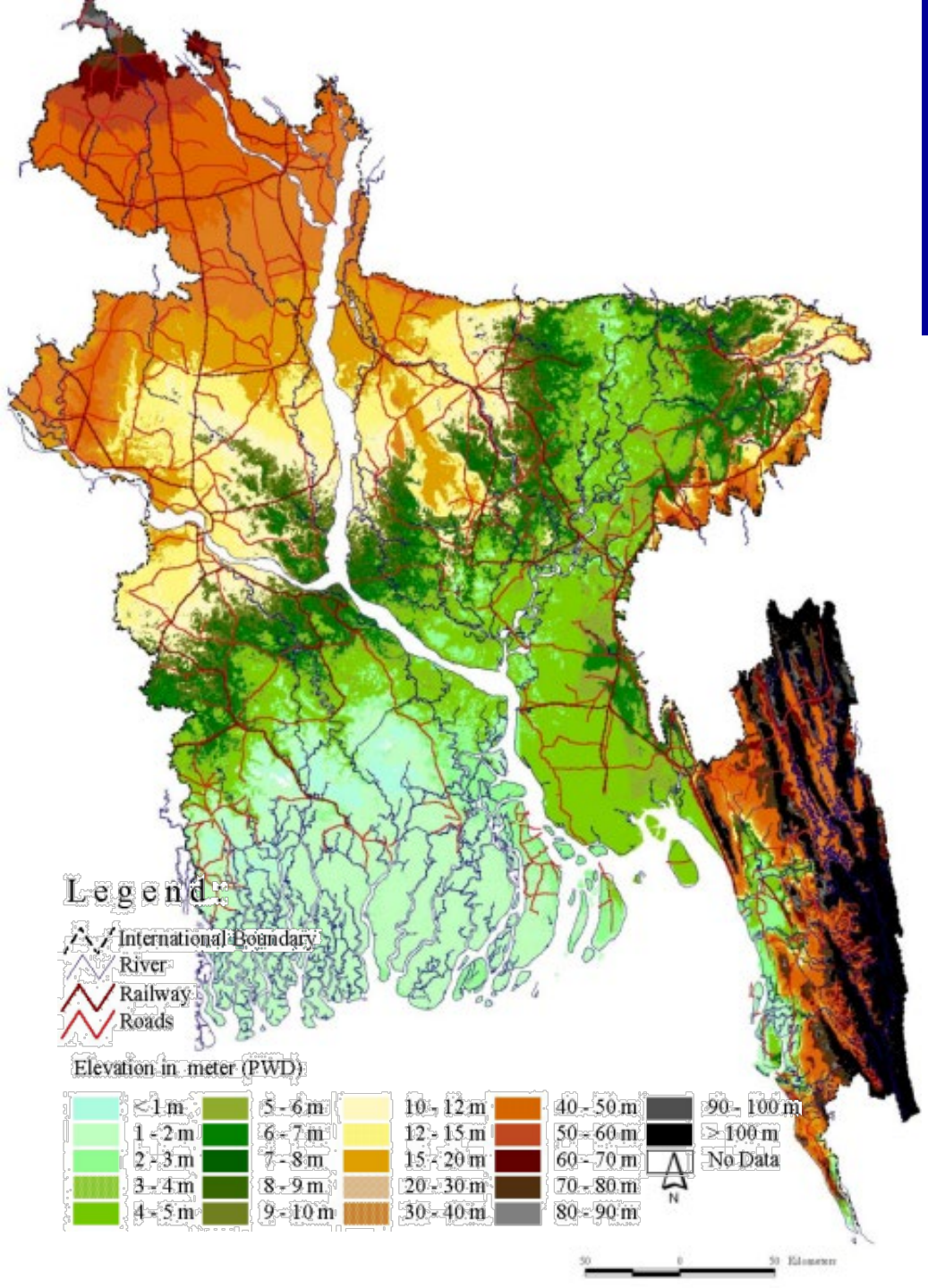
GEOGRAPHICAL POSITION:

Bangladesh is surrounded on the east, north and west by India,

by Myanmar on the south-east

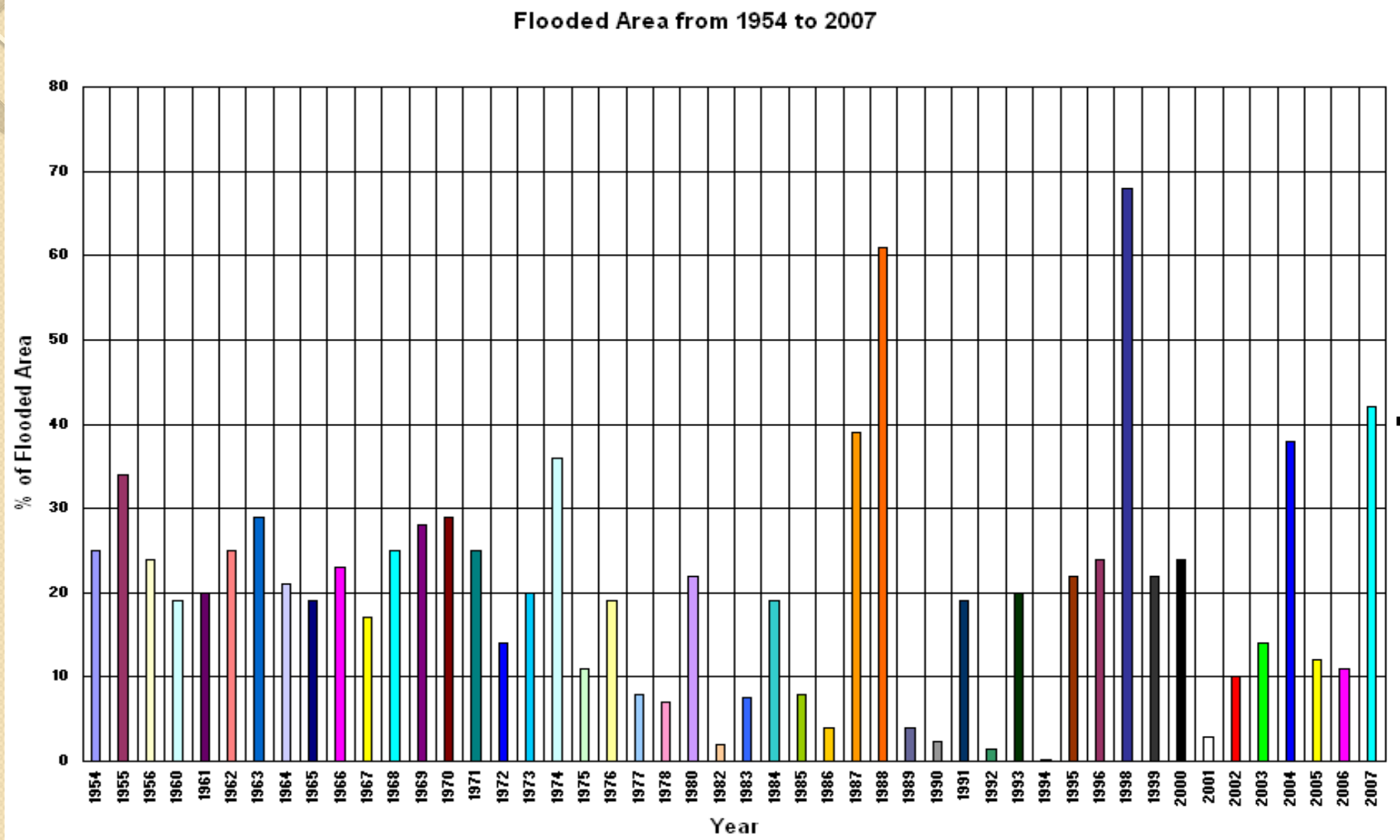
and by the Bay of Bengal on the south.

Topography of Bangladesh

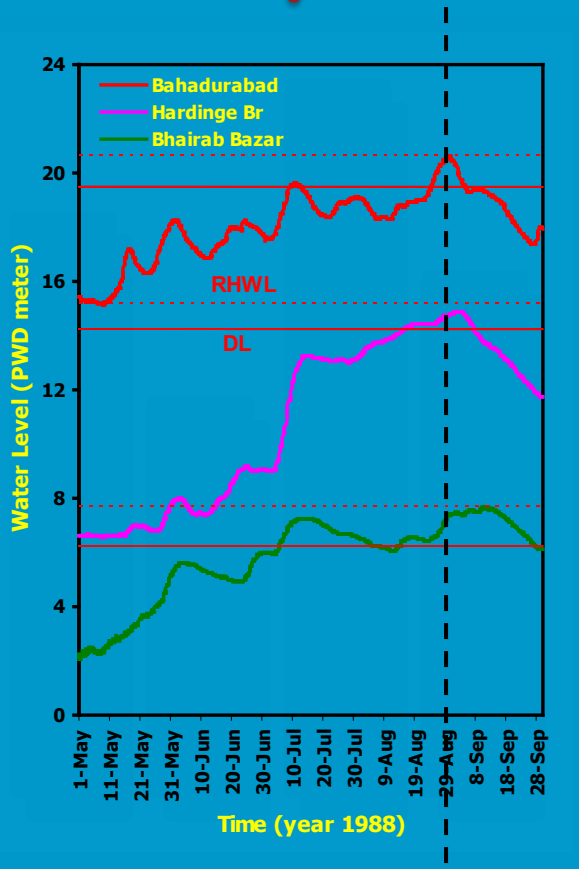


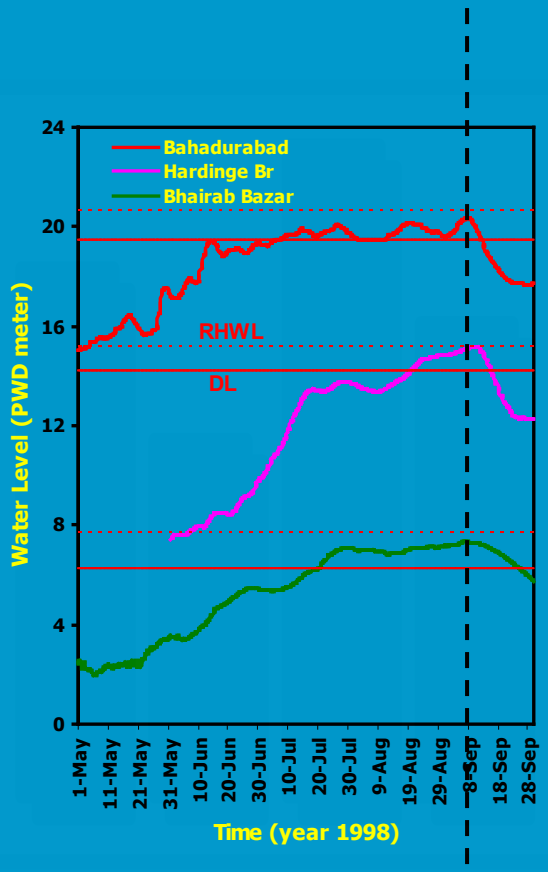
- About 50% of the country is within 6-7 m of MSL.
- About 68% of the country is vulnerable to flood.
- 25 to 30% of the area is inundated during normal flood

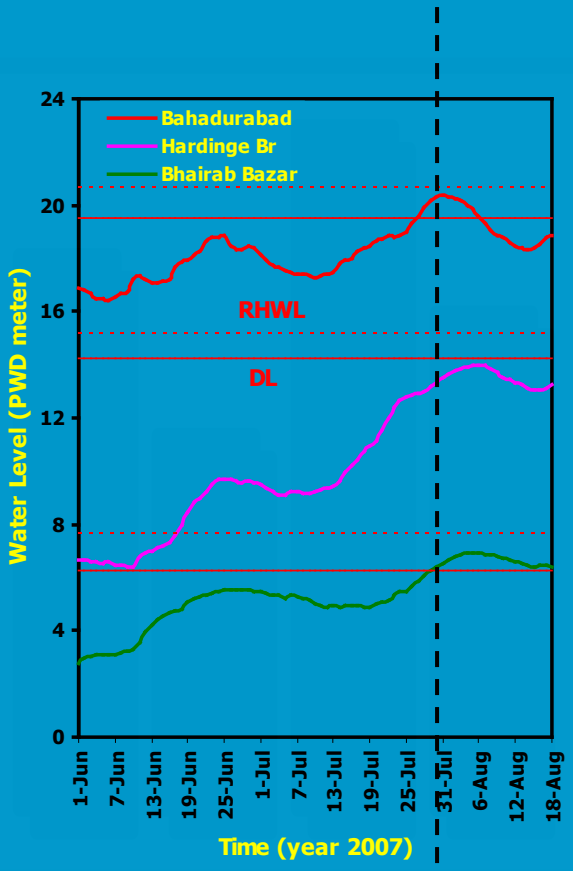
Flooded Area from 1954 to 2007



Synchronization of flood-peaks

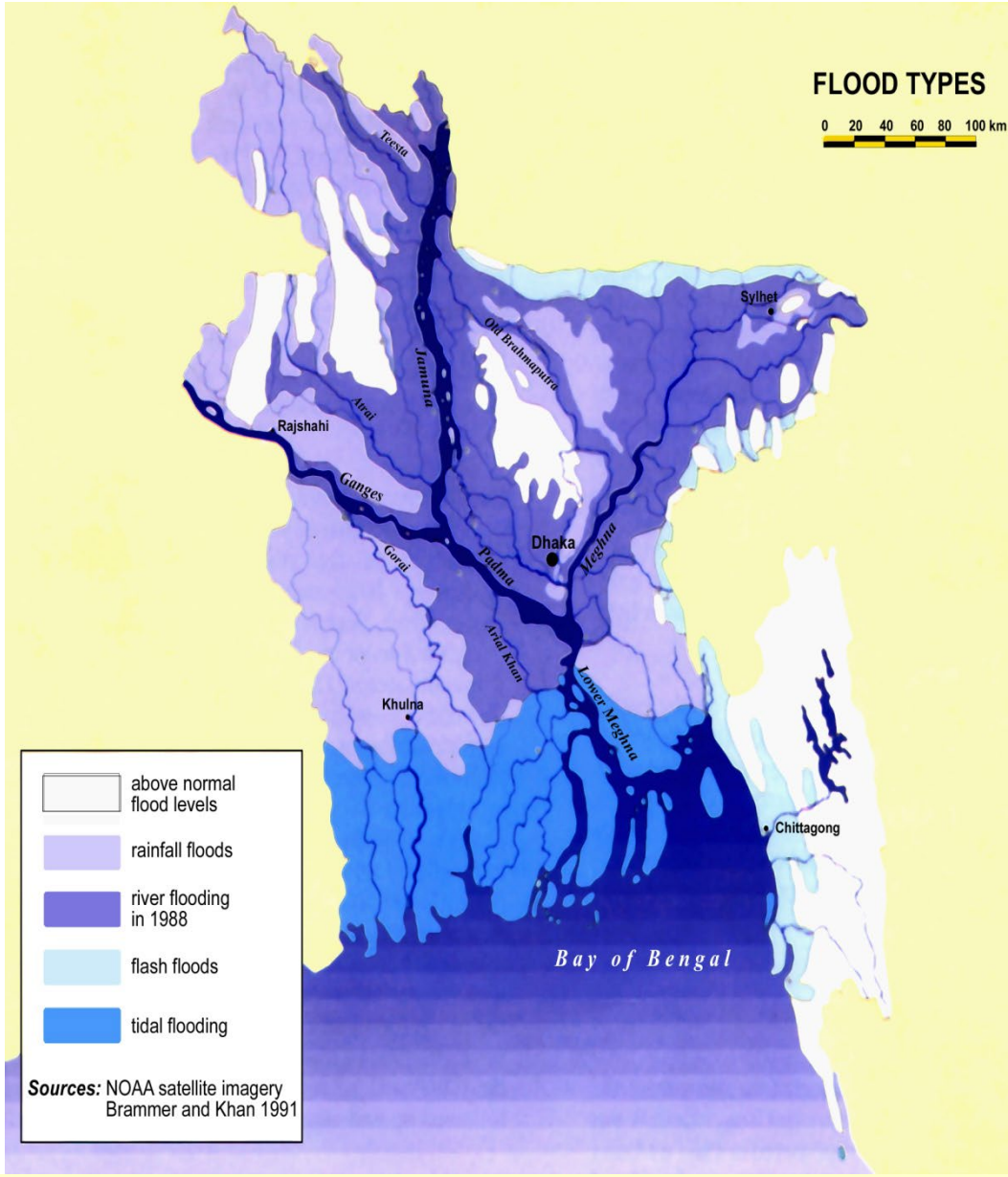






Types of flood

- River/monsoon Flood
- Flash Flood
- Rain-fed flood
- Flood due to Storm Surges



Flood types in Bangladesh

Effects of Floods

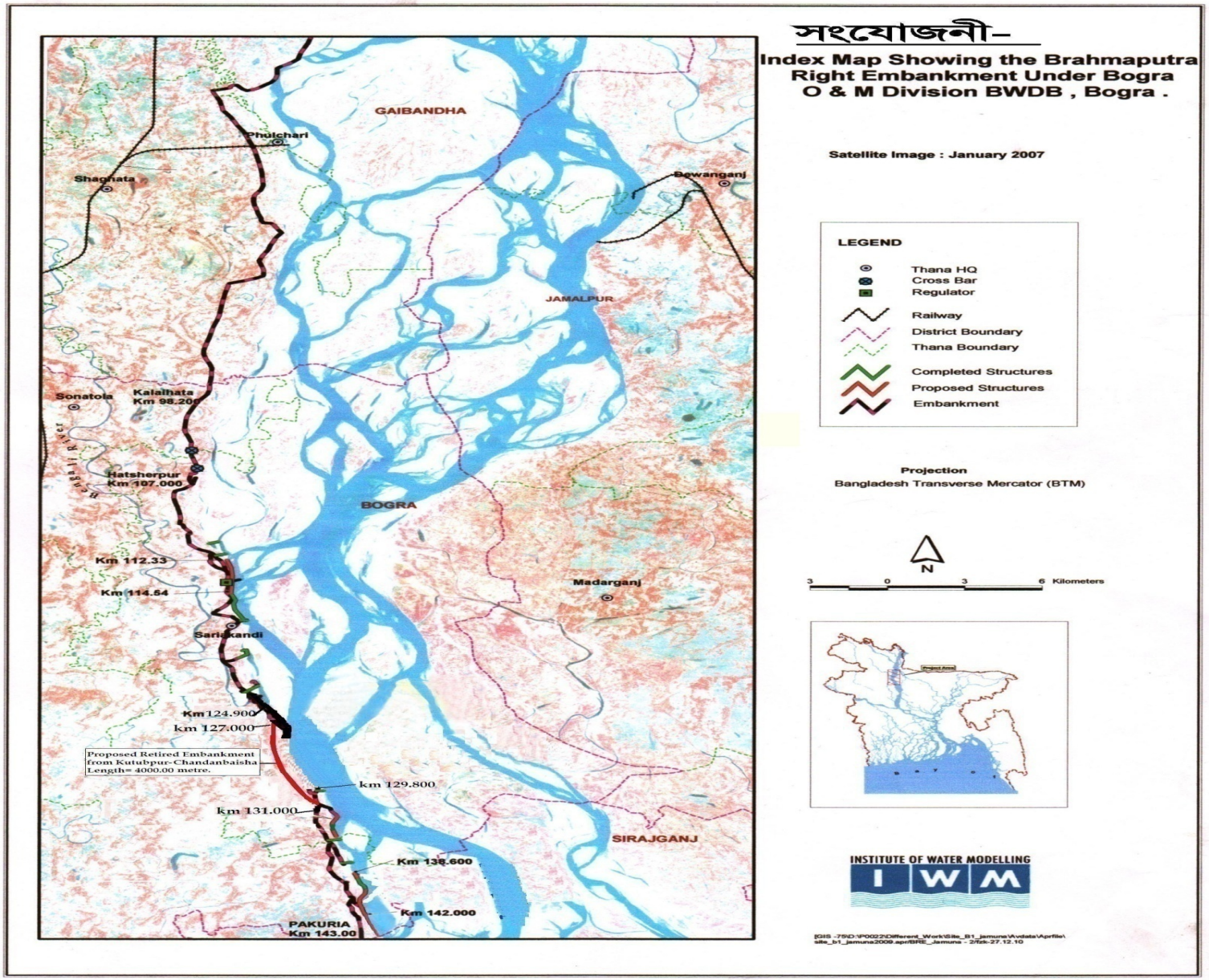
Negative or adverse effects

- Dislocation of normal life and communication system;
- Damage to the habitat, physical infrastructure and properties;
- Erosion of river banks to accommodate larger flow volume;
- Deterioration of environment due to water logging;
- Increase of different water borne diseases;
- Deterioration of sanitation; etc.

Positive contributions

- Land building in the flood plains due to siltation;
- Natural fertilization of the flood plain lands;
- Increased recharge of the Groundwater;
- Availability of abundant soil moisture during post flood period;
- Increase in production of fish, etc.

Study Area


সংযোজনী–
Index Map Showing the Brahmaputra Right Embankment Under Bogra O & M Division BWDB , Bogra .
Satellite Image : January 2007
GAIBANDHA
Phulchari
Shaghata
Dewanganj
JAMALPUR
Sonatola
Kalaihata
Km 98.20
Hatsherpur
Km 107.000
BOGRA
Km 112.33
Km 114.64
Madarganj
Sariakandi
Km 124.900
km 127.000
Proposed Retired Embankment from Kutubpur-Chandanbaisha Length= 4000.00 metre.
km 129.800
km 131.000
SIRAJGANJ
Km 138.600
Km 142.000
PAKURIA
Km 143.00
LEGEND
Thana HQ
Cross Bar
Regulator
Railway
District Boundary
Thana Boundary
Completed Structures
Proposed Structures
Embankment
Projection
Bangladesh Transverse Mercator (BTM)
N
3 0 3 6 Kilometers
INSTITUTE OF WATER MODELLING
I W M

Data Collection and Analysis

- Water level data for different flooding years from the Sariakandi Gauge Station at Jamuna River.
- SWAT analysis of Water Level data .

Flood' 2012 at Bogra District in mighty Brahmaputra River

- Mainly eastern part of the district was affected by the flood, 2012.
- Due to breaching of embankment (BRE) by severe river erosion
- Two flood picks occurred (1st one end of the June and 2nd one first week of October)
- WL was 88 cm and 83 cm above DL
- Damaged massive amount of crops, human properties, infrastructures, embankment, fisheries, school-college, village market
- Late flood makes 1000 people to homeless

Flood' 2012 at Bogra District Cont…

- Most of the people sheltered to the top of embankment to protect from severe flood.
- Cattle also suffered due to shortage of food and safe place.
- Students experienced a huge problem after damaging School, College, Madrasa.
- People affected by the different water related diseases.
- Huge amount of Aman rice on both areas i.e. project area and char area was totally damaged due to late flood for climate change effects.

Images on Flood' 2012

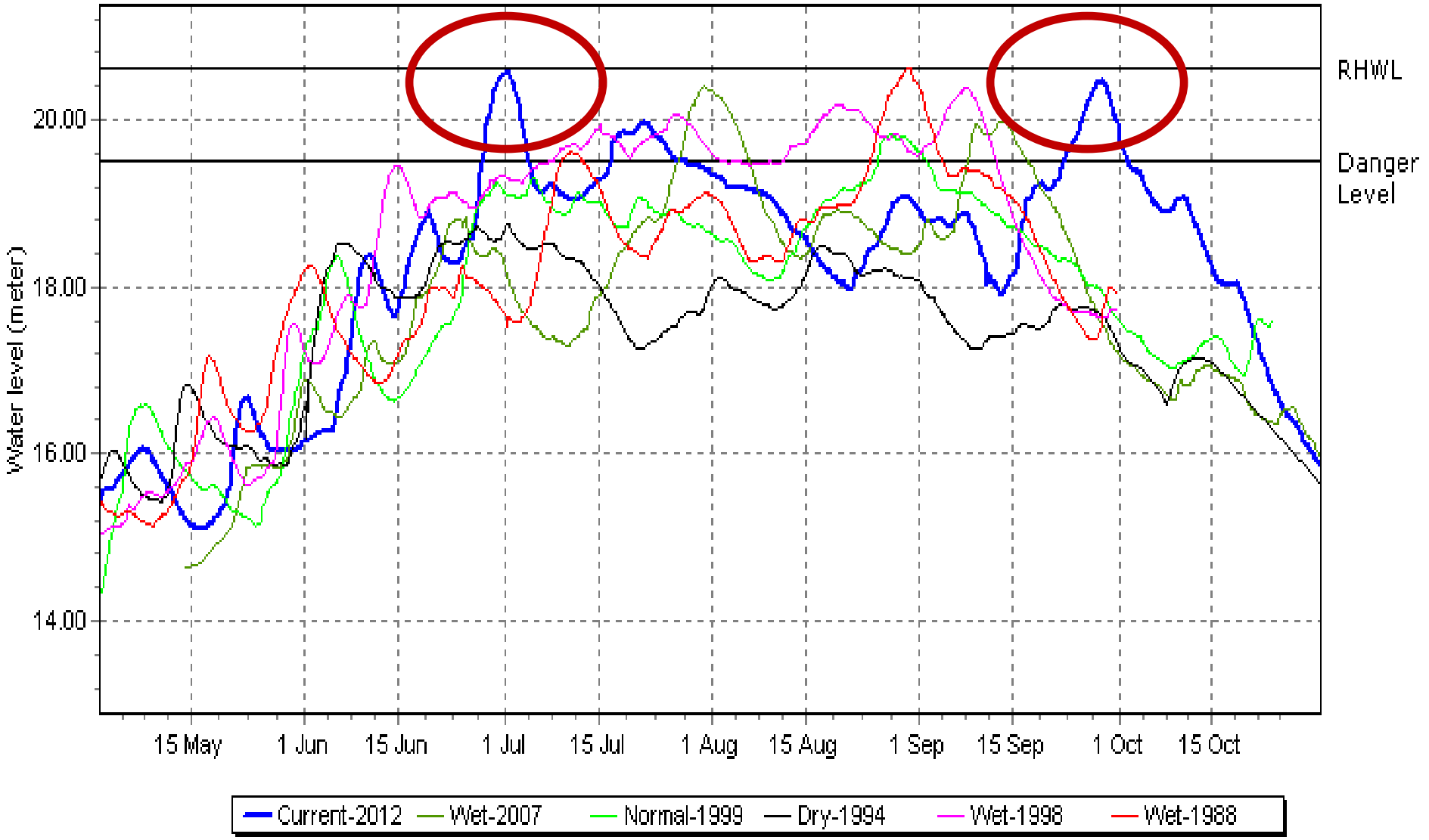
Climate Change Impact on Flooding' 2012

- Mighty river is carrying about 93% water from outside of Bangladesh.
- Normally the flood period of this river between mid of July to mid of September (1988, 1998 etc).
- Due to the effects of climate change, in 2012, first flood pick occurred at the end of June and second pick occurred first week of October.
- Flood period in Brahmaputra-Jamuna River has been shifted due to the climate change effect which is very dangerous for crops and human properties.

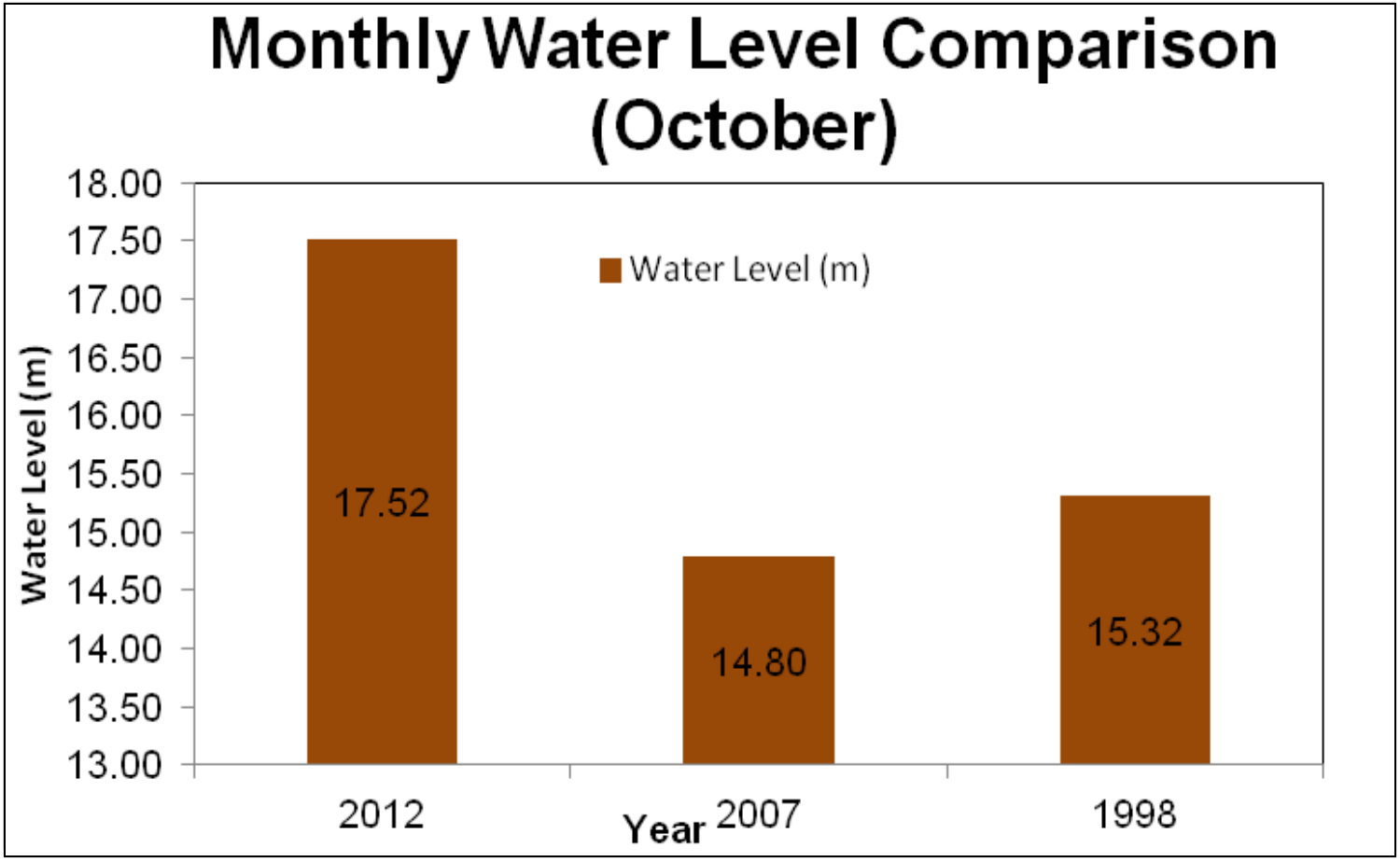
Climate Change Impact on Flooding' 2012

- It is increasing of flooding in both terms i.e. magnitude and frequency
- reducing the conveyance capacity of major river systems
- increasing sea water level

Climate Change Impact on Flooding' 2012



Water Level Comparisons



Conclusion and Recommendations

- Bangladesh is significantly vulnerable to climate induced hazards like floods.
- In the context of Bangladesh flood cannot be prevented.
- Necessary and useful steps such as bank revetment work, proper re-sectioning of FCE, people awareness, proper integration between structural and non-structural measures need to be taken to save human properties, crops, infrastructures from floods due to climate change effects of mighty Brahmaputra-Jamuna river at Bogra District.
- Need to change the cropping pattern
- Regional co-operation for integrating flood plain management



THANKS FOR PATIENCE HEARING