

NATURAL DISASTERS OF BANGLADESH: MONITORING-MAPPING

South Asia Geospatial Forum

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Geographical Settings of Bangladesh

Water disasters of Bangladesh

- Flood
- River bank erosion
- Cyclonic Storm Surge
- Drought
- Salinity Intrusion

Water Disaster in Bangladesh

➤ **Floods**



➤ **Droughts**



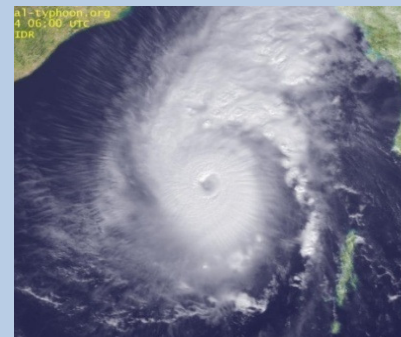
➤ **Riverbank Erosion**



➤ **Salinity intrusion**

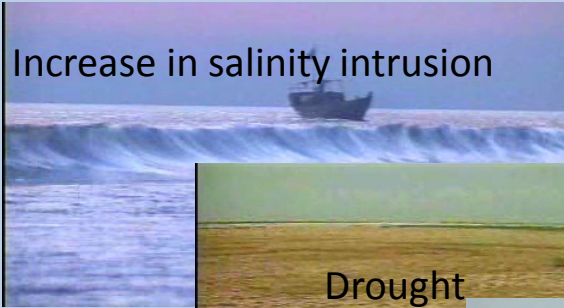


➤ **Cyclone and storm surge**



Challenges due to Climate Change

Increase in salinity intrusion

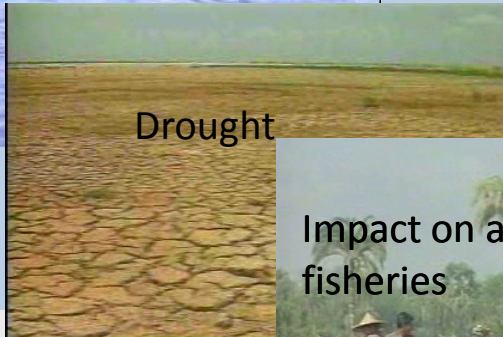


Sea level rise

Increase in evaporation

Decrease in precipitation in dry season

Drought



Impact on agriculture & fisheries



Increase in precipitation in monsoon

Prolonged & shifting monsoon

Bank erosion



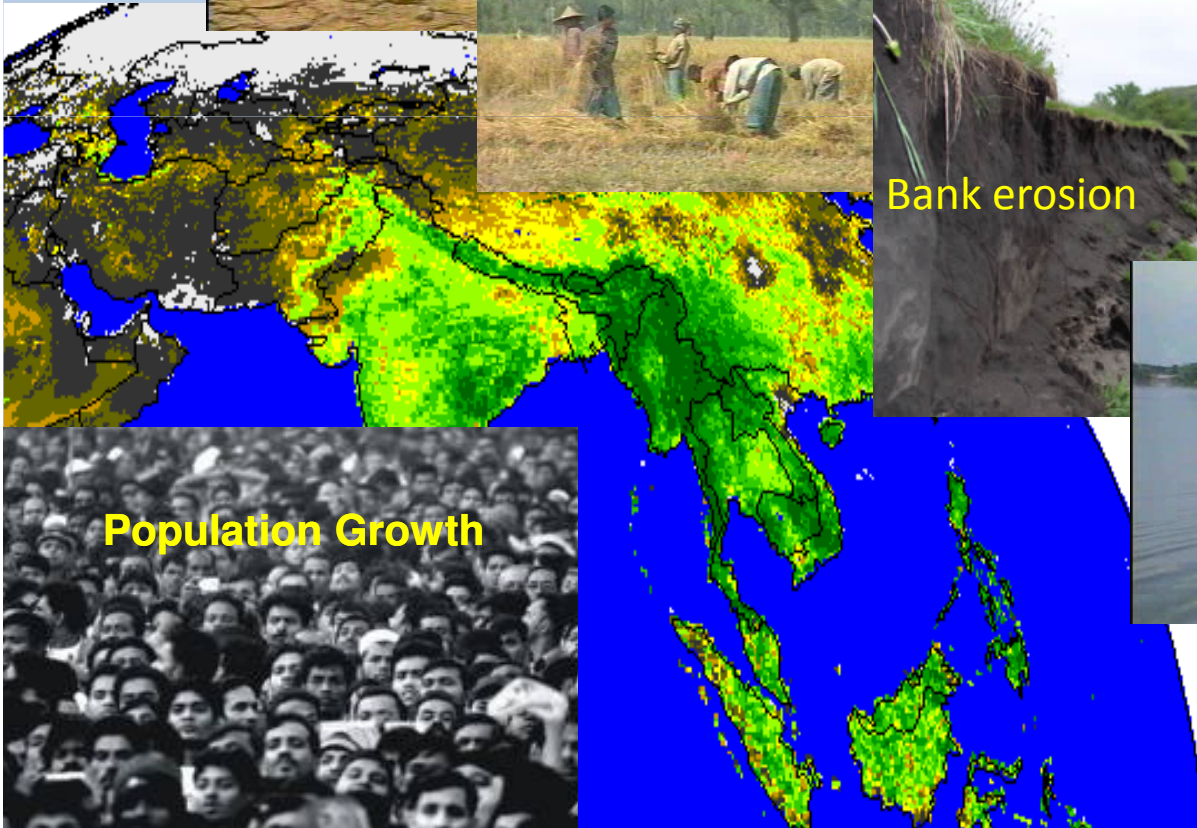
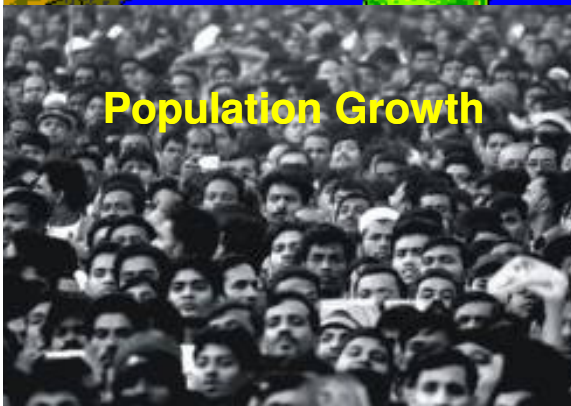
Flood



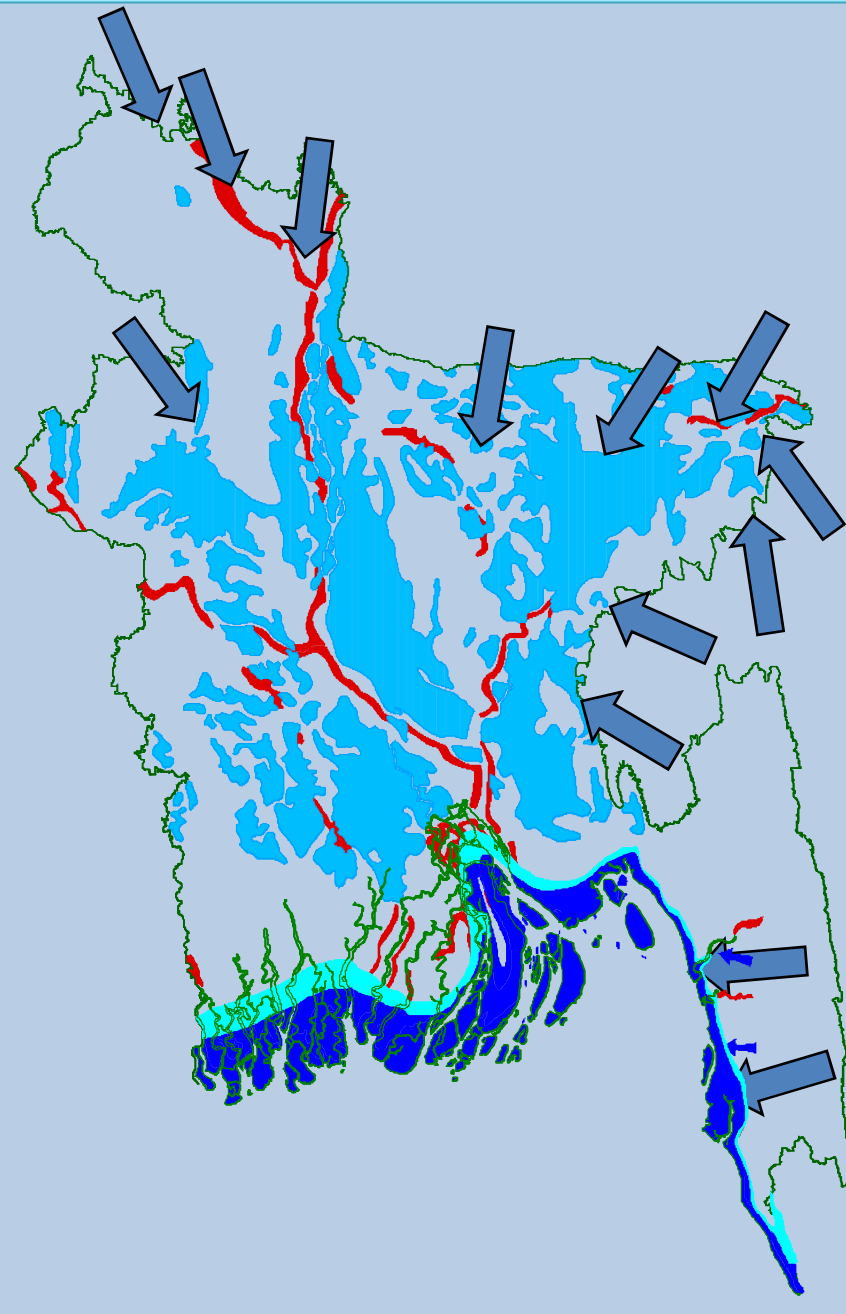
Cyclone



Population Growth



Water Hazard Distributions in Bangladesh



Flood

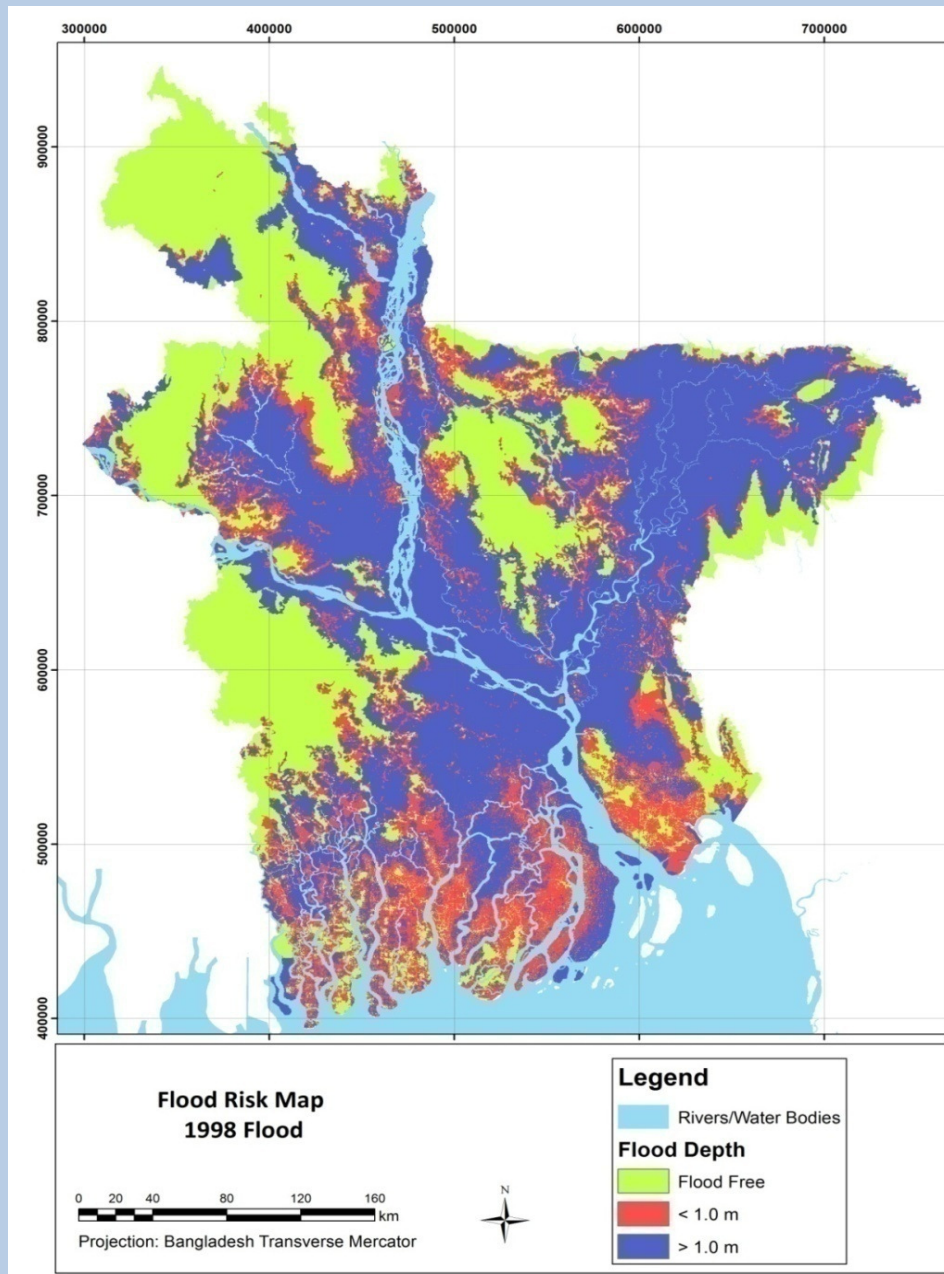
River Bank Erosion

Flash Flood

**Storm Surges/Tidal
Flooding**

(Source: IWM)

Inundation Map of Flood of 1998



Preparation of Flood Inundation Map

Inundation Maps for 25, 50, 100 and 500 year return period

Selection of design year for 25, 50, 100 and 500 return period

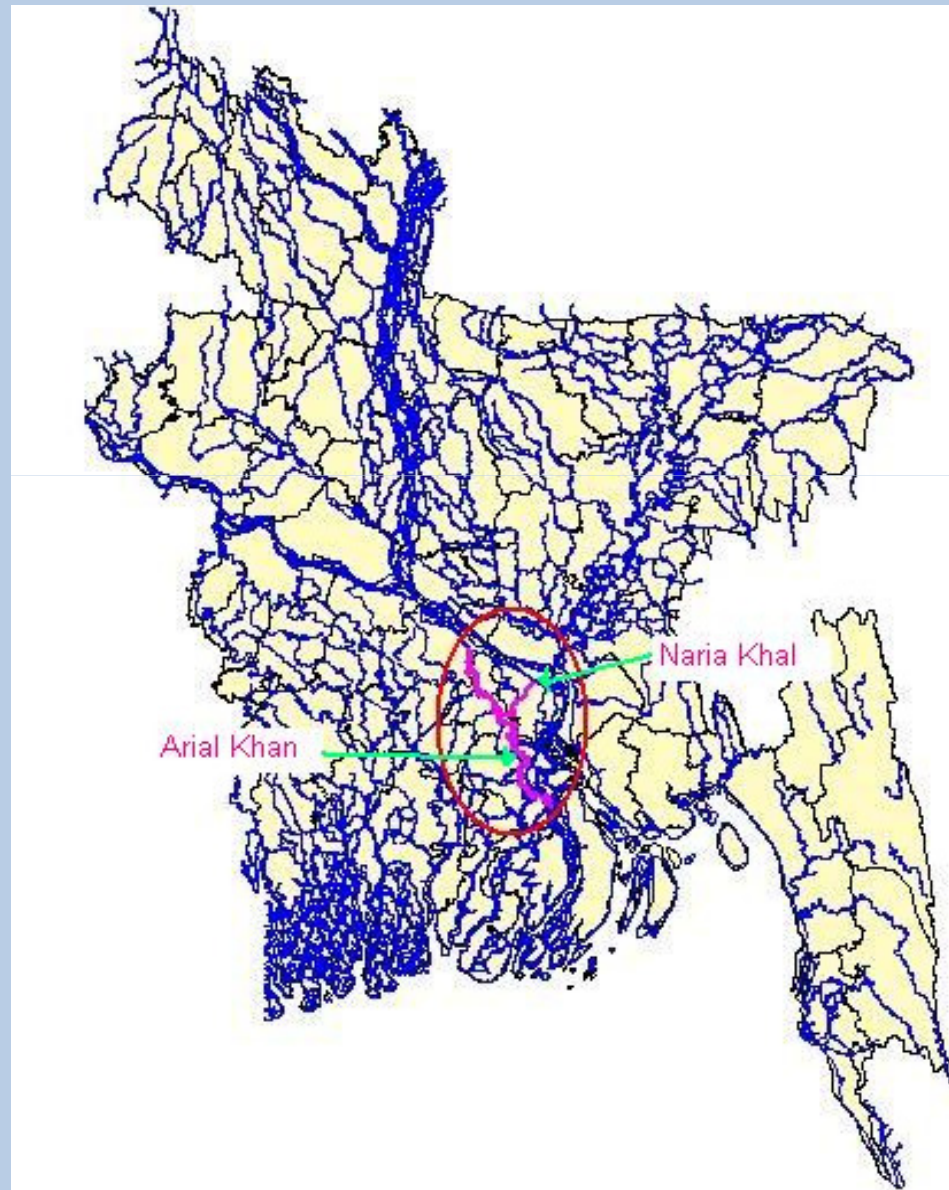


Simulation of models for selected design year

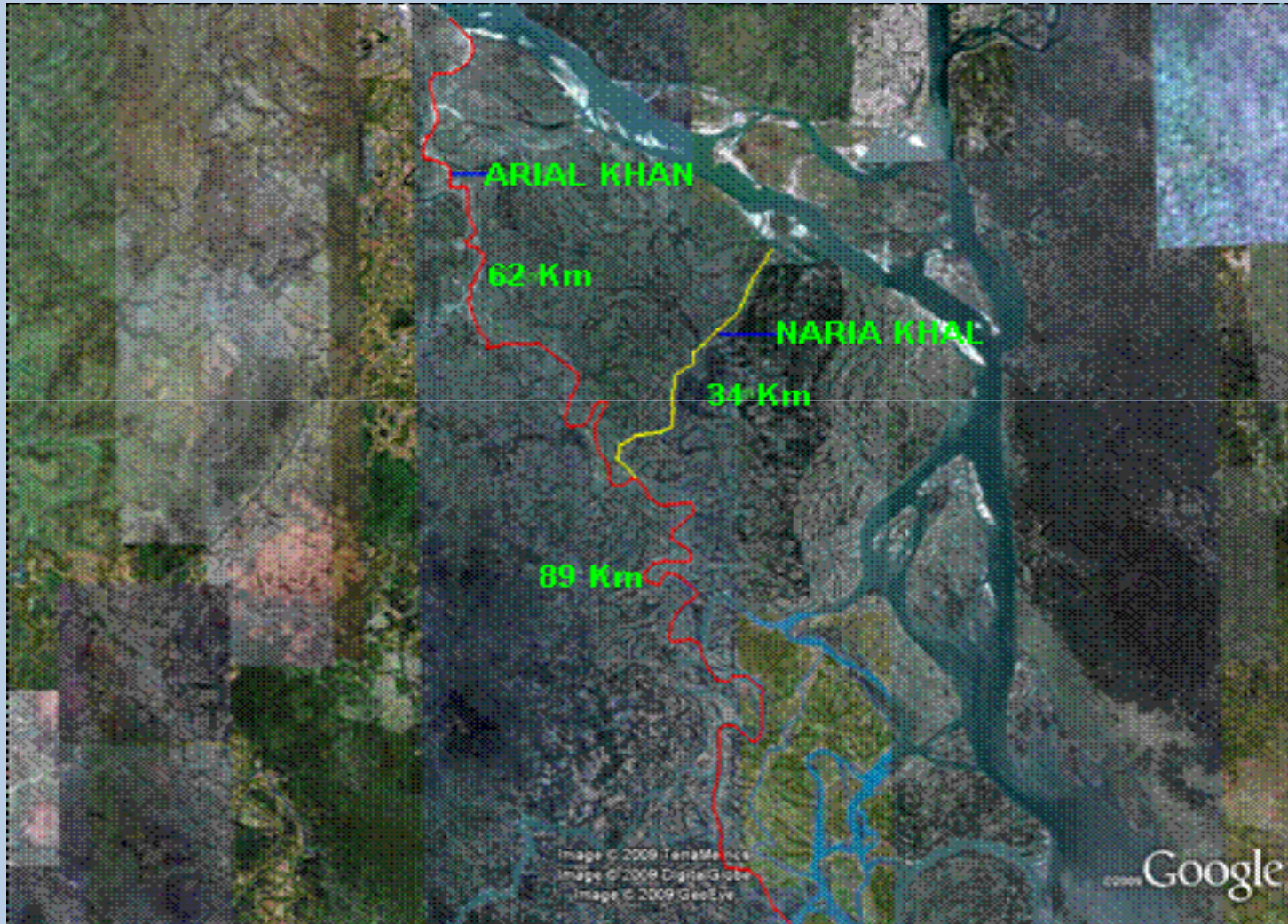


Inundation maps using the simulation results file and ARC GIS

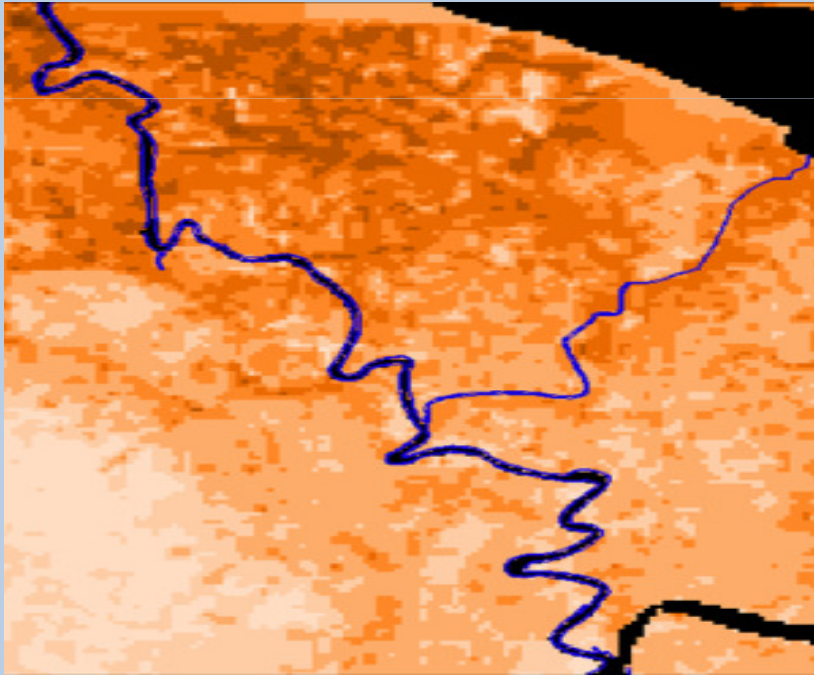
Example: Flood plain inundation map for Arial Khan-Naria Khal



Google Earth map of Aria Khan-Naria Khal

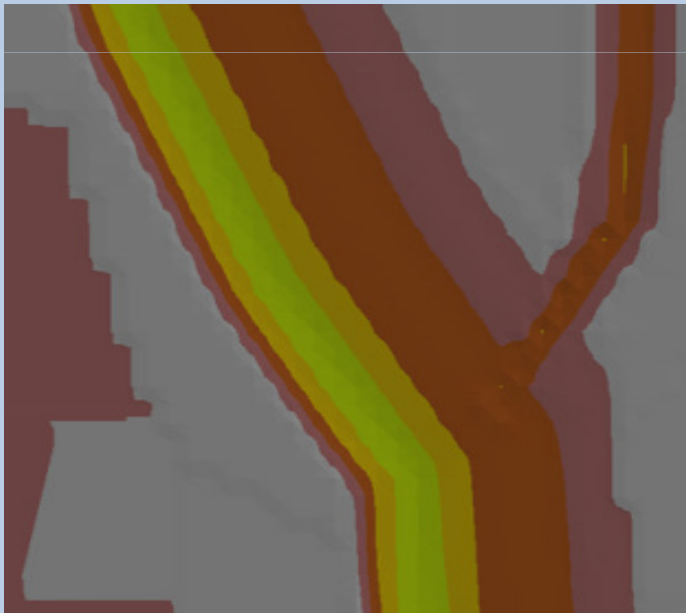


River Streams-DEM (Left); Extracted bathymetry Grid-Naria Khal (Right)

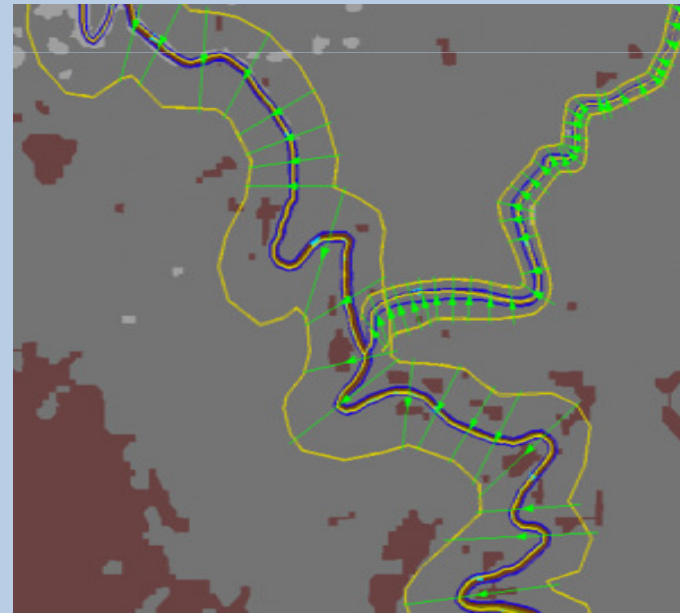


Tools: HECRAS, HEC-GeoRAS, ArcView GIS and ArcGIS

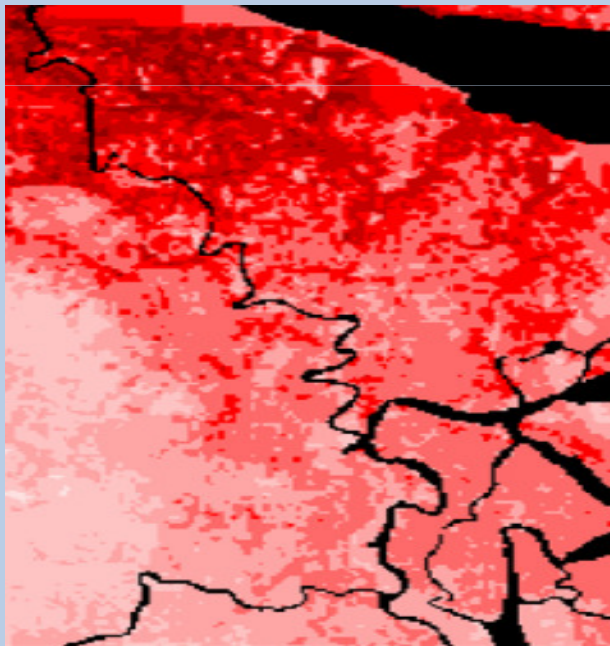
Zoom of TIN-Arial Khan- Naria Khal Confluence



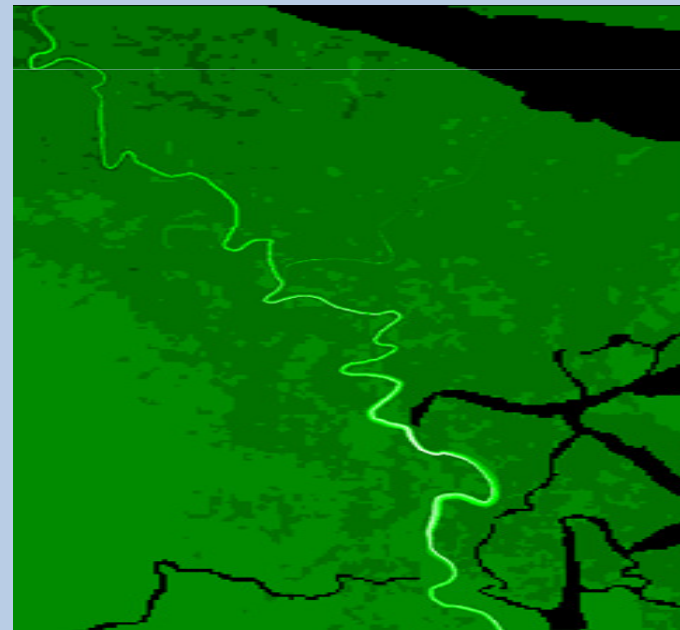
Geometric Data extraction of Flood plain from TIN



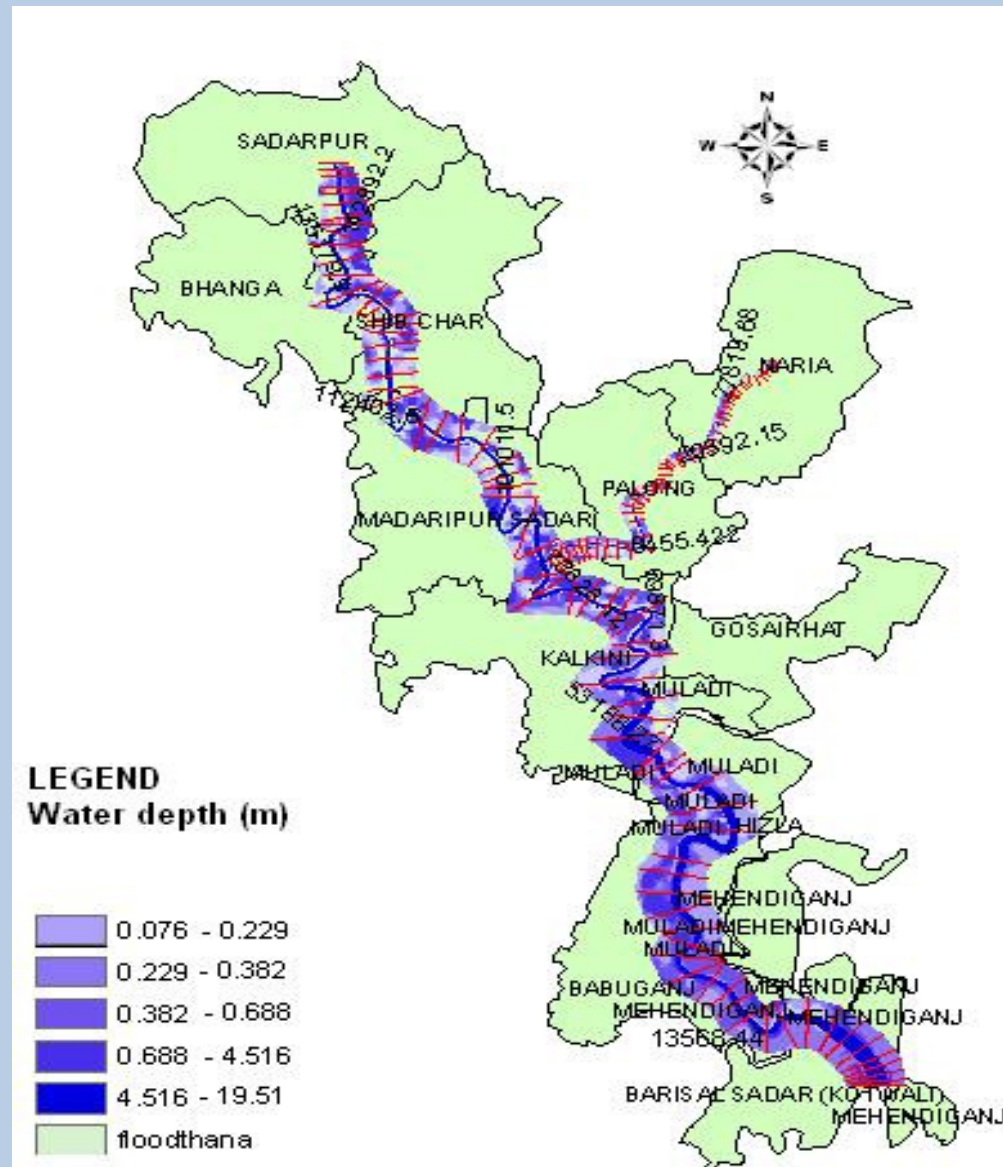
**DEM without
bathymetry data**



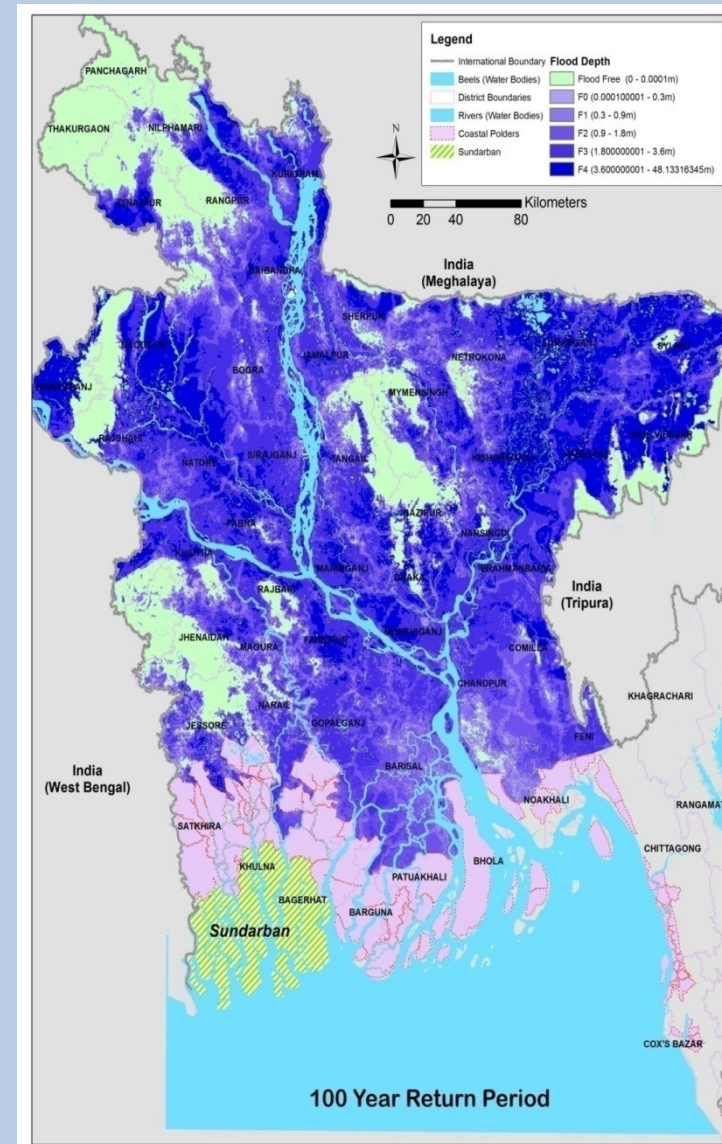
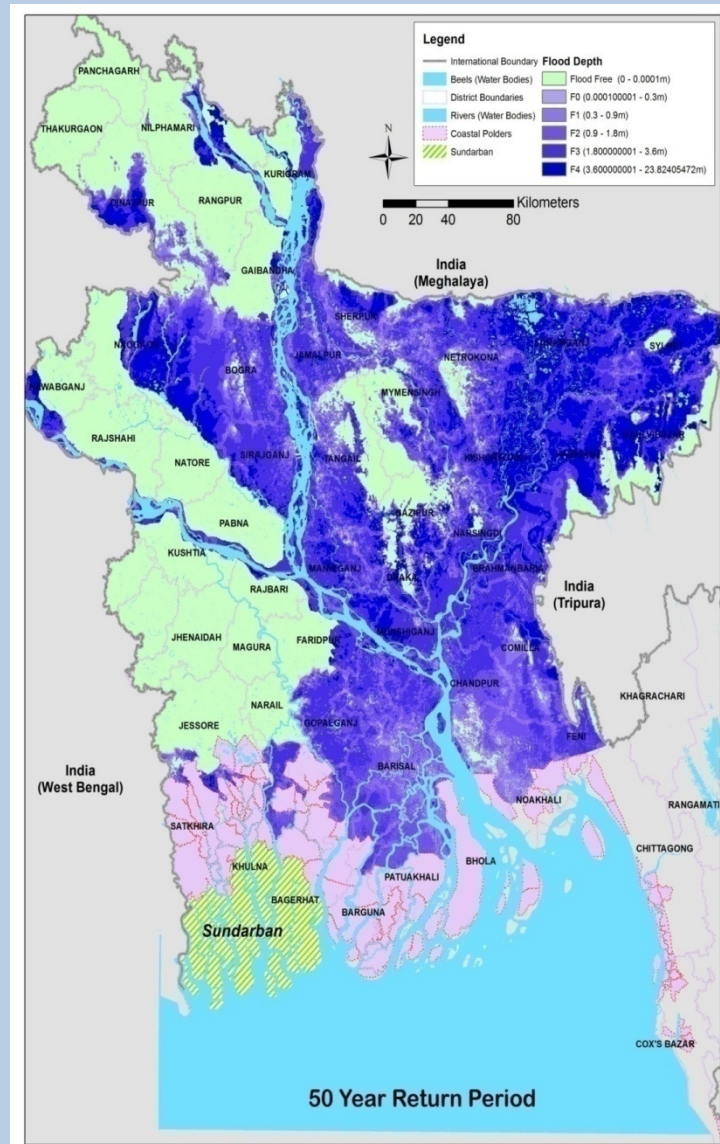
**DEM with
Bathymetry data**



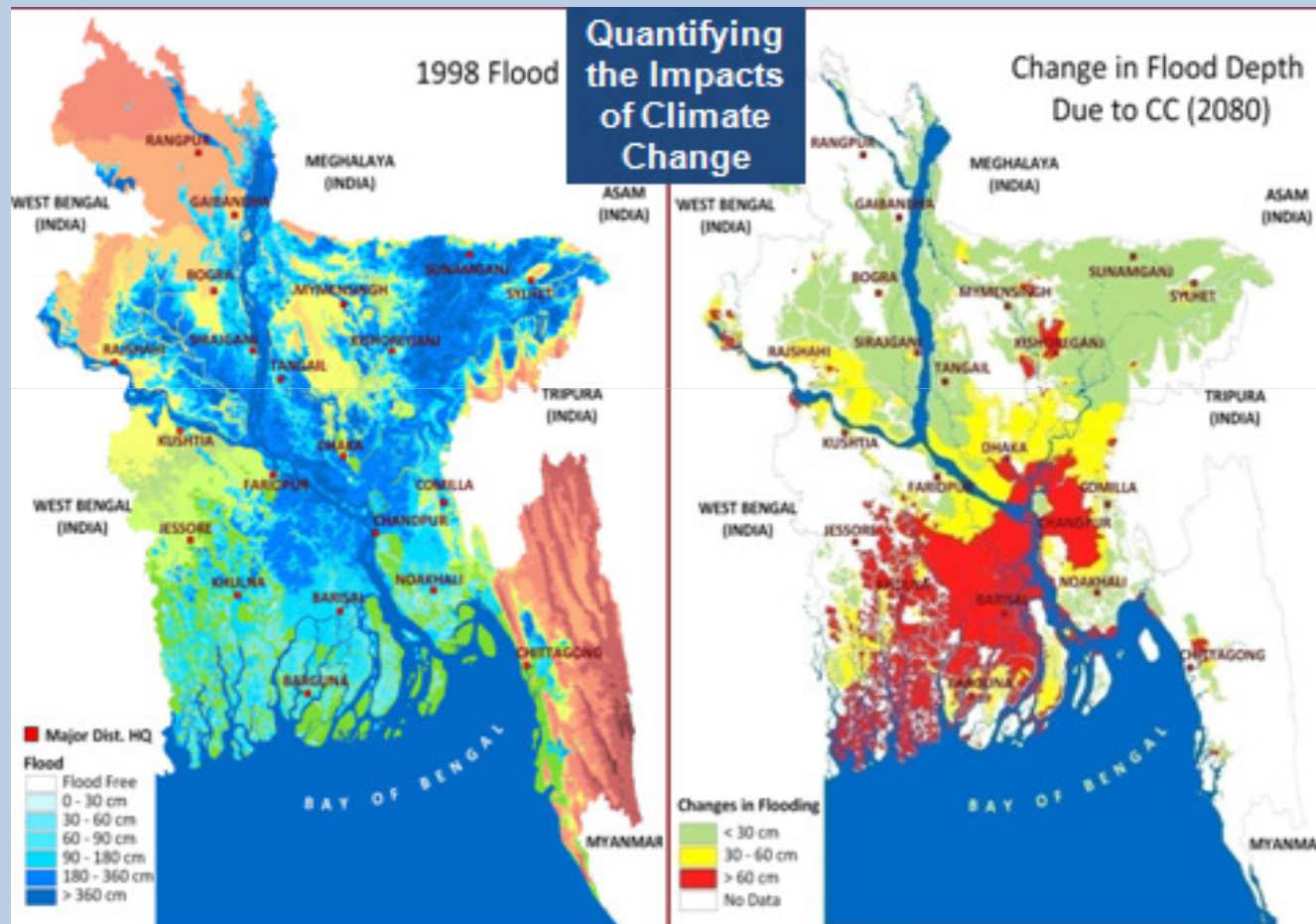
Flood Plain Map of Arial Khan-Naria Khal



Flood Hazard (50 and 100-yr from recent studies of IWM & DDM)

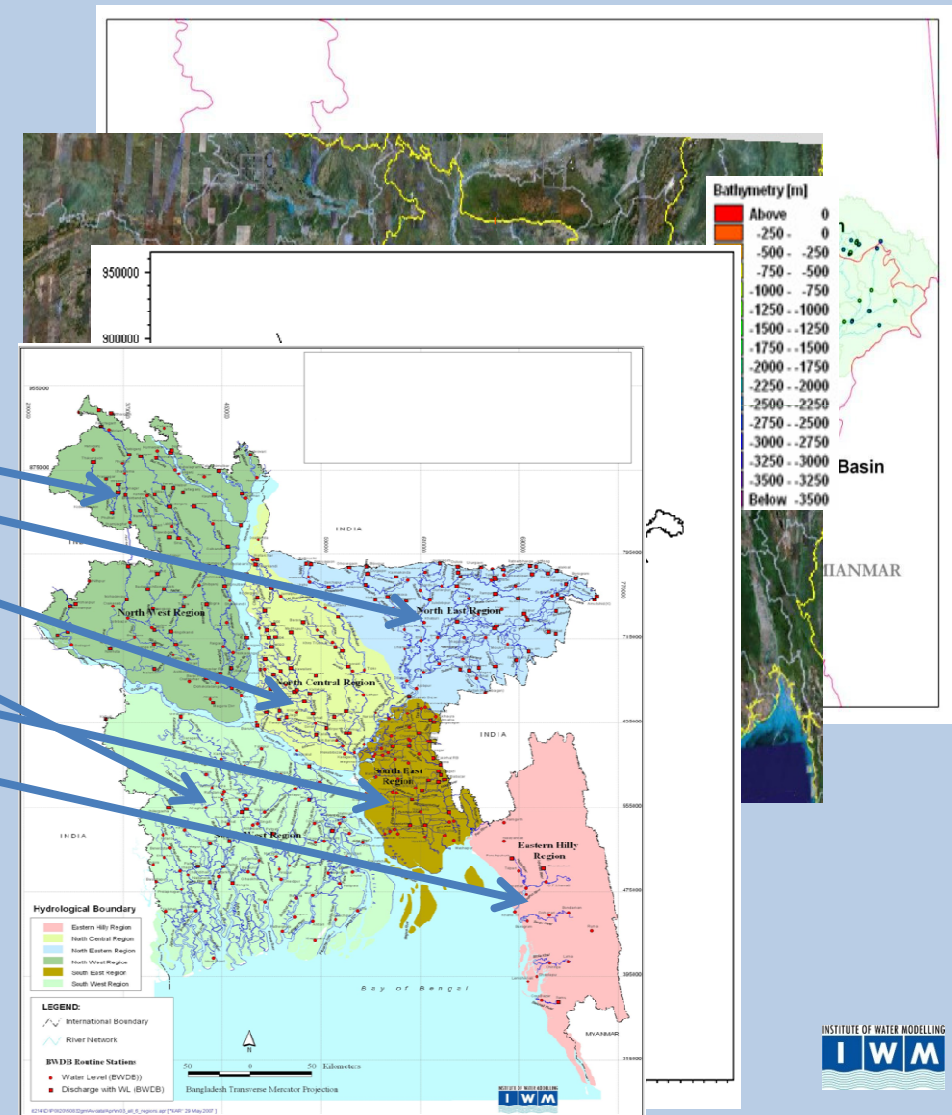


Impact of Climate Change

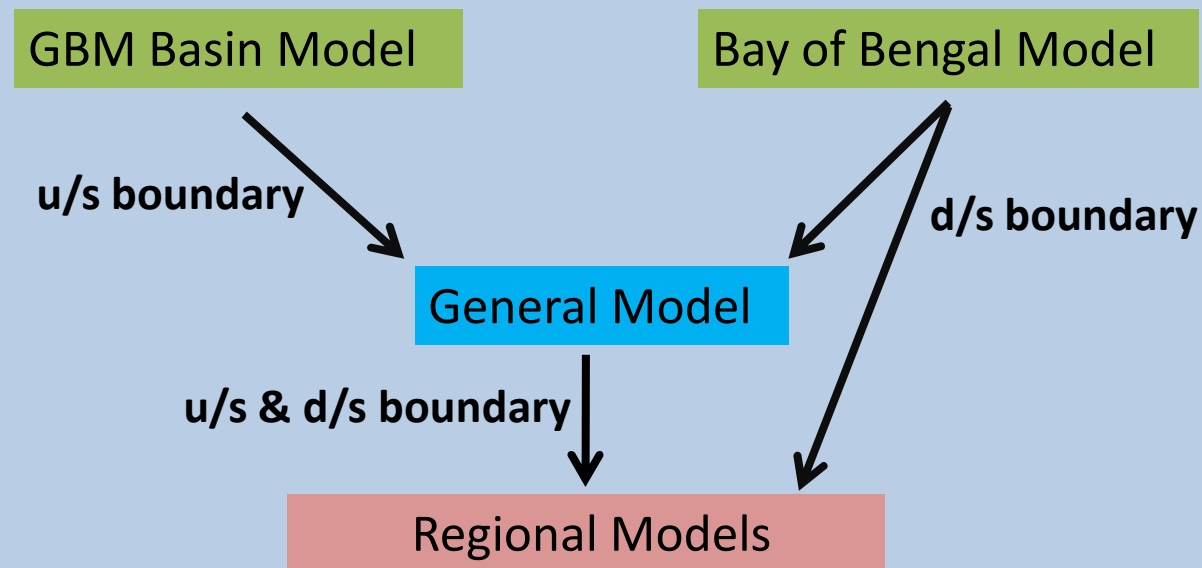


Different Models Used for Flood Map

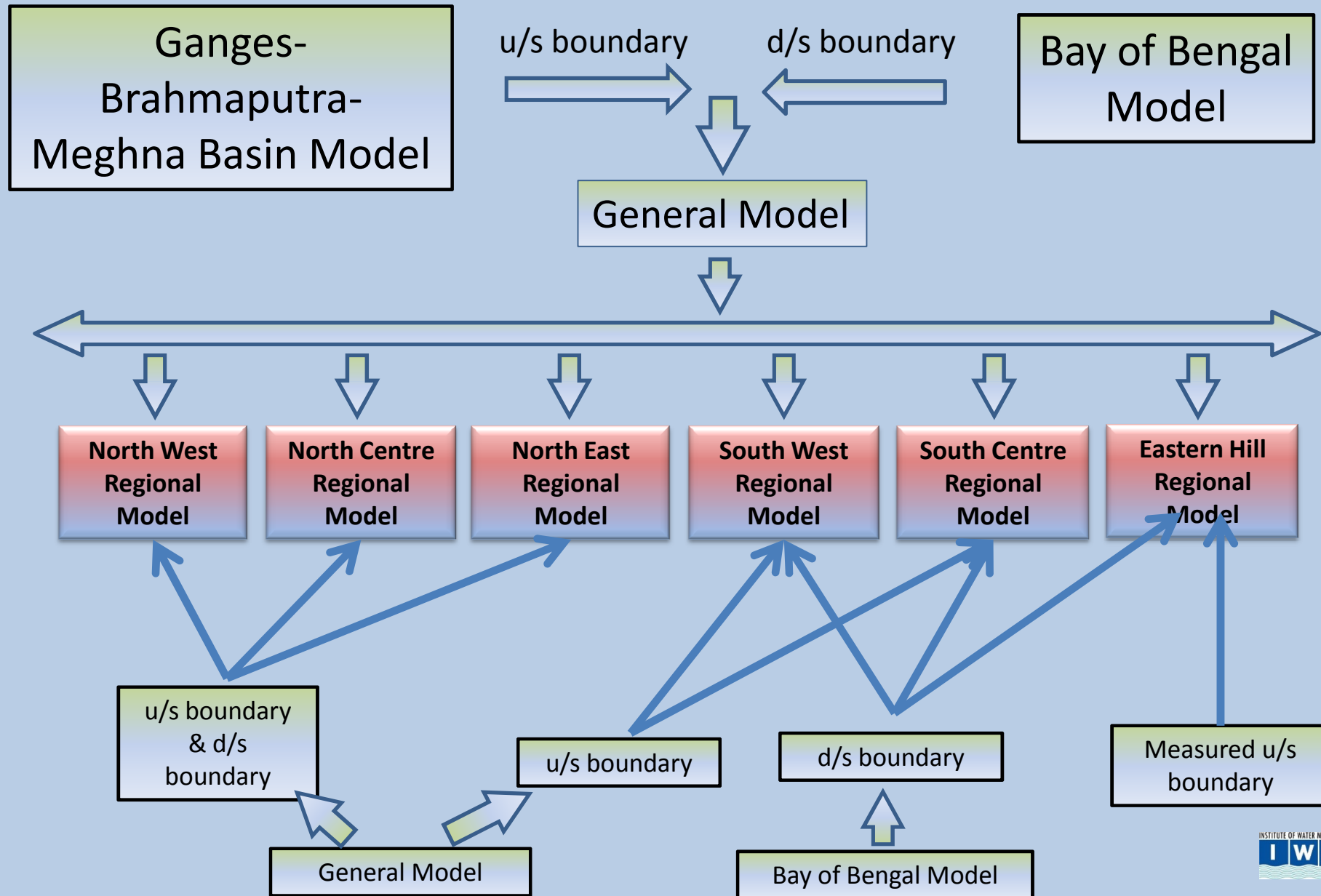
- Ganges, Brahmaputra and Meghna (GBM) Basin Model
- Bay of Bengal Model (BoBM)
- General Model
- Regional Models
 - North west Regional model
 - North east Regional Model
 - North Central Regional Model
 - South West Regional Model
 - South East Regional Model
 - Eastern Hilly Regional



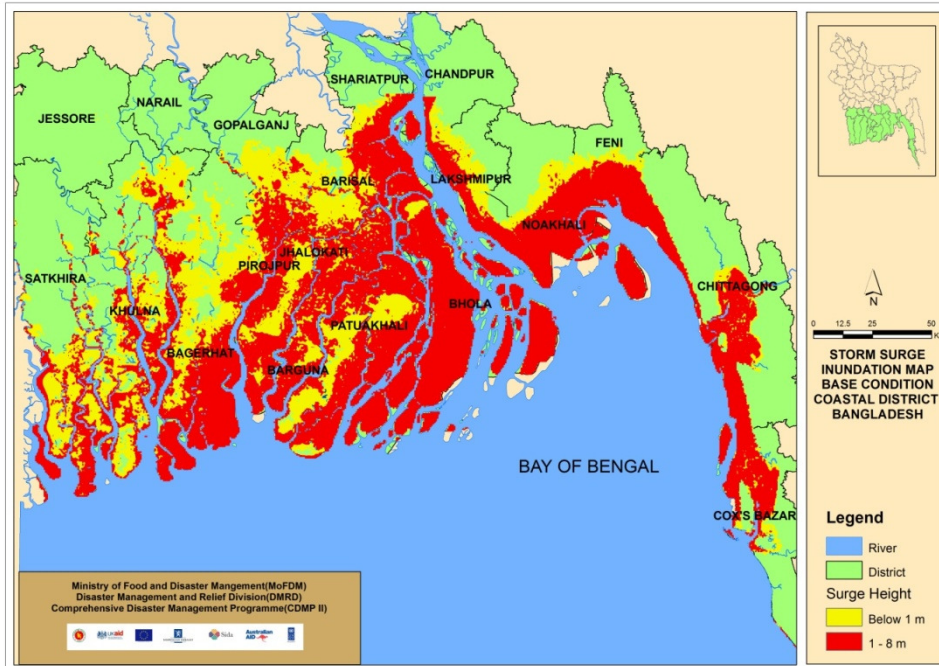
Different Models Used for Flood Map



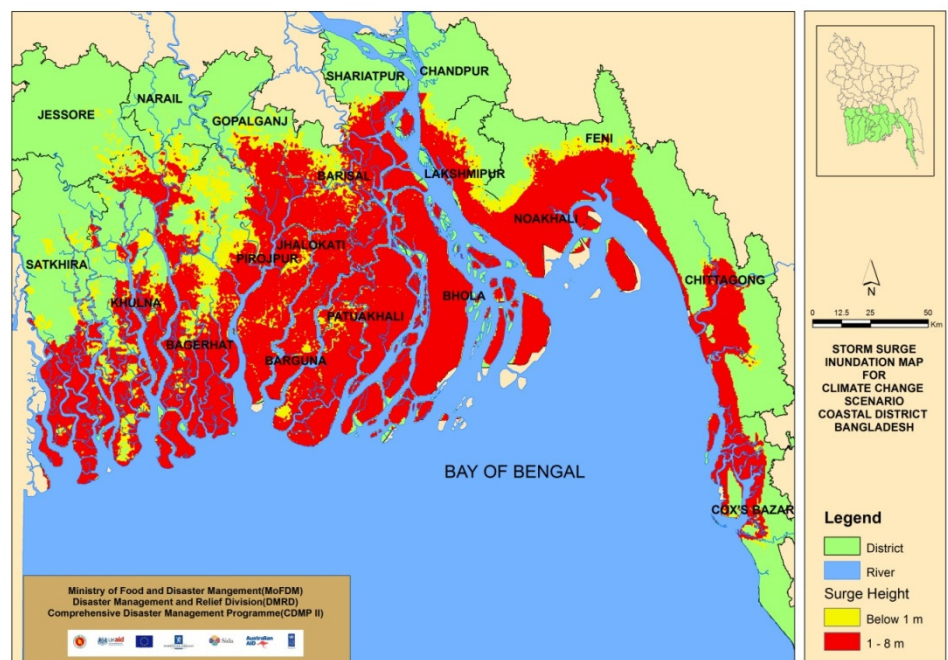
Different Models Used for Flood Map



Coastal Flood Risk Maps



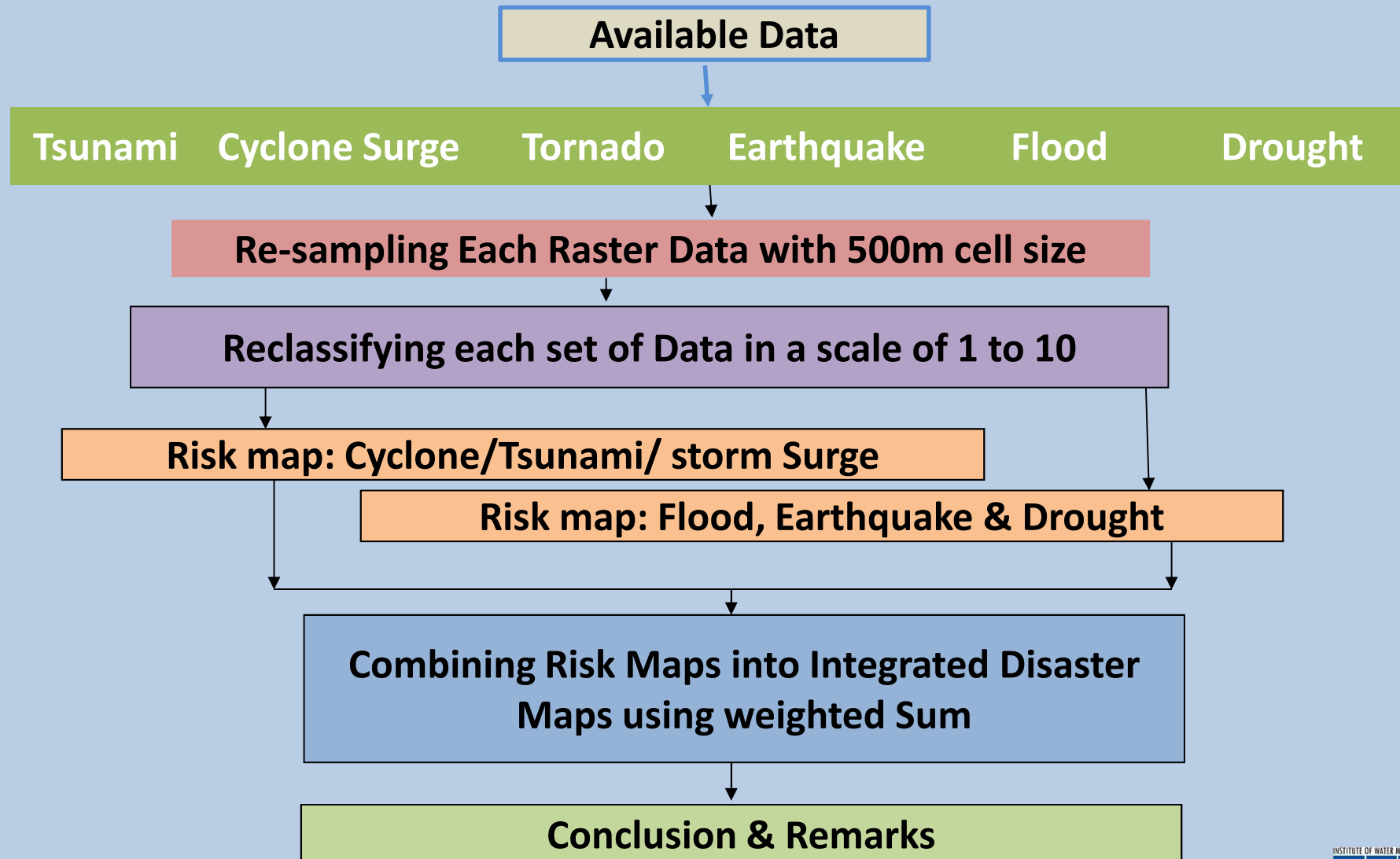
Base Condition



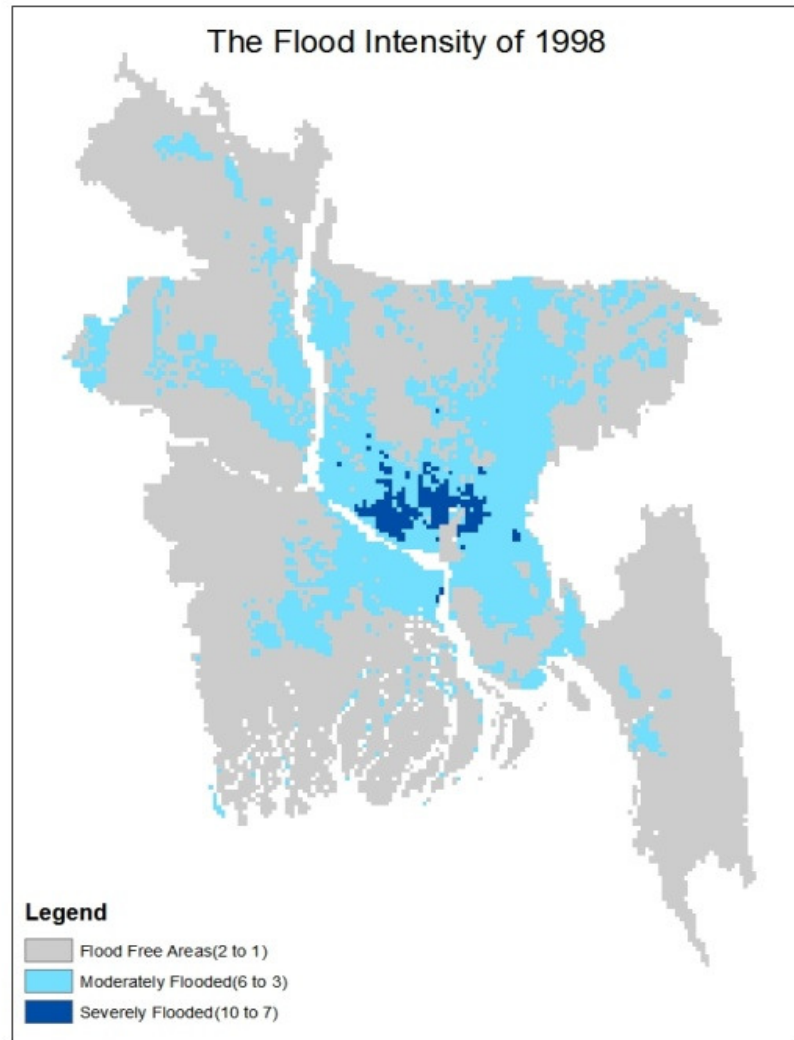
Climate Change Condition

An area of 20,745 km² will be inundated by more than 1m water depth in the changing climate

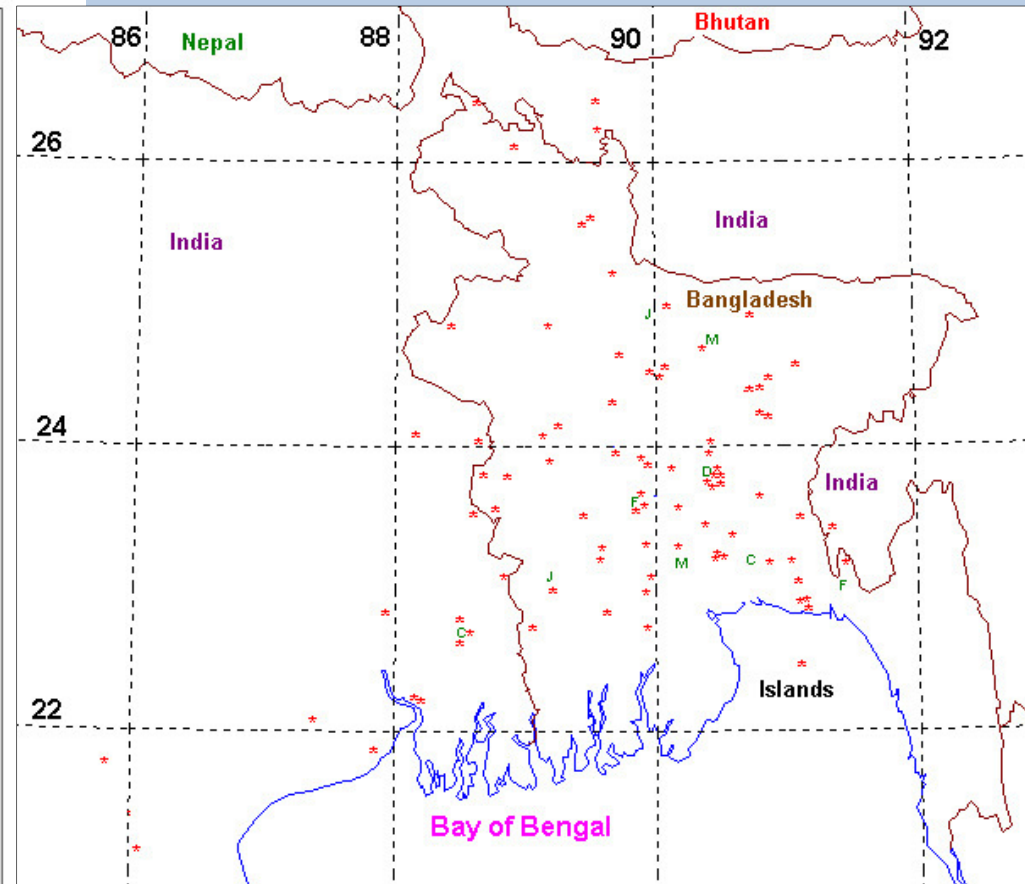
Example: Preparation of Multi-hazard Map



Data: Available Disaster Maps

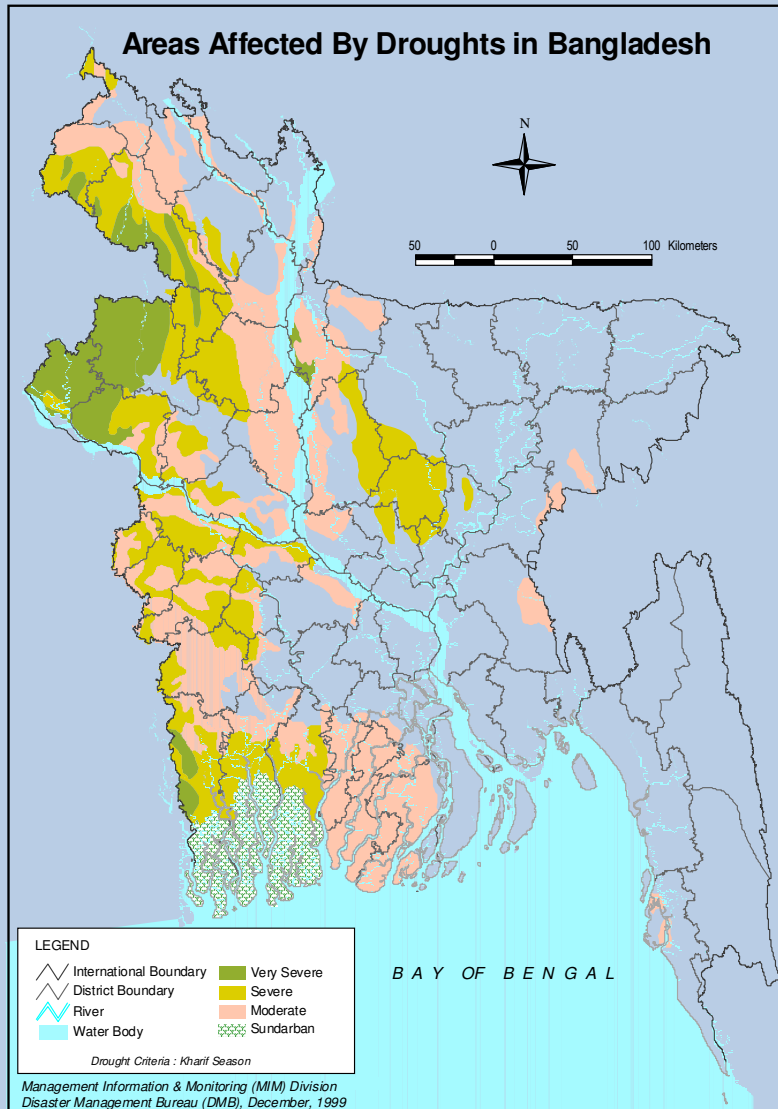


Flood Intensity Bangladesh, 1998

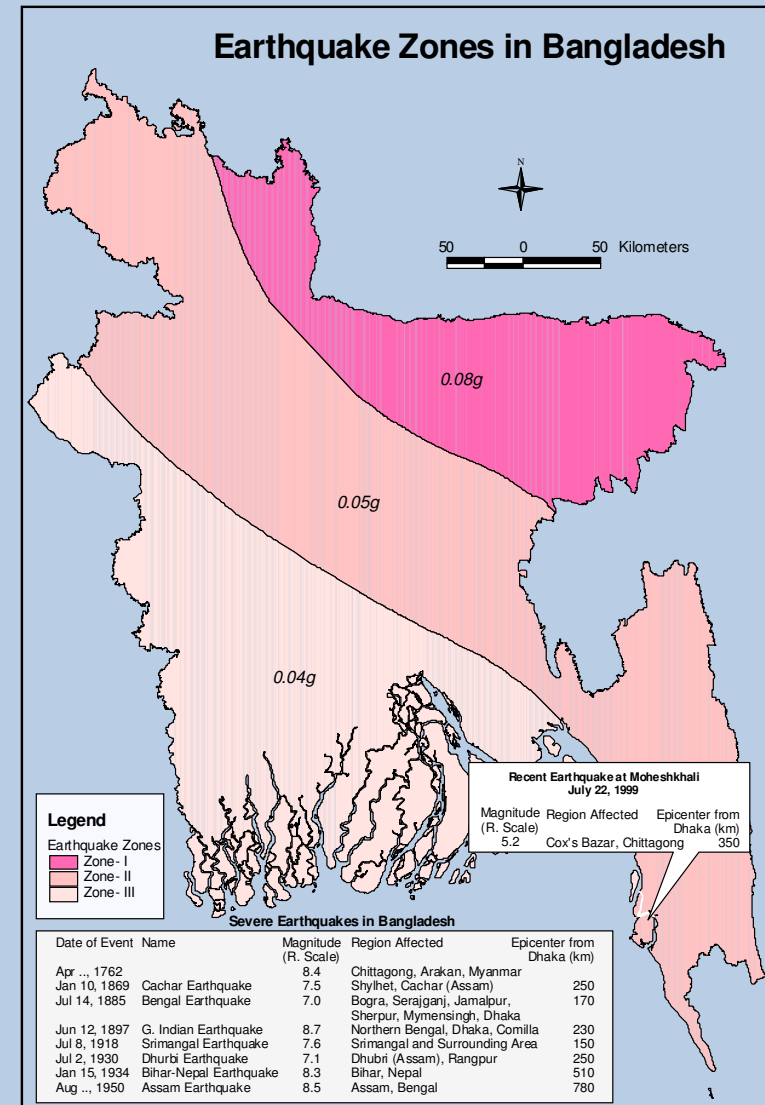


Tornado Intensity of Bangladesh

Data: Available Disaster Maps

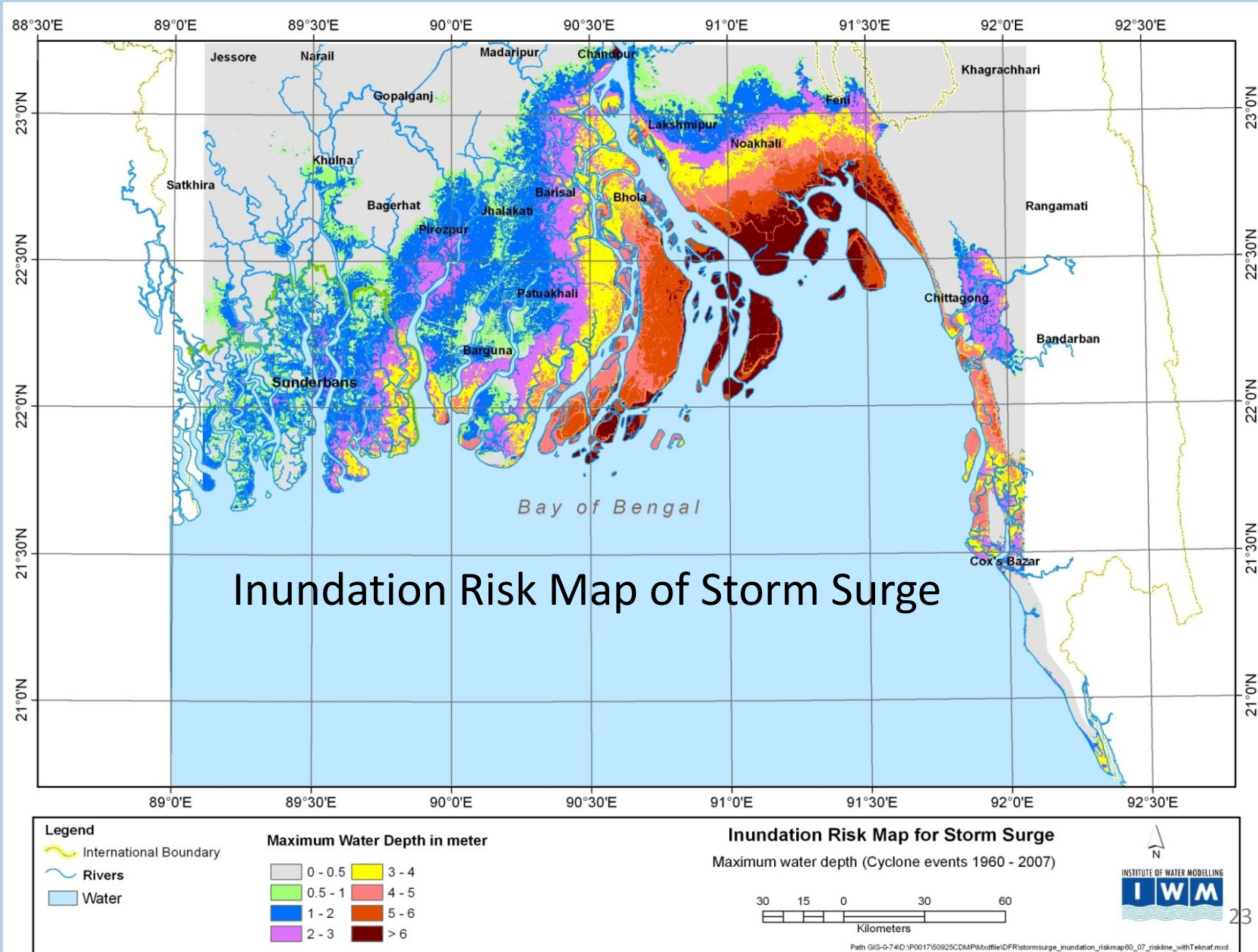


Droughts Effected Areas

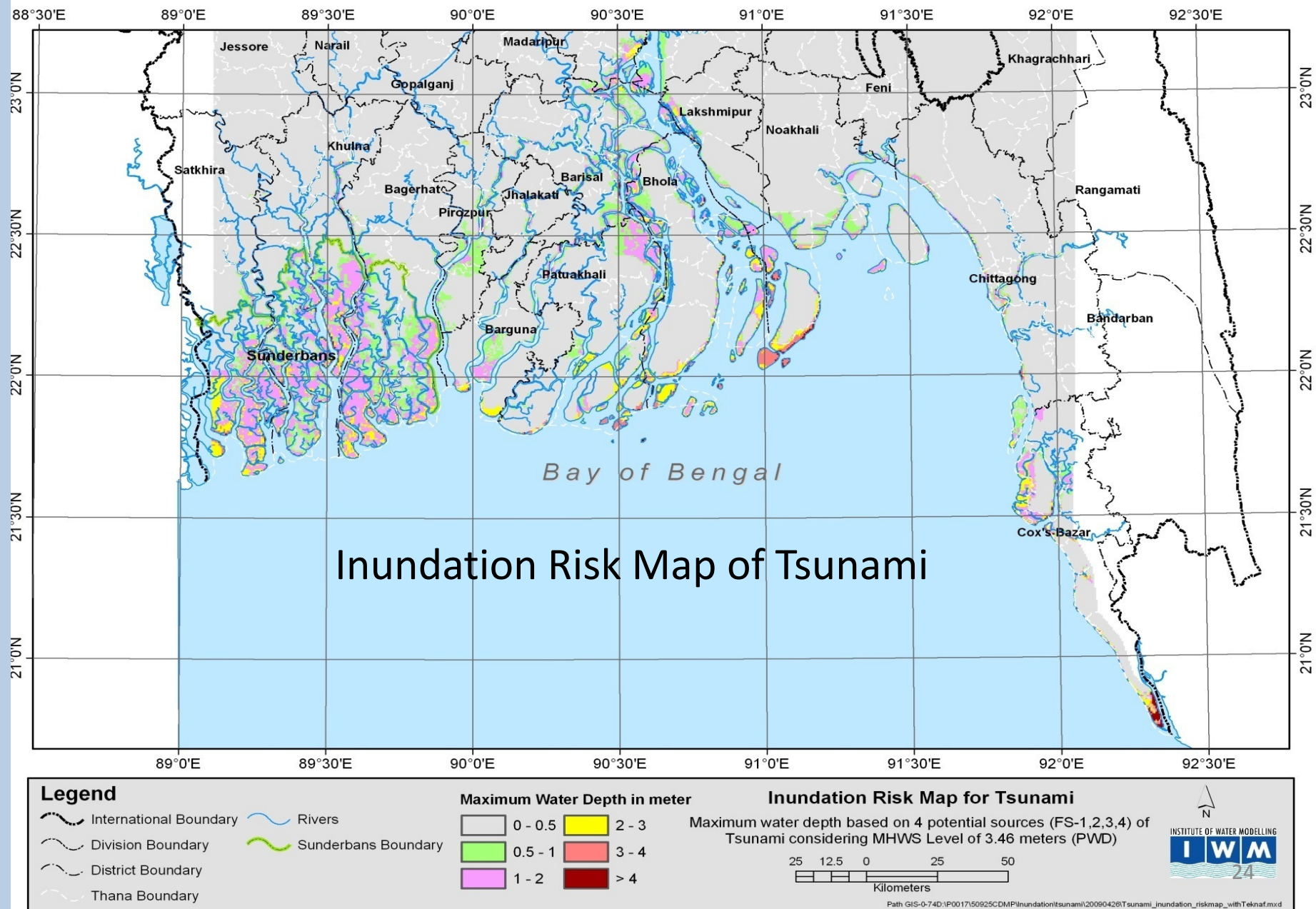


Earthquake Zones

Data: Available Disaster Maps



Data: Available Disaster Maps



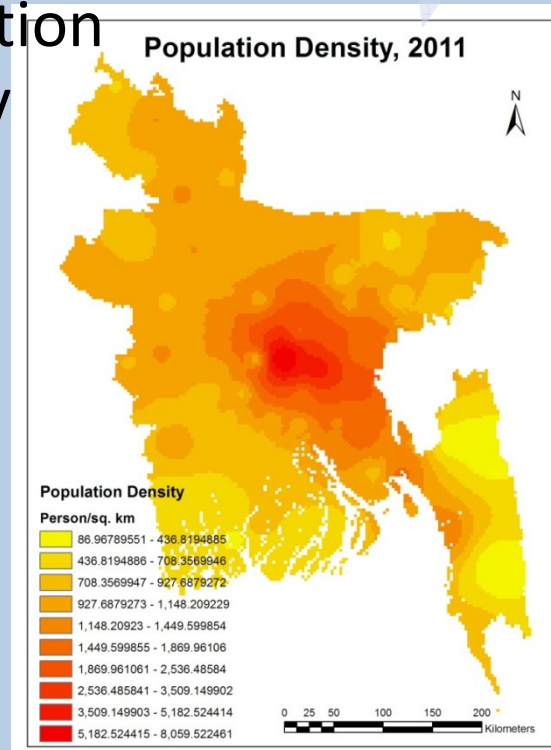
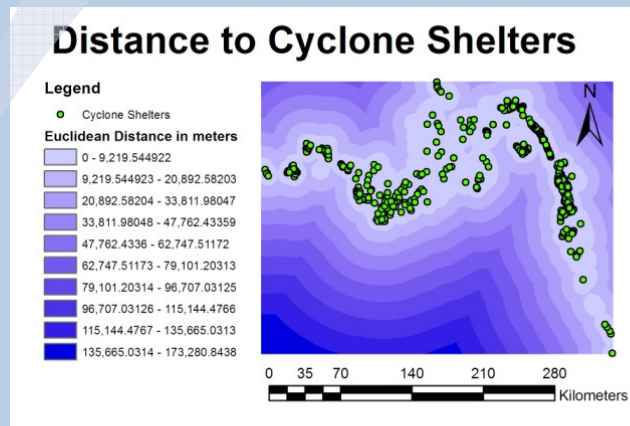
Risk Factors Considered

RISK MAP

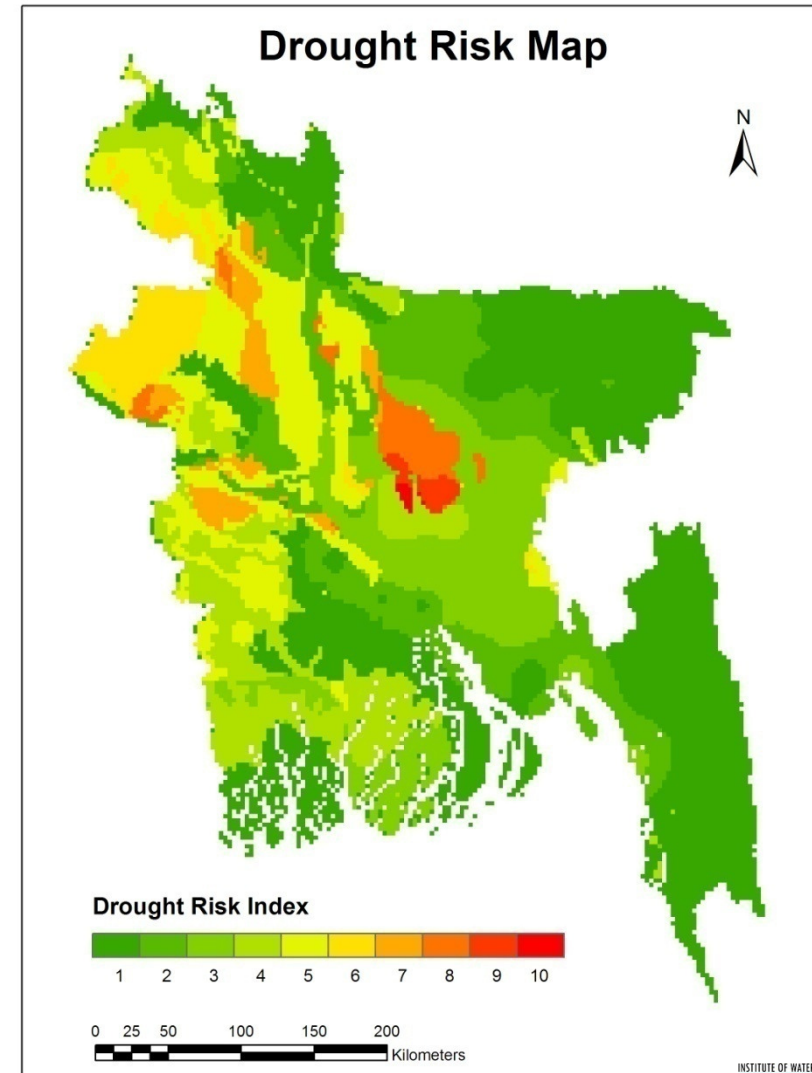
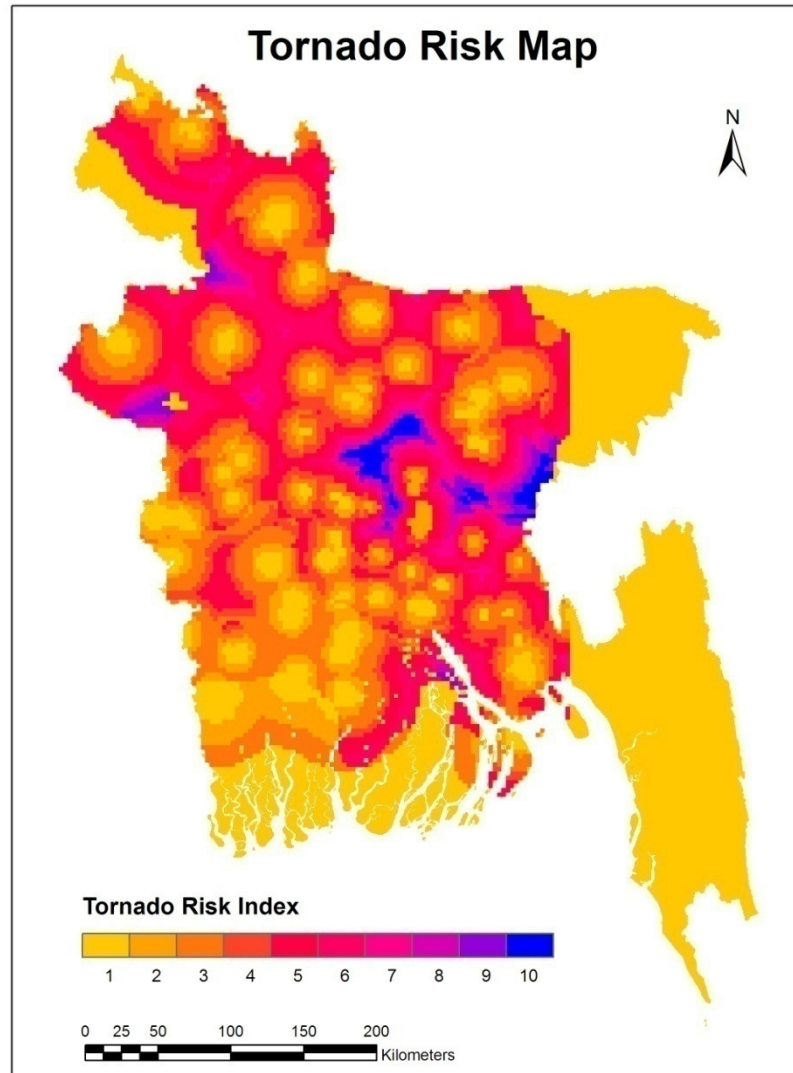
Individual Risk Map

Population Density

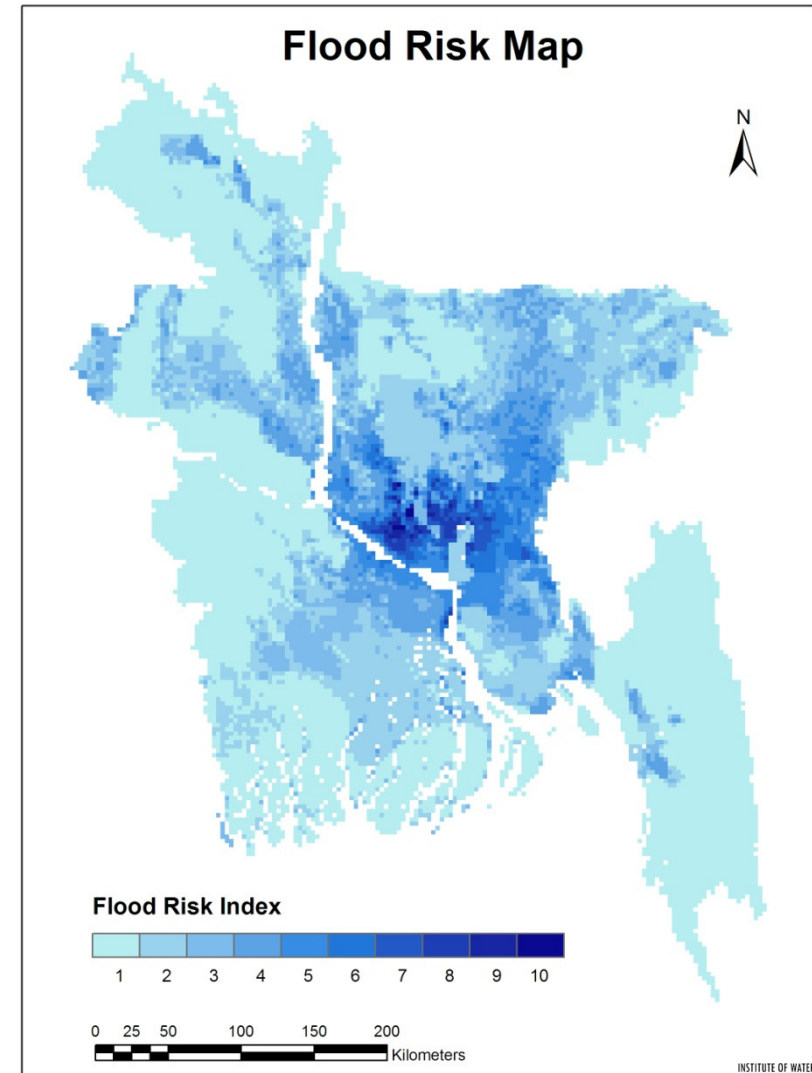
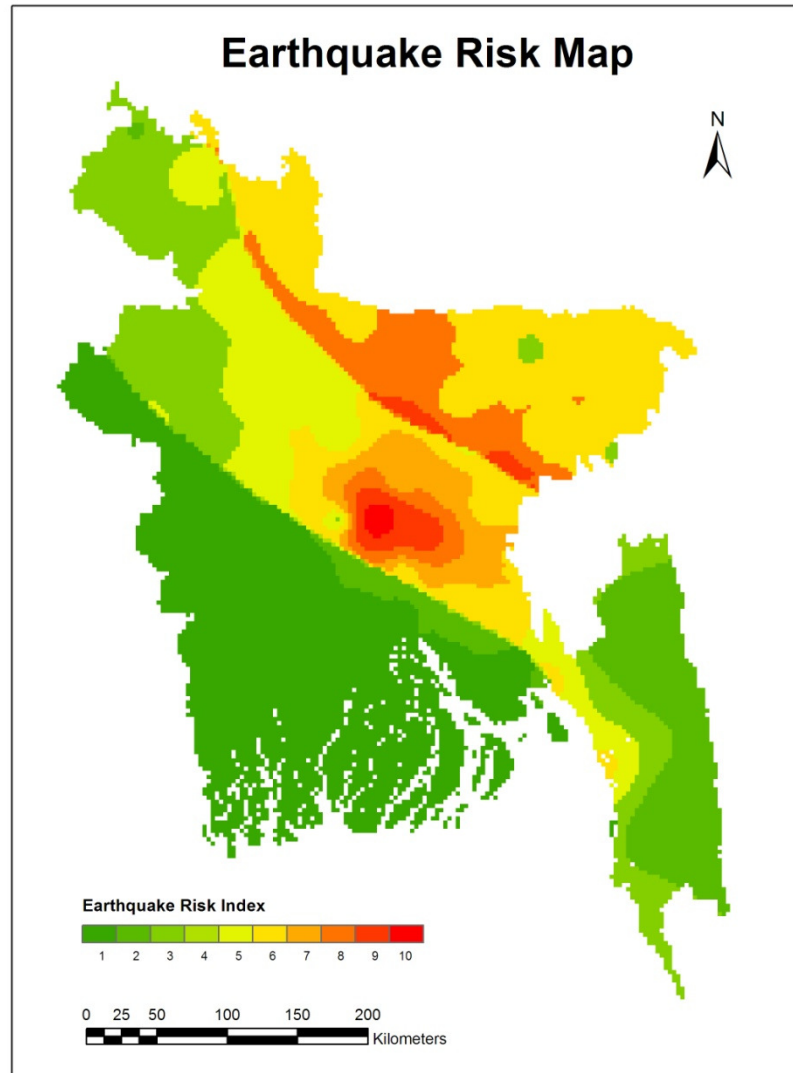
Protective Measures



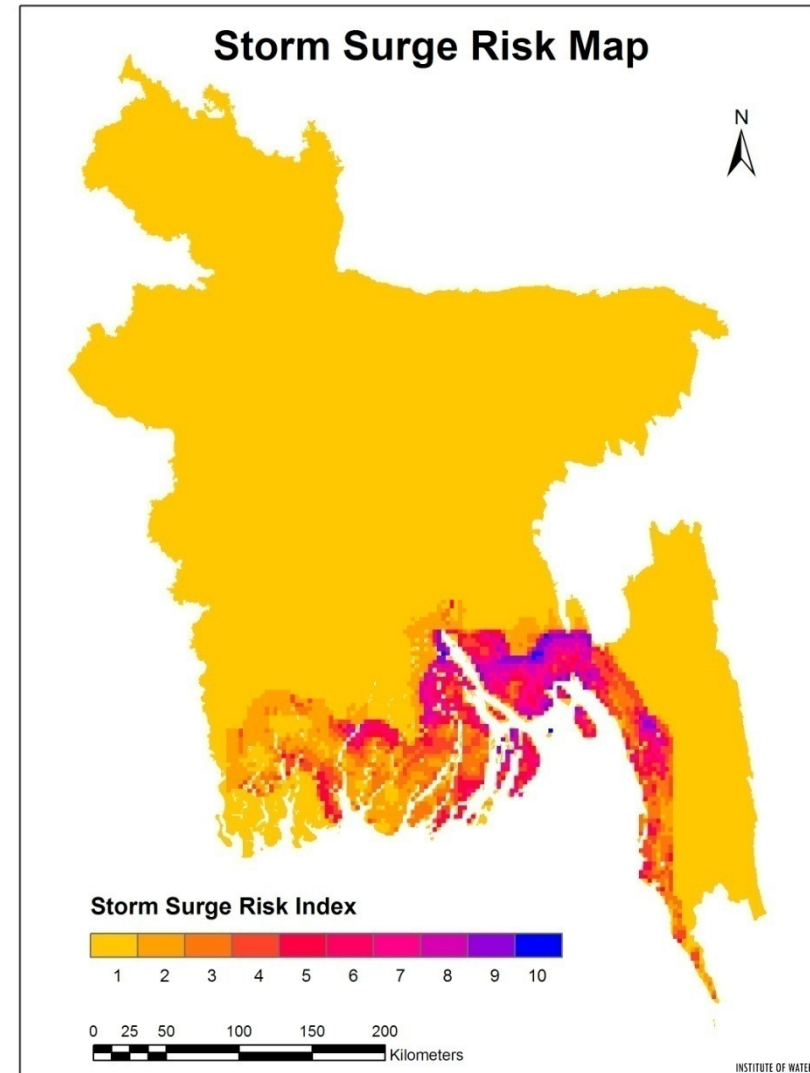
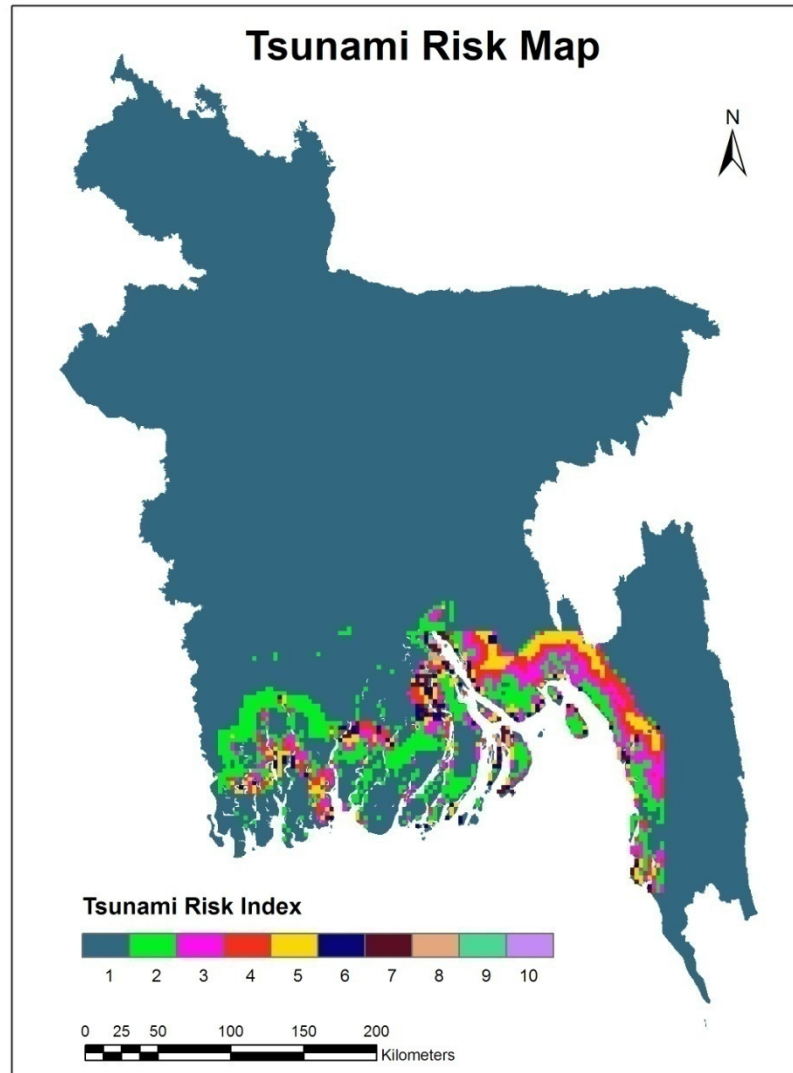
RISK MAP: RECLASSIFIED IN 10 SCALE



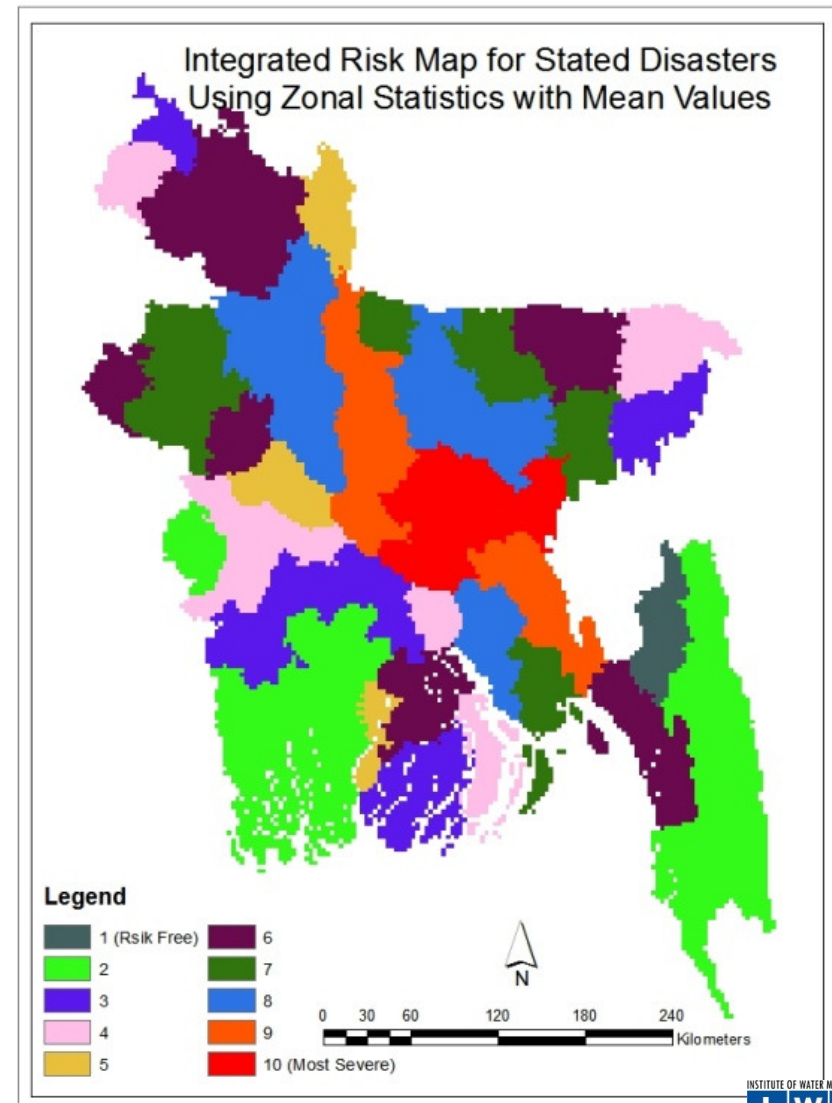
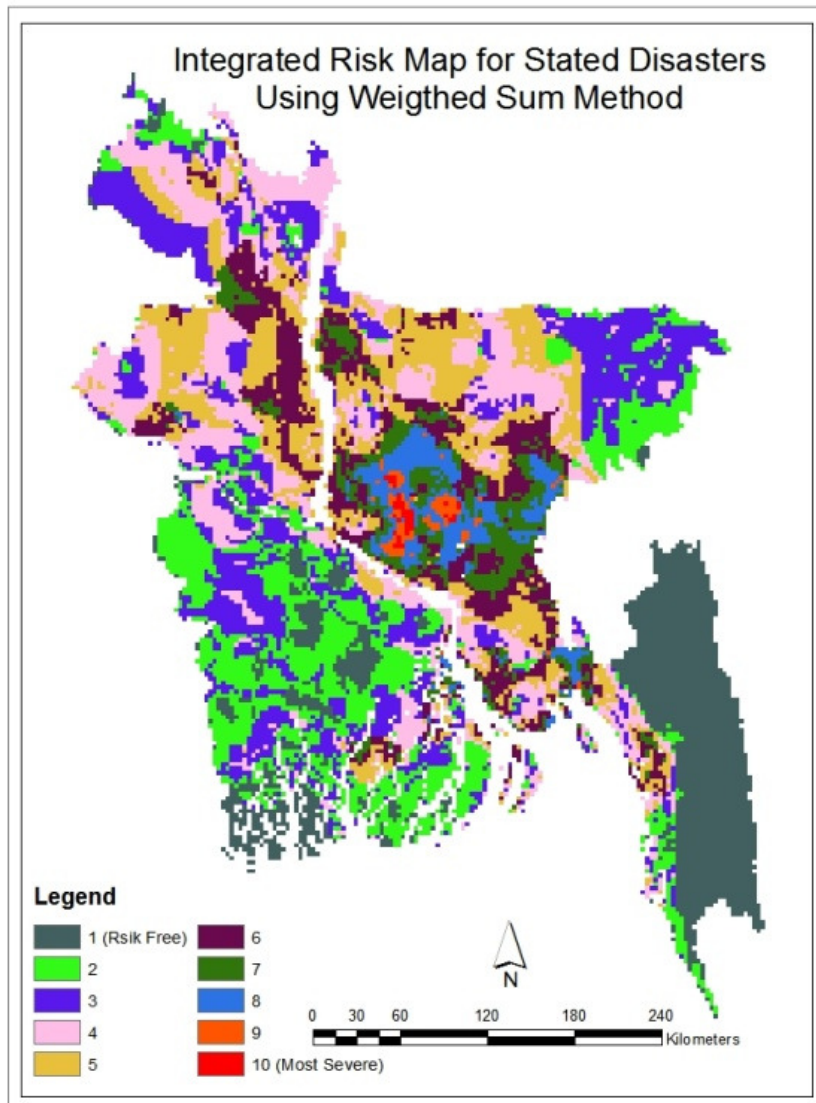
RISK MAP: RECLASSIFIED IN 10 SCALE



RISK MAP: RECLASSIFIED IN 10 SCALE



Combined Risk Map



Results

Population Density governs most followed by trans-boundary flow in overall Risk assessment while for flood risk-transboundary flow governs

Divisions	Indexes							Grand Total
	2	3	4	6	7	8	10	
Barisal	2	2	1	1				6
Chittagong	6		1	3		1		11
Dhaka		3	4	7		1	2	17
Khulna	3		1	6				10
Rajshahi	2		2	10	1	1		16
Sylhet		1	2	1				4
Grand Total	13	6	11	28	1	3	2	64

Recommendations

Risk weighting should be more practical

Early preparedness can be included as a tool for risk mitigation.

Natural hazard maps (order-wise) should be made handy and updated regularly

Decision makers, planners, disaster managing professionals should be well aware about impacts of disasters and use of maps properly

For early preparedness in terms of individual hazards community should be involved for better management



THANK YOU