NATURAL DISASTERS OF BANGLADESH: MONITORING-MAPPING

South Asia Geospatial Forum

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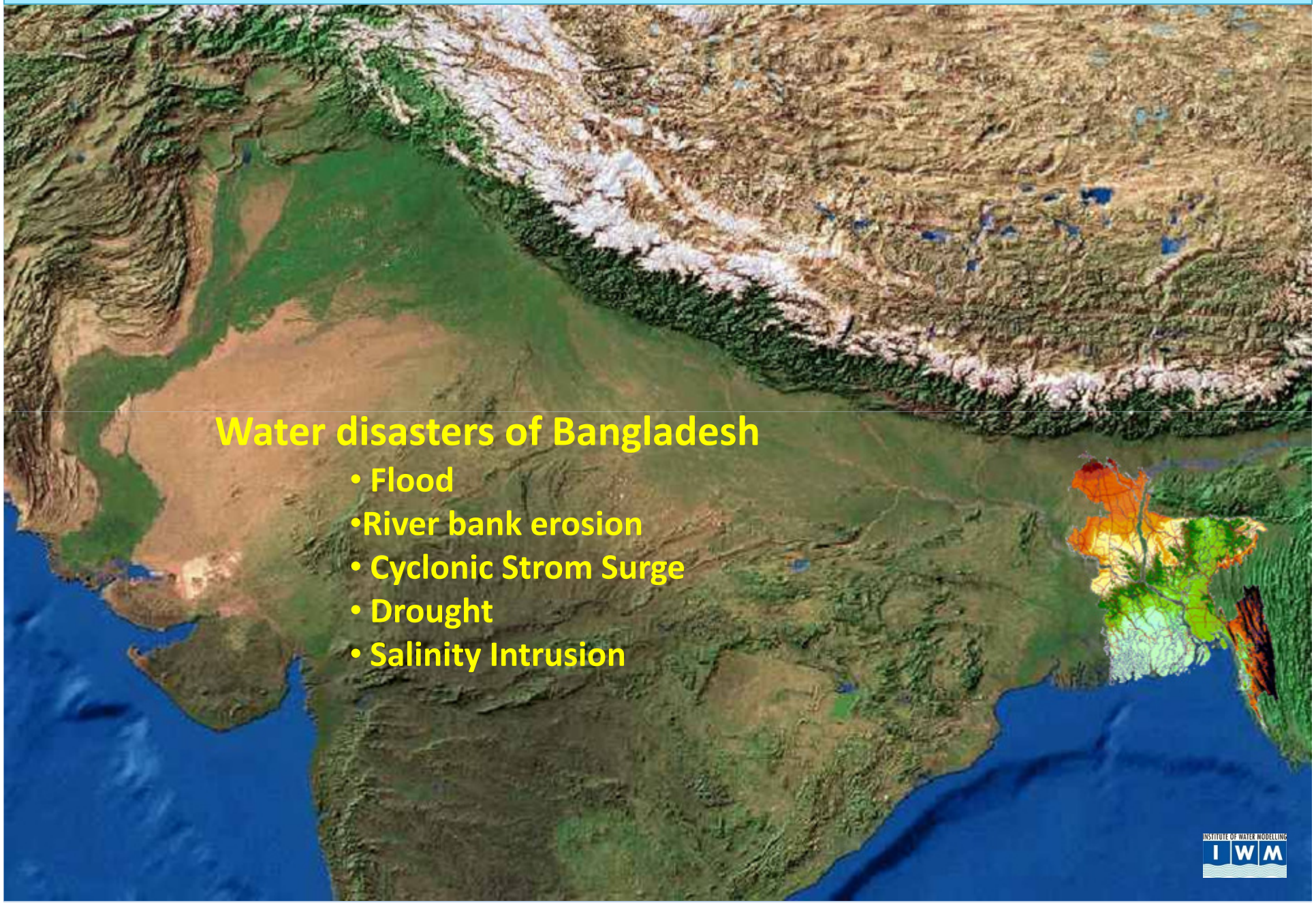
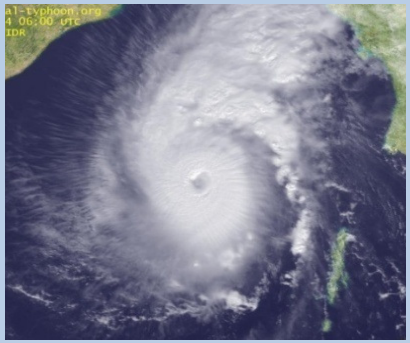
www.iwmbd.org

Geographical Settings of Bangladesh



Water Disaster in Bangladesh

- **Floods**
- **Droughts**
- **Riverbank Erosion**
- **Salinity intrusion**
- **Cyclone and storm surge**



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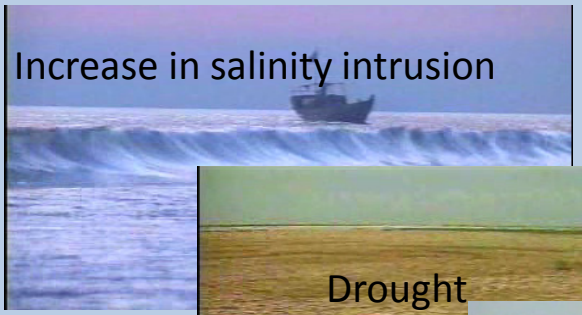
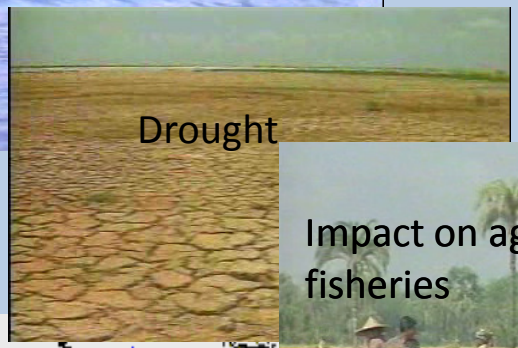
Challenges due to Climate Change



Sea level rise

Increase in evaporation

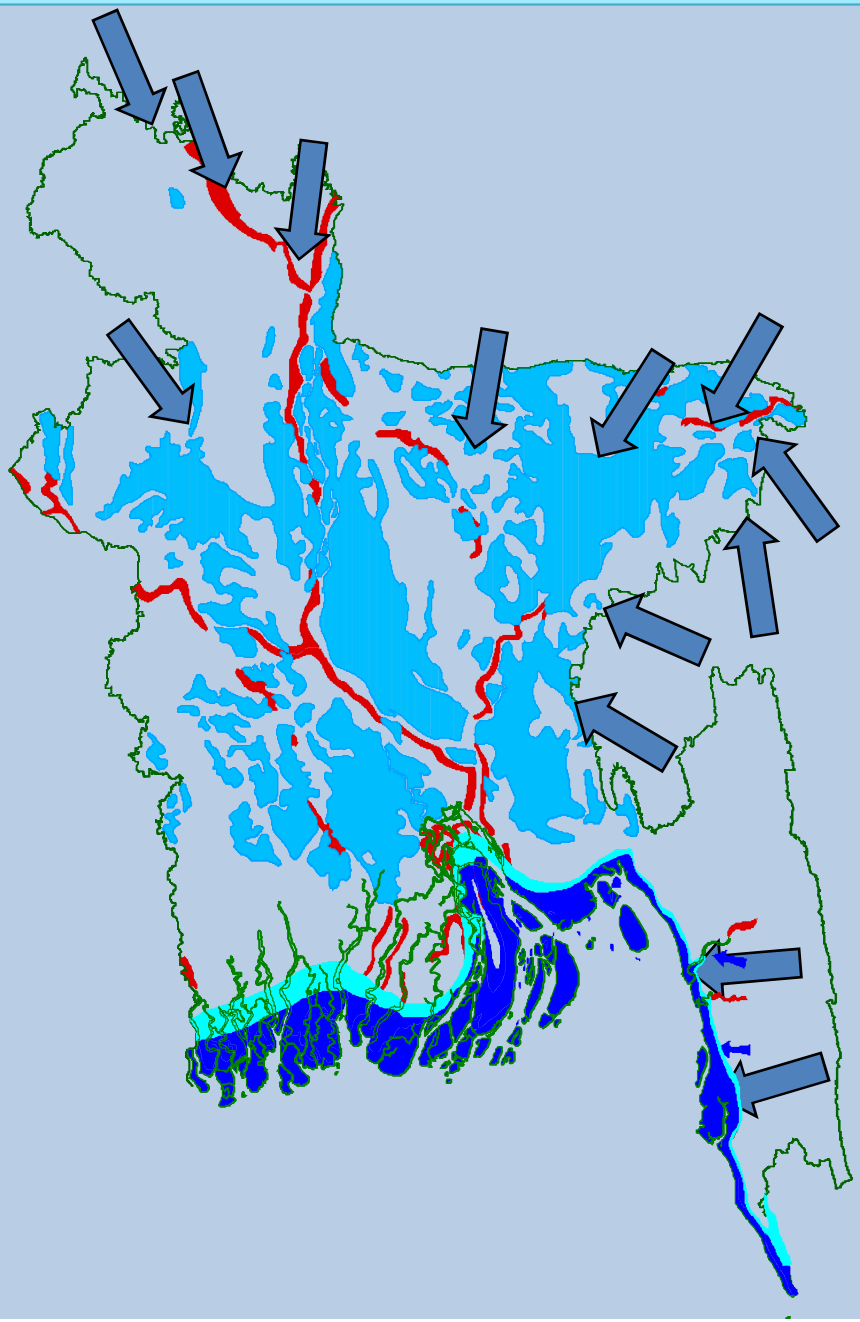


Decrease in precipitation in dry season

Increase in precipitation in monsoon

Prolonged & shifting monsoon

Water Hazard Distributions in Bangladesh



Flood

River Bank Erosion

Flash Flood

Storm Surges/Tidal Flooding

(Source: IWM)

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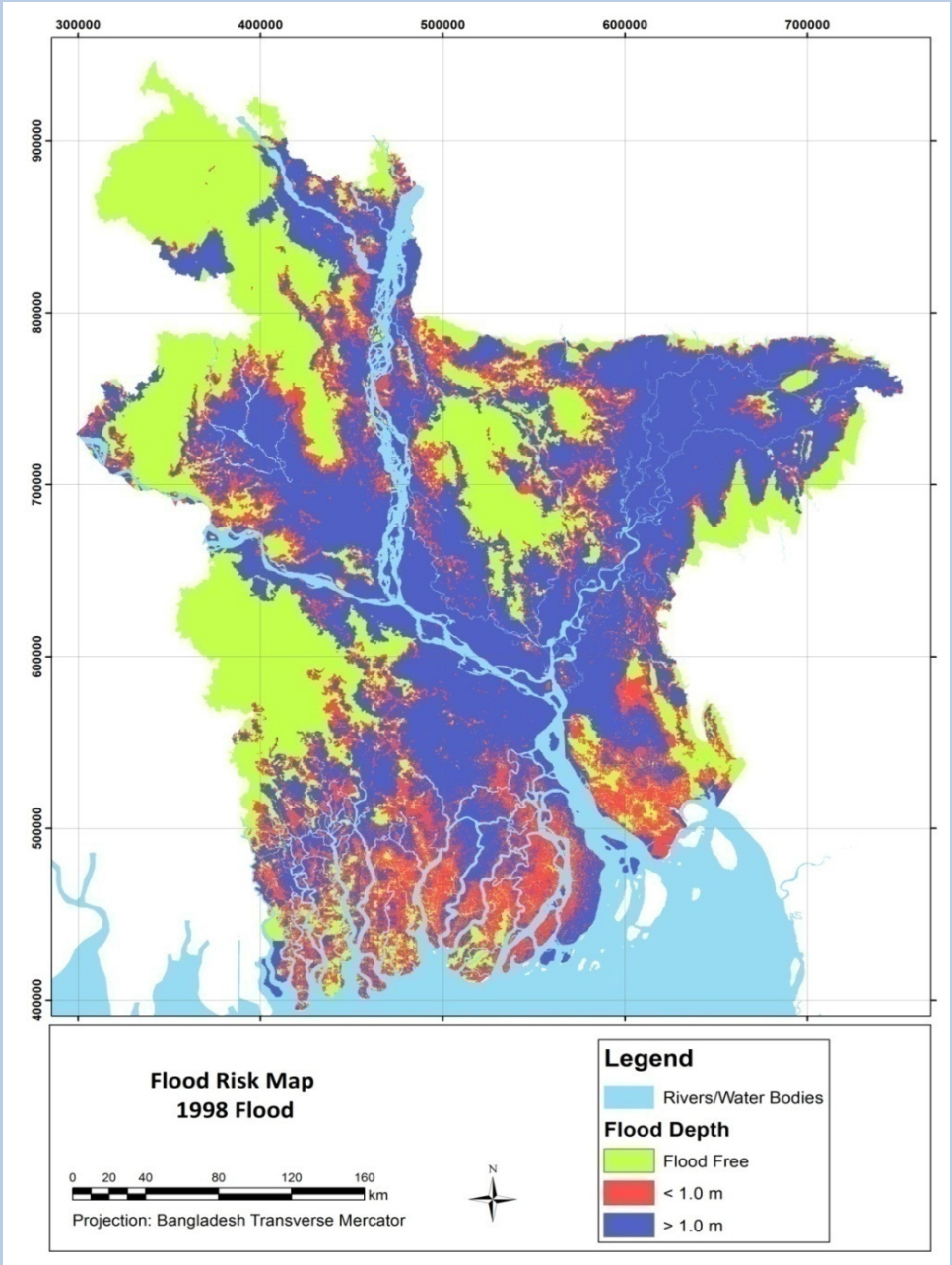
Inundation Map of Flood of 1998



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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

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Inundation maps using the simulation results file and ARC GIS

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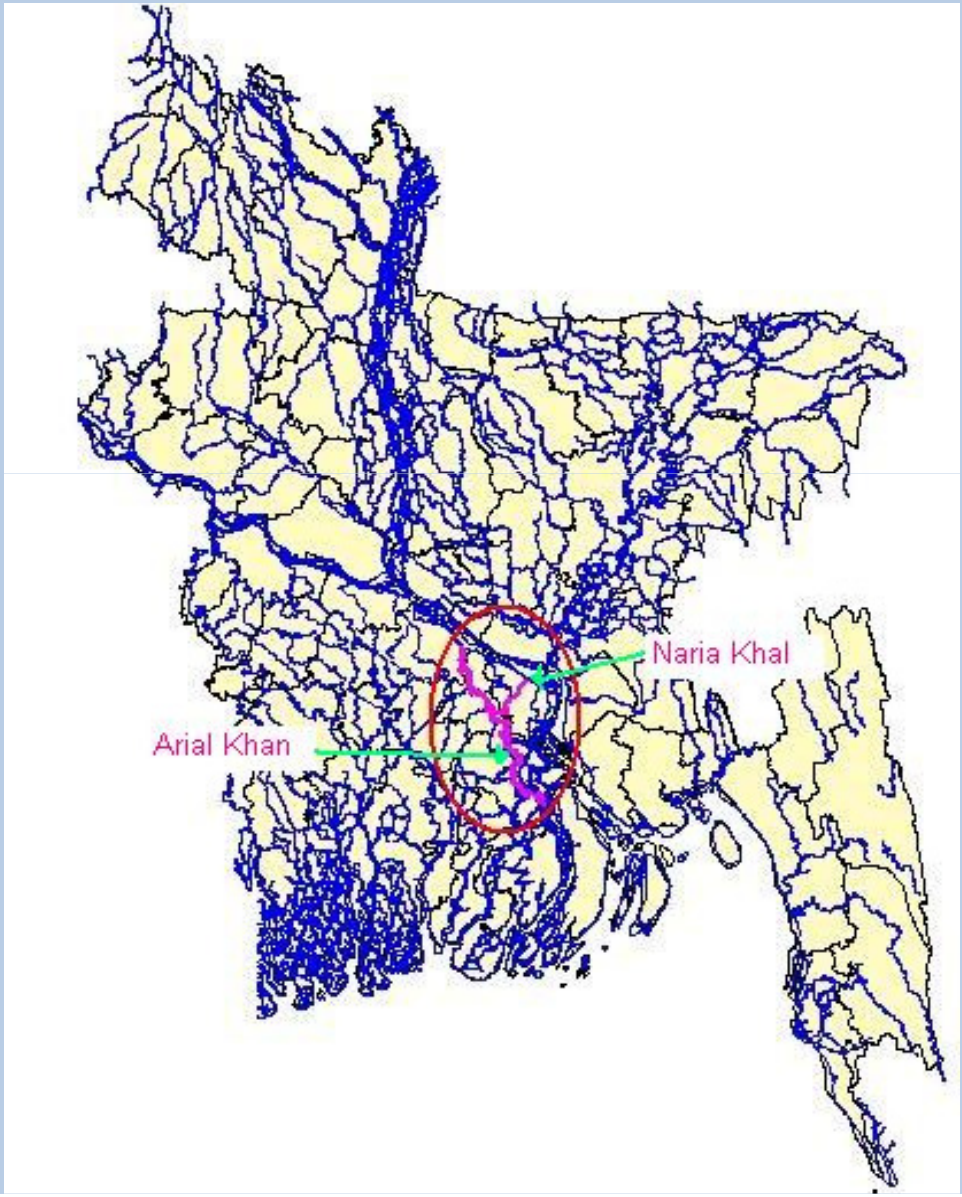
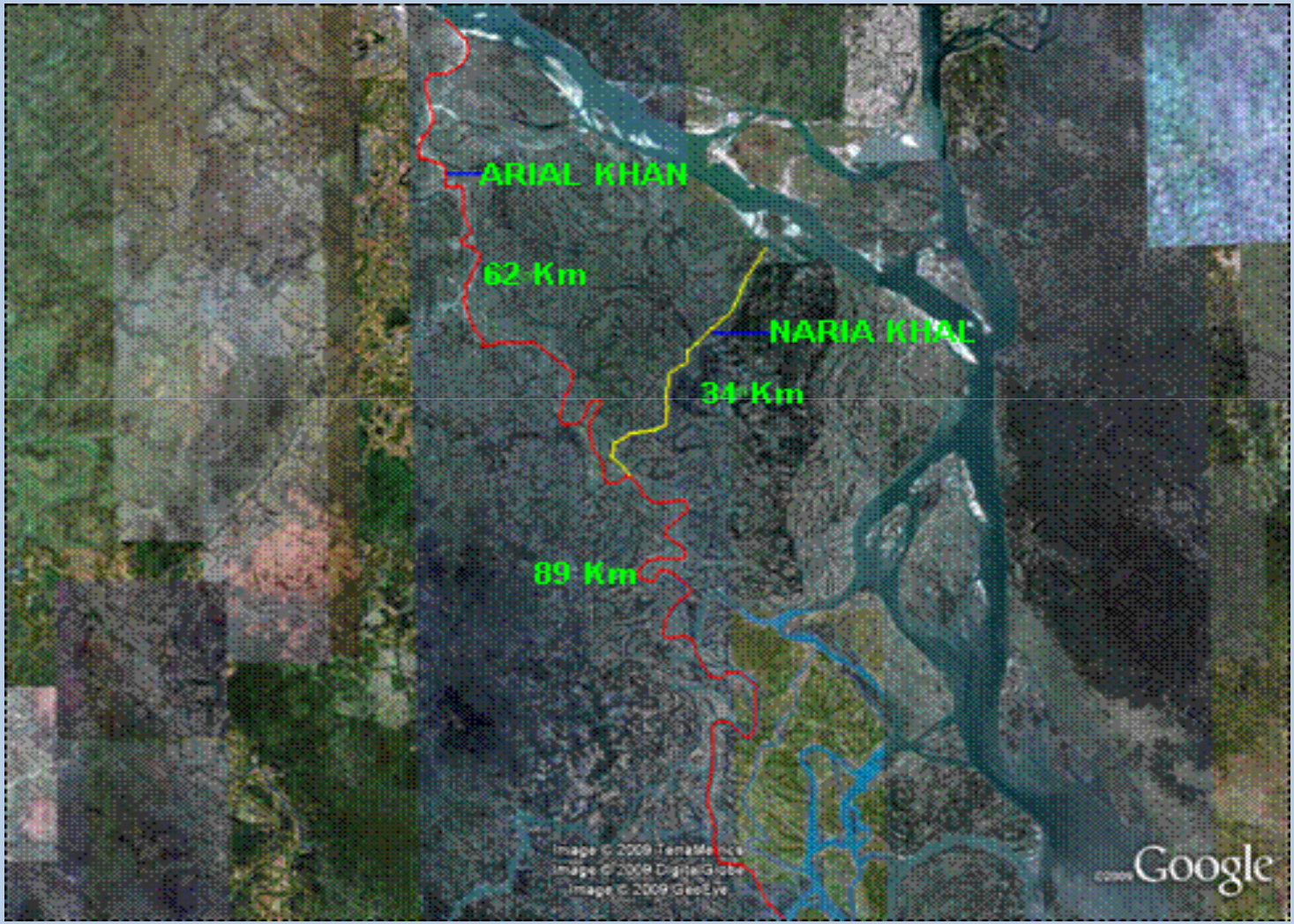
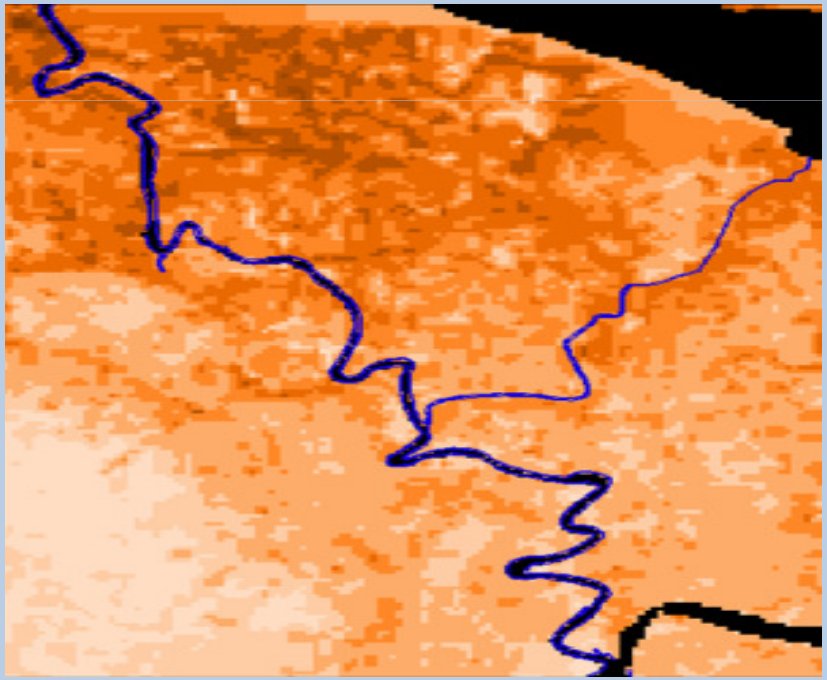
Example: Flood plain inundation map for Arial Khan-Naria Khal



Google Earth map of Aria Khan-Naria Khal

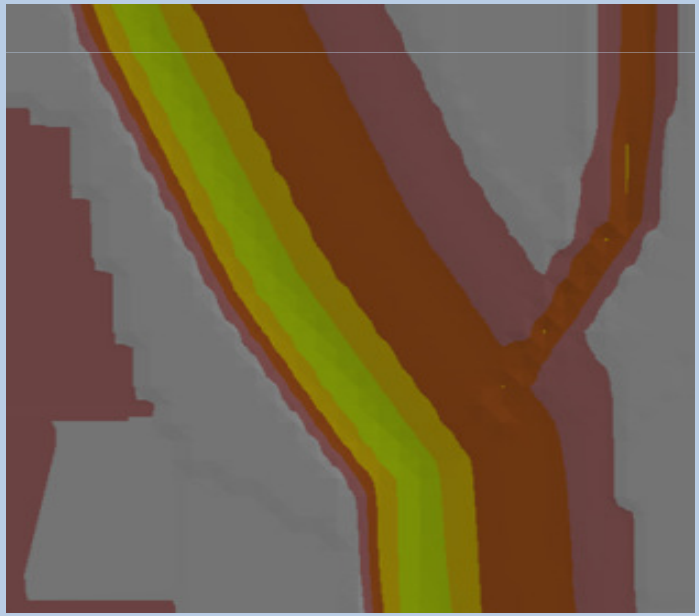


River Streams-DEM (Left); Extracted bathymetry Grid-Naria Khal (Right)

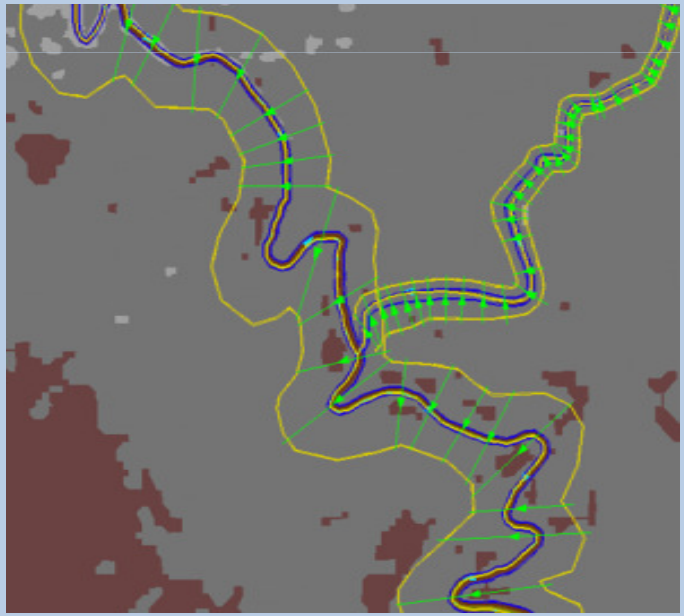


Tools: HECRAS, HEC-GeoRAS, ArcView GIS and ArcGIS

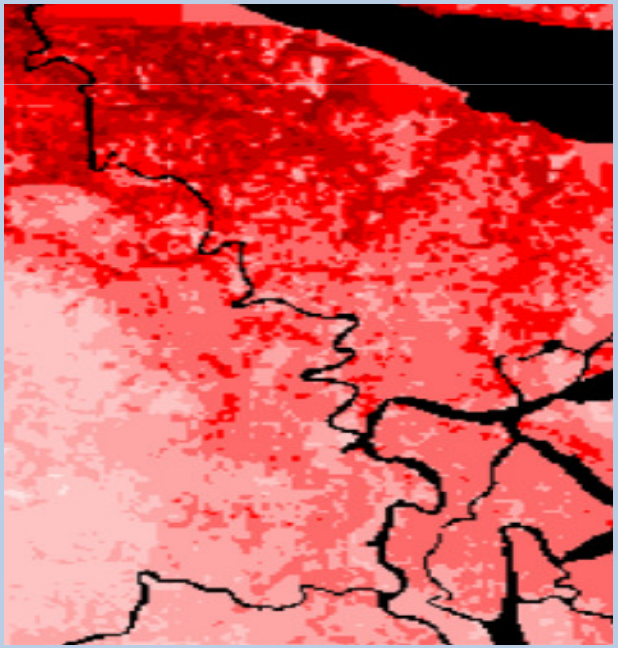
Zoom of TIN-Arial Khan- Naria Khal Confluence



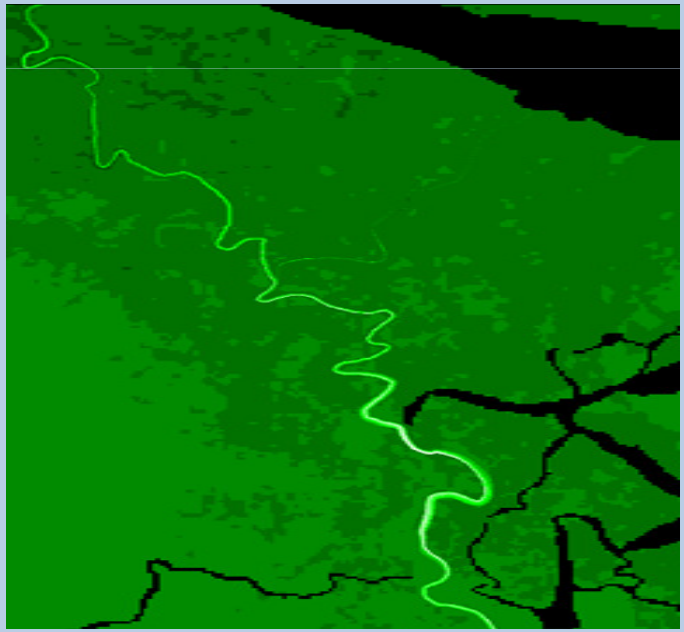
Geometric Data extraction of Flood plain from TIN



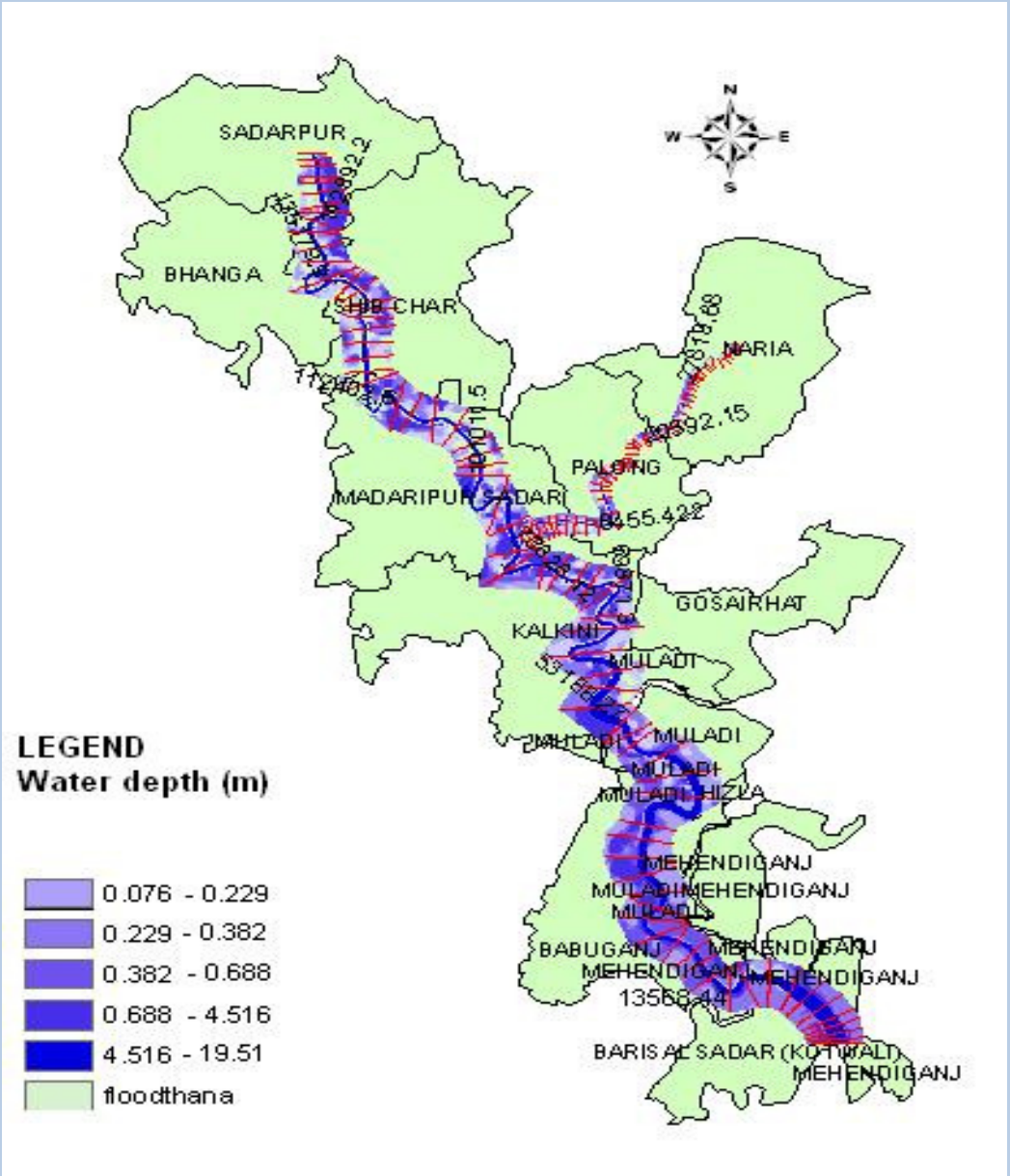
DEM without bathymetry data



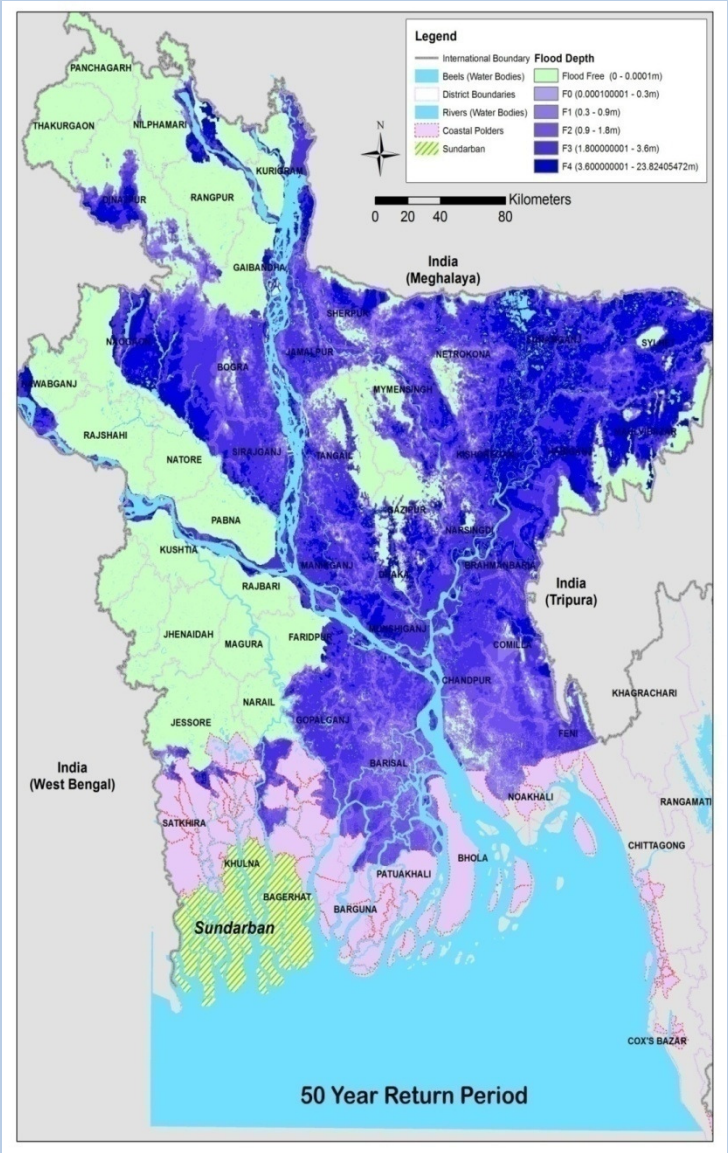
DEM with Bathymetry data

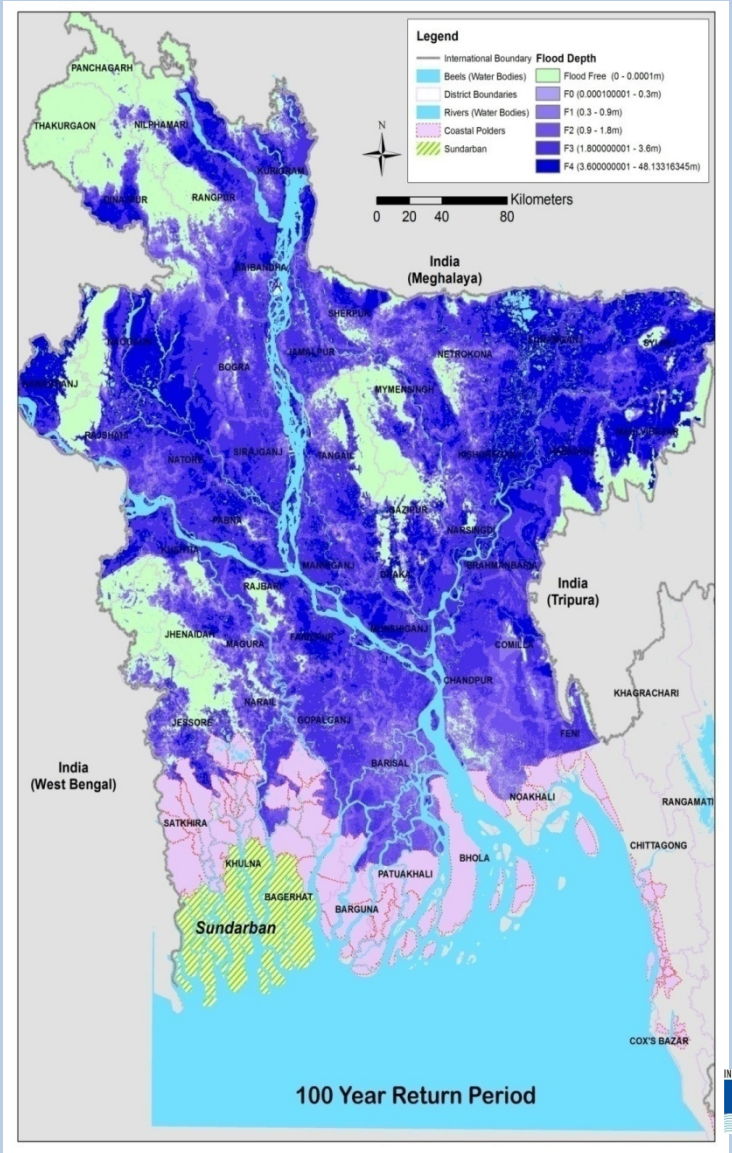


Flood Plain Map of Arial Khan-Naria Khal



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





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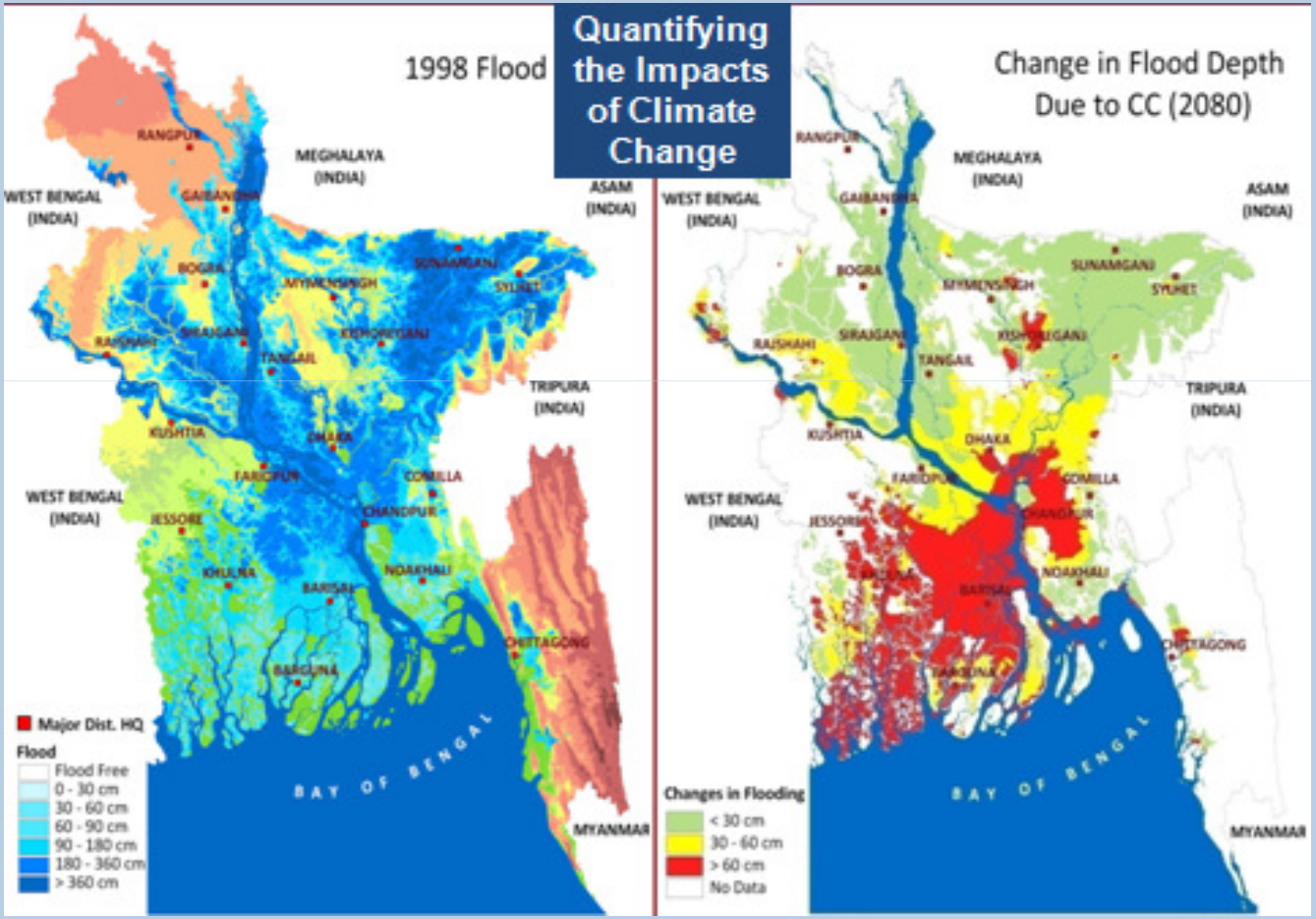
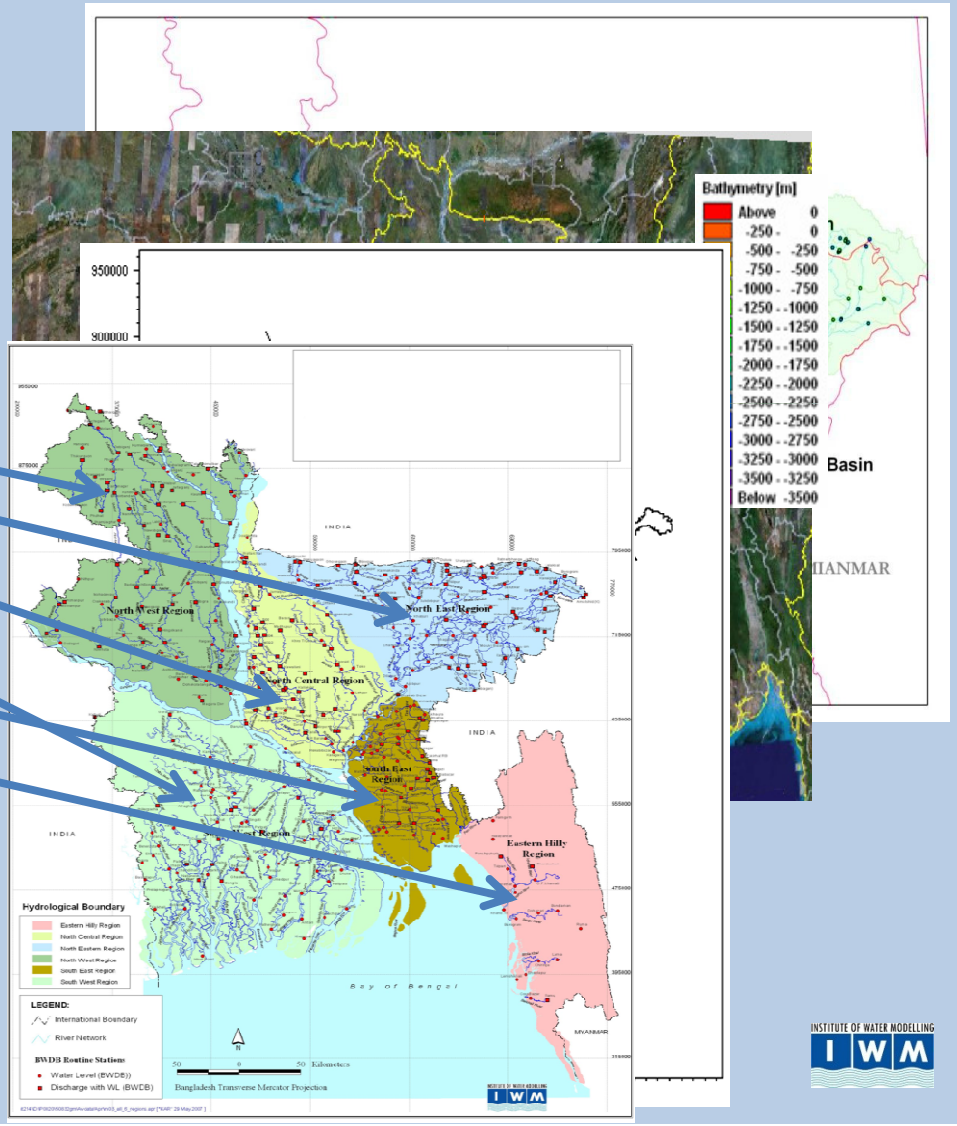
Impact of Climate Change

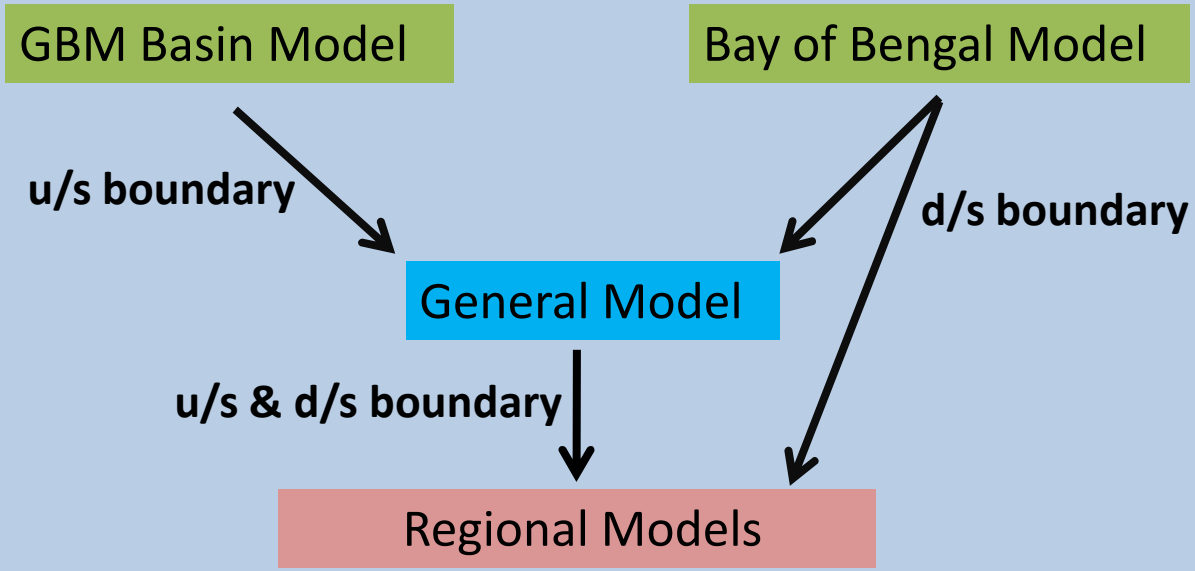


Different Models Used for Flood Map

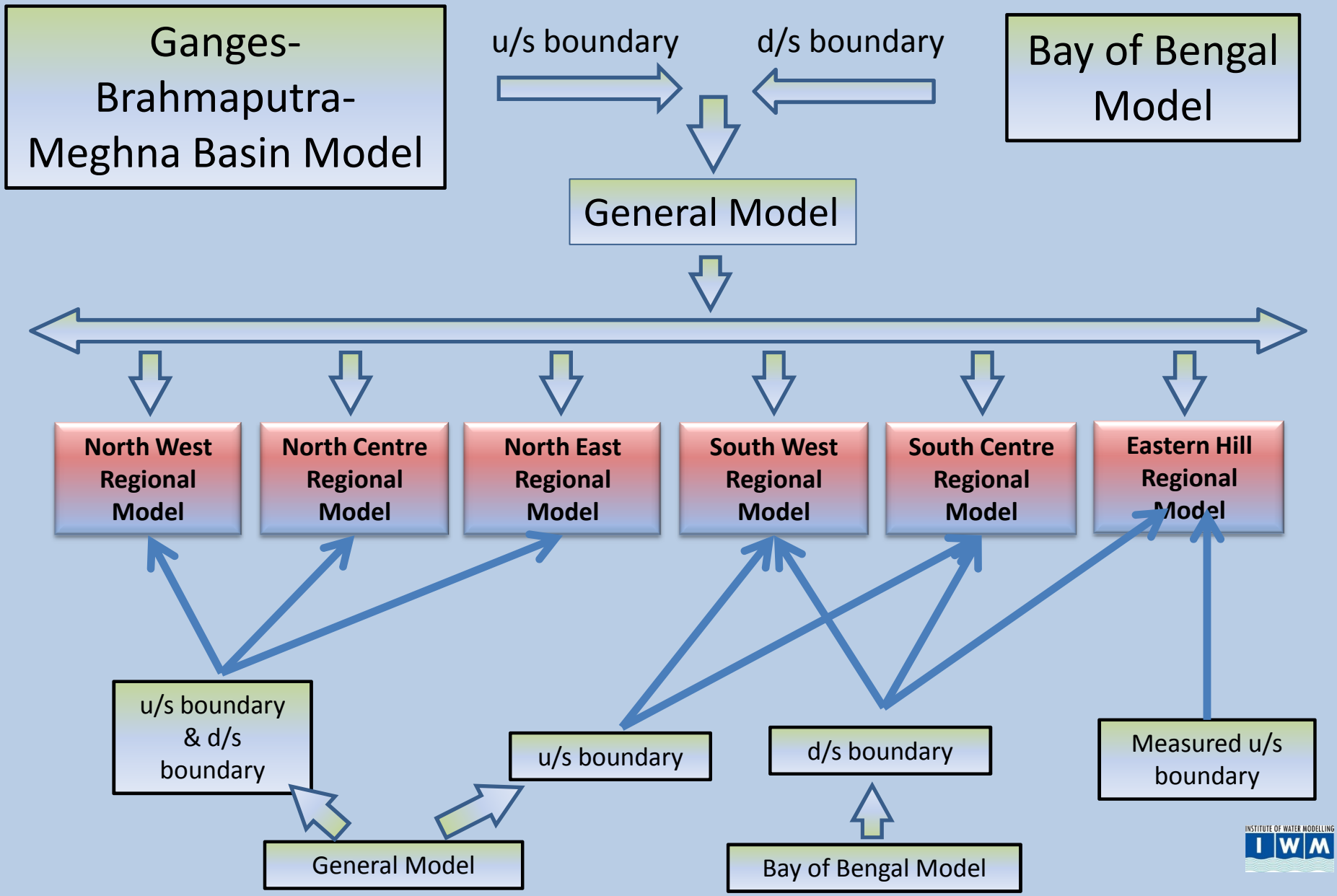
- Ganges, Brahmaputra and Meghna (GBM)Basin Model
- Bay of Bengal Model (BoBM)
- General Model
- Regional Models
  - ➢ North west Regional model
  - ➢ North east Regional Model
  - ➢ North Central Regional Model
  - ➢ South West Regional Model
  - ➢ South East Regional Model
  - ➢ Eastern Hilly Regional



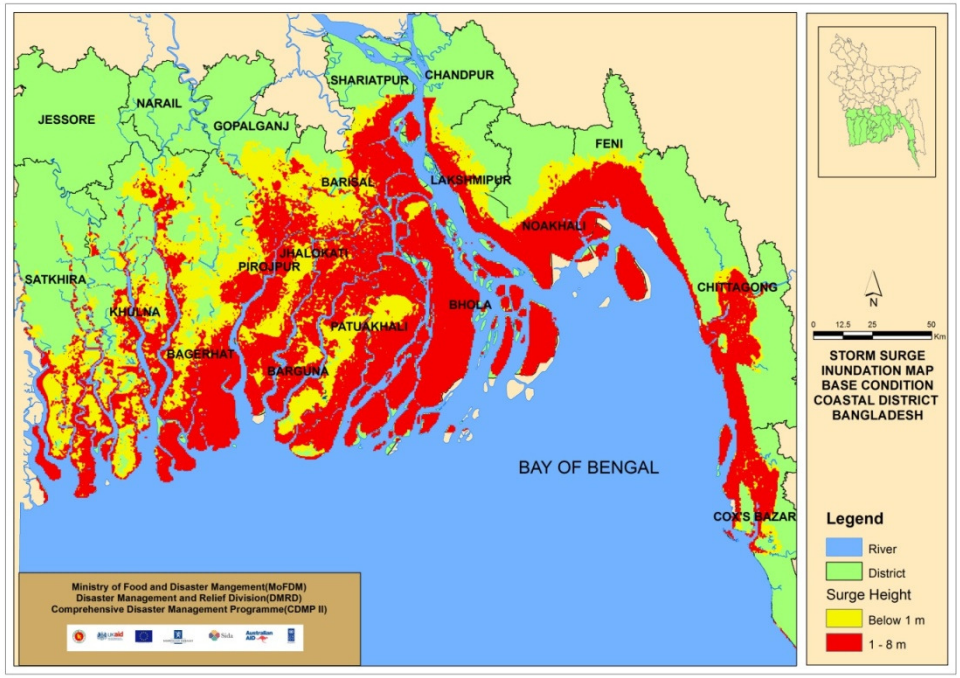
Different Models Used for Flood Map



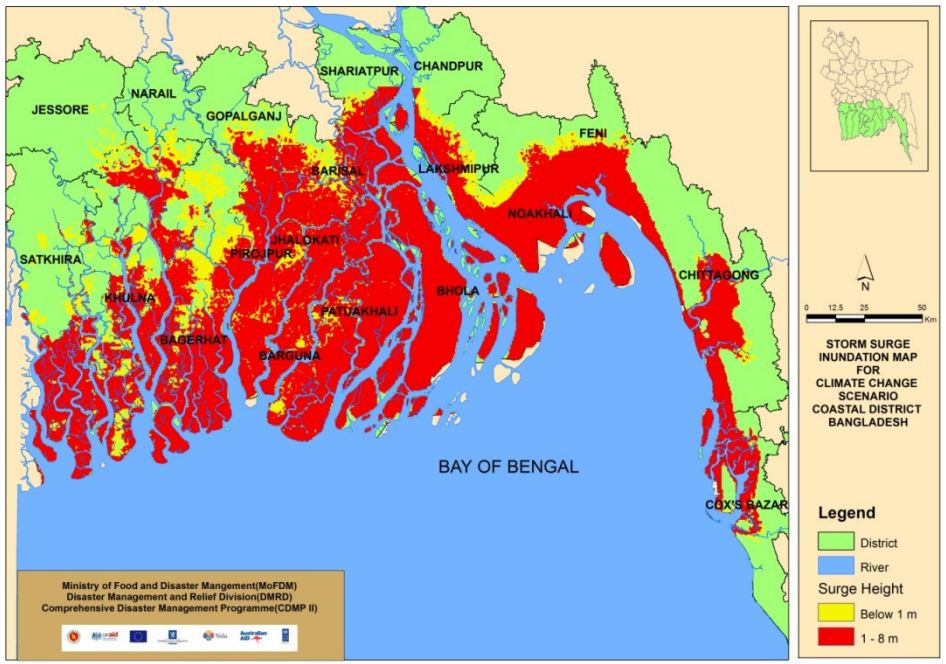
Different Models Used for Flood Map



Coastal Flood Risk Maps



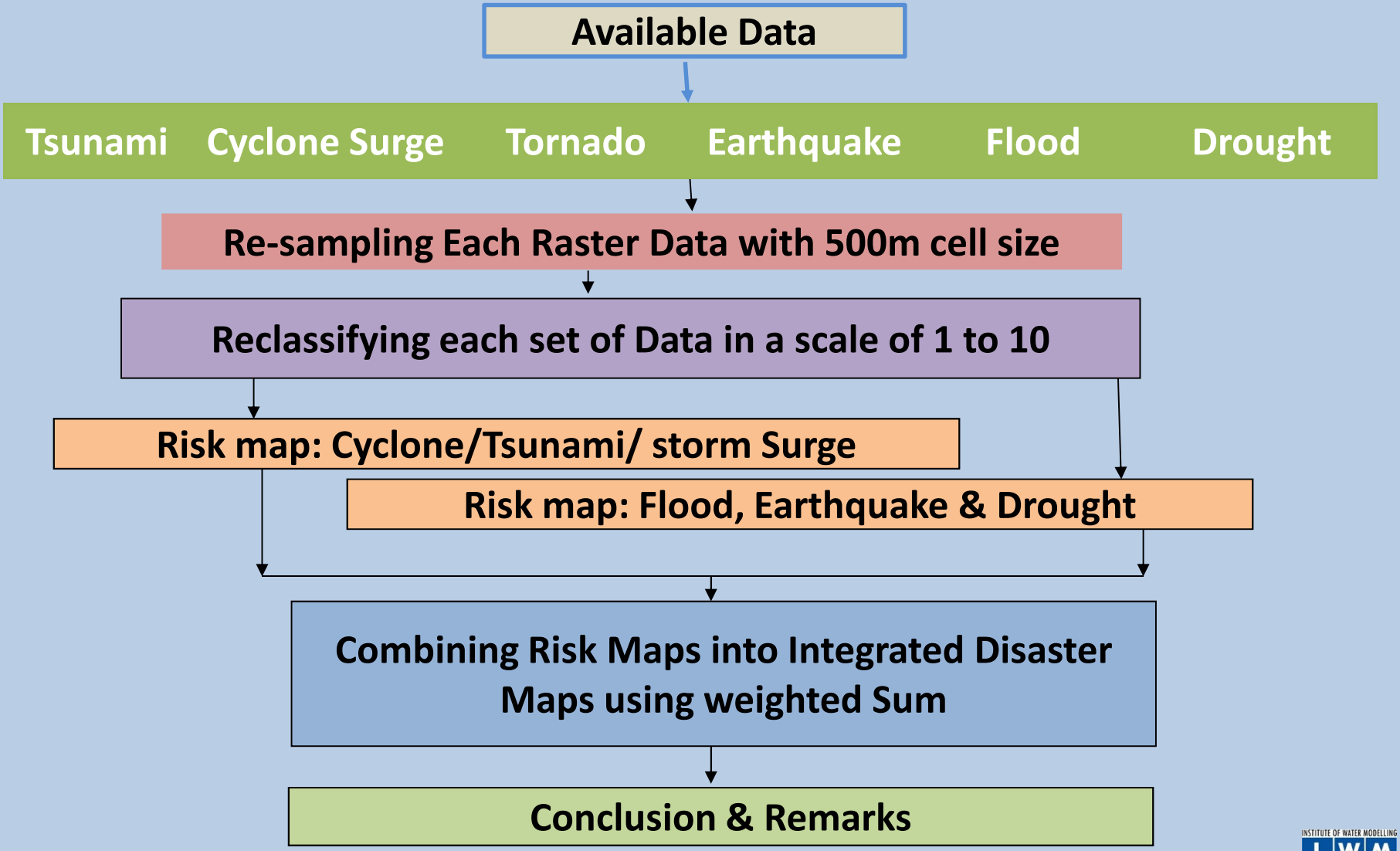
Base Condition



Climate Change Condition

An area of 20,745 km^2 will be inundated by more than 1m water depth in the changing climate

Example: Preparation of Multi-hazard Map



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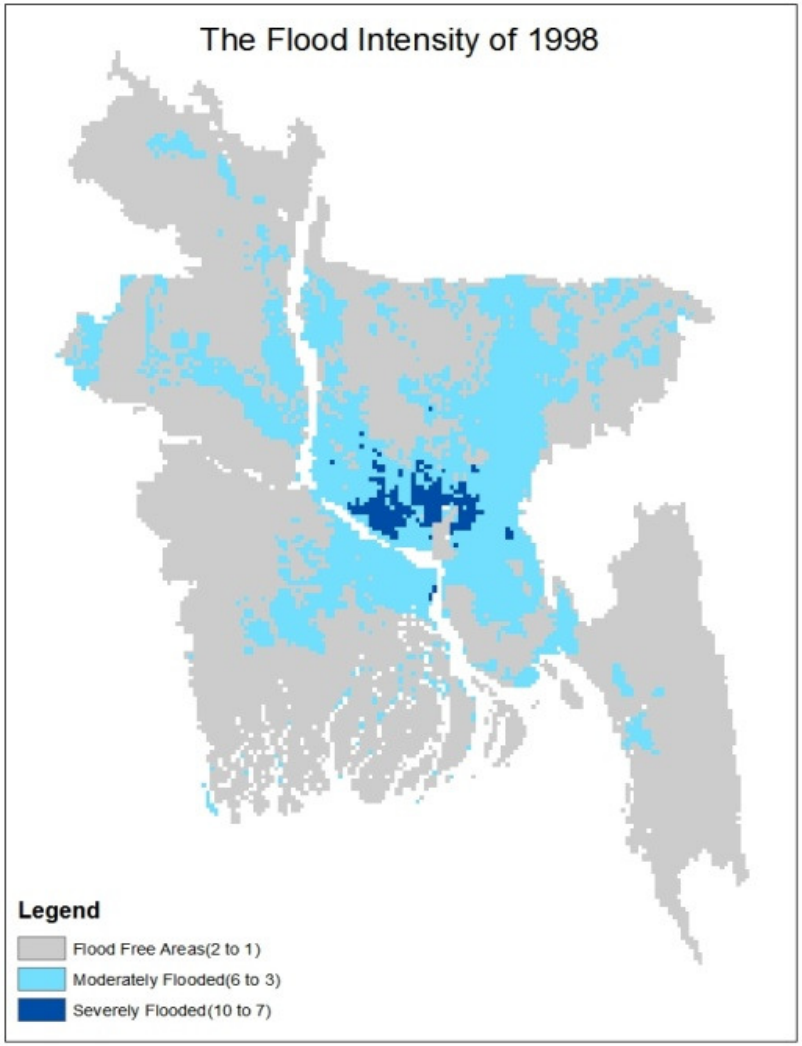
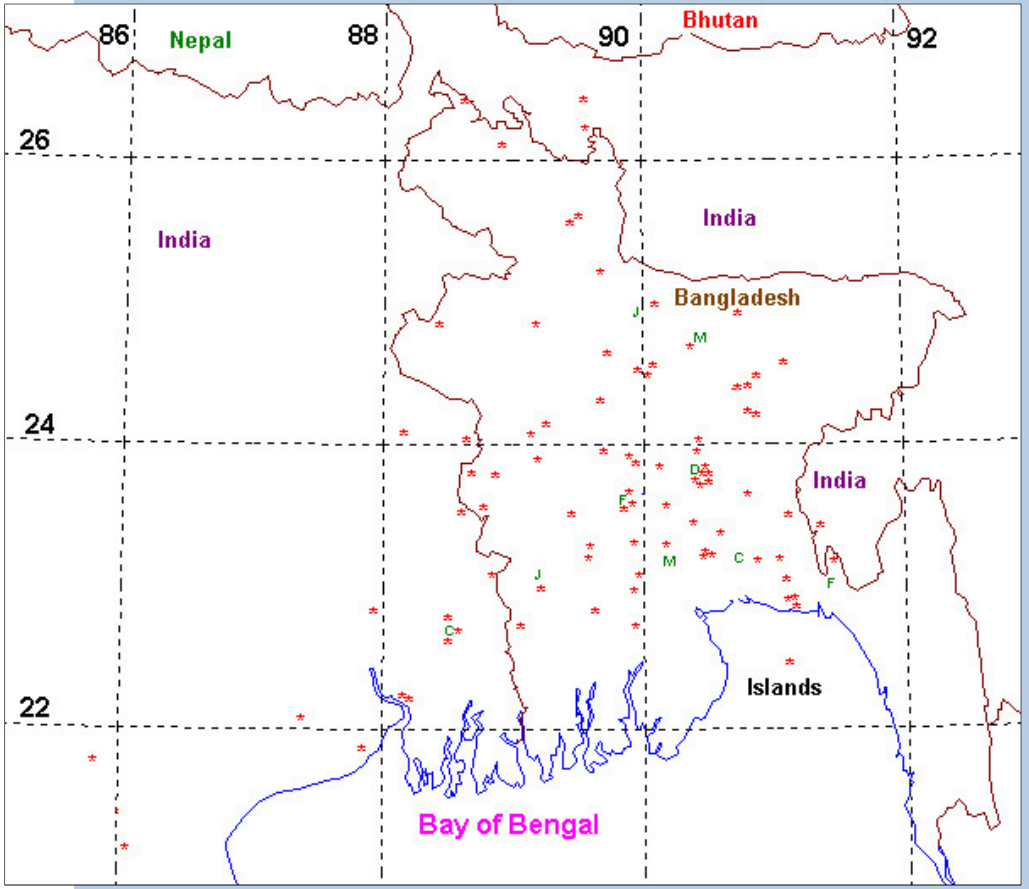
Data: Available Disaster Maps

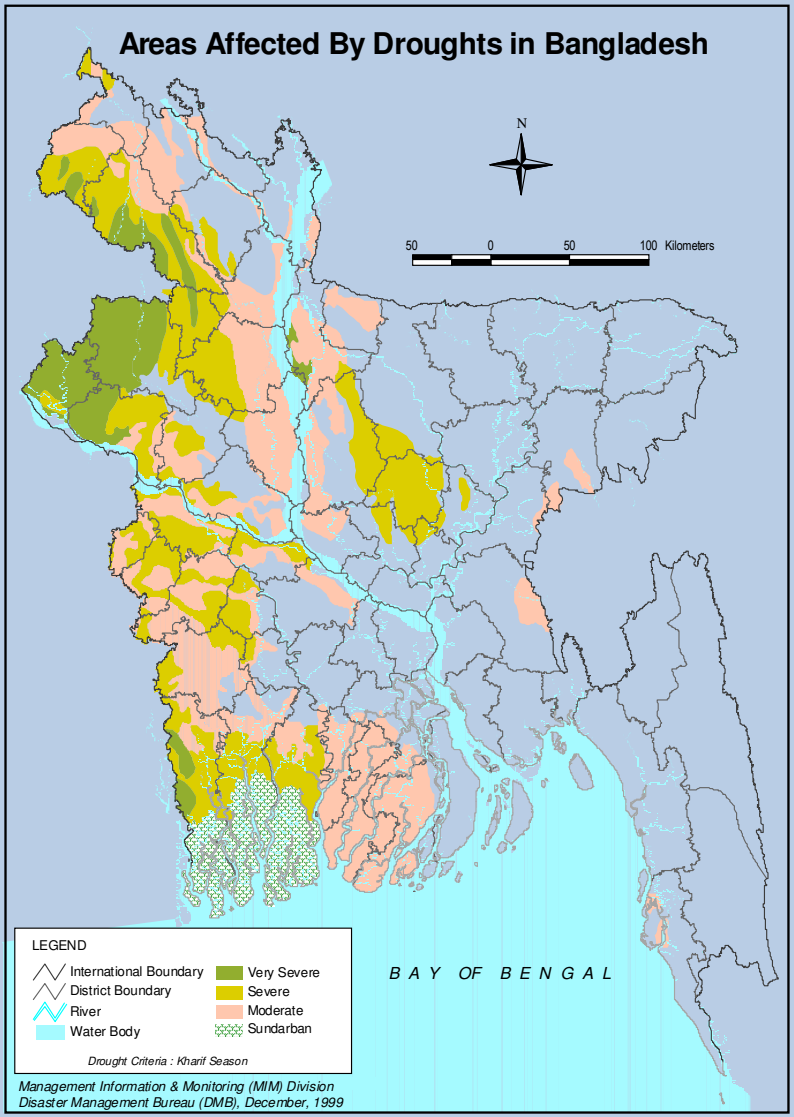


Flood Intensity Bangladesh, 1998

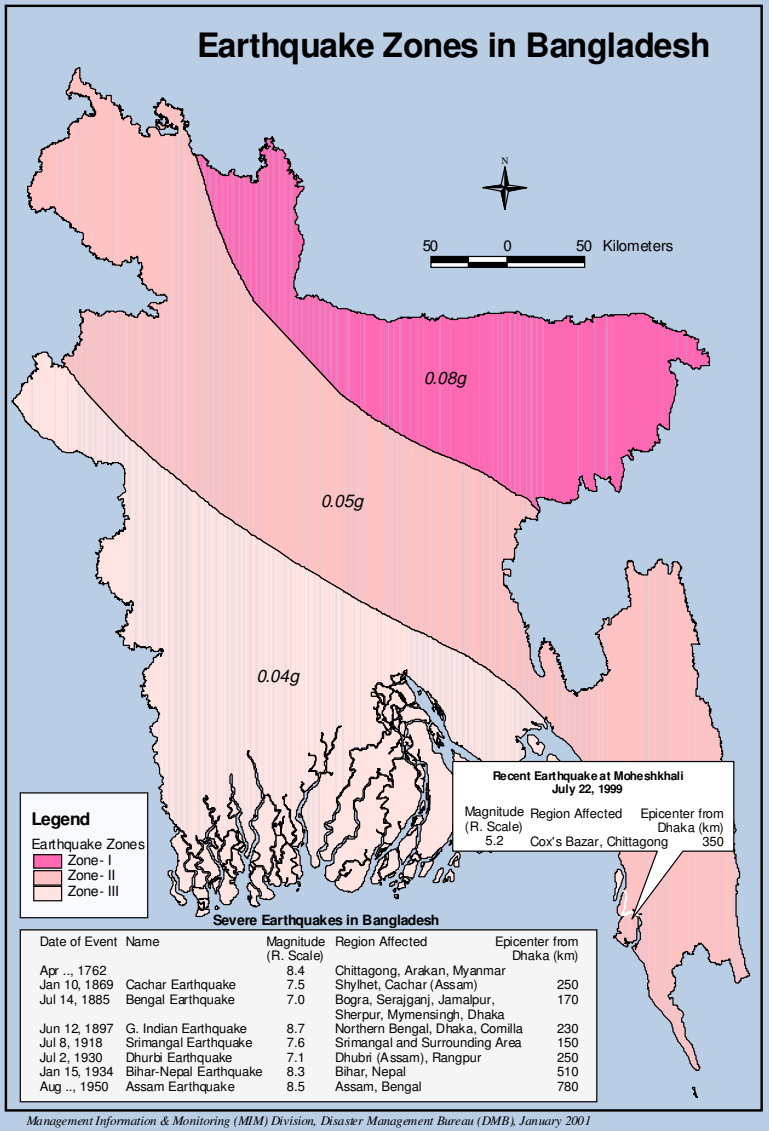


Tornado Intensity of Bangladesh

Data: Available Disaster Maps



Droughts Effected Areas



Earthquake Zones

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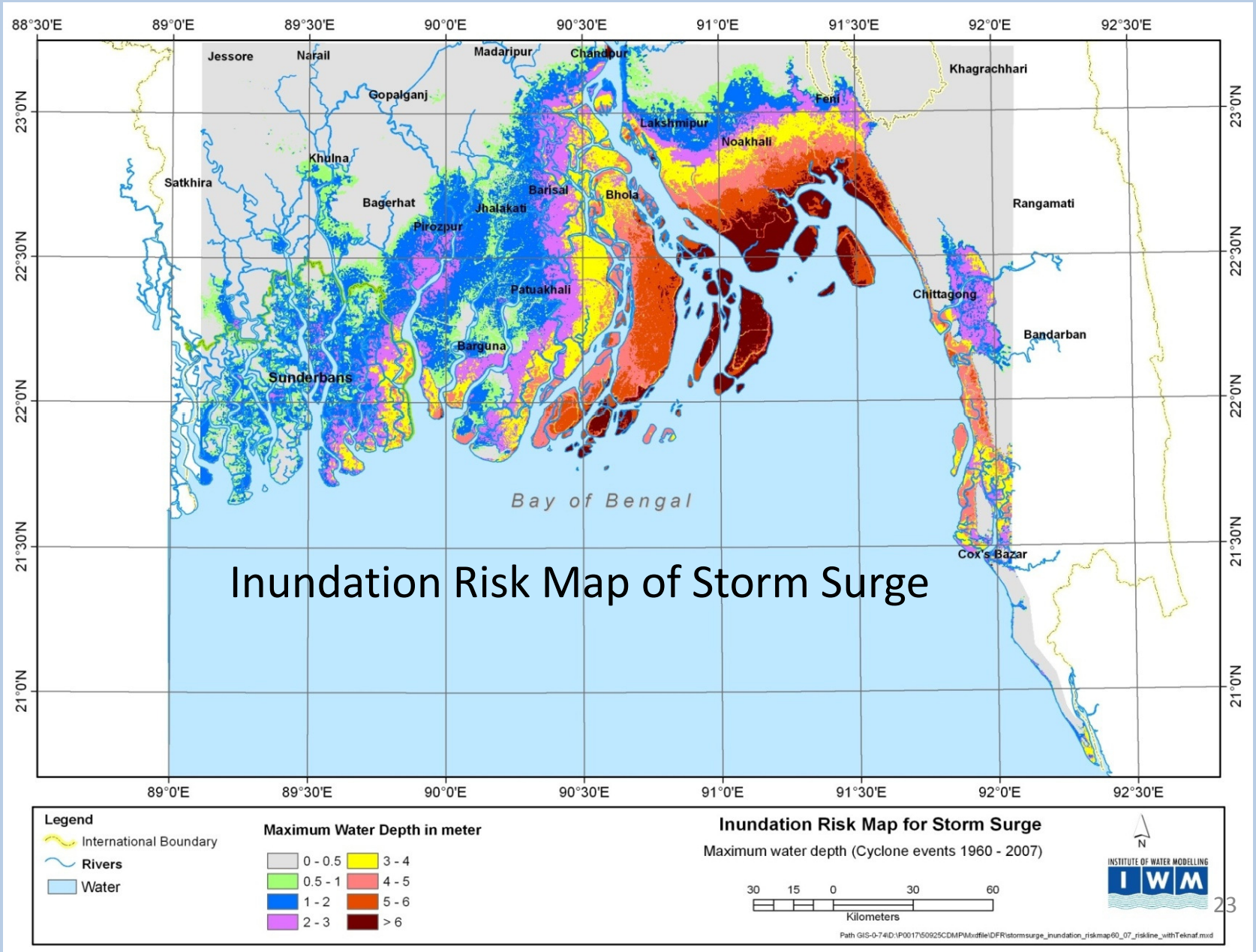
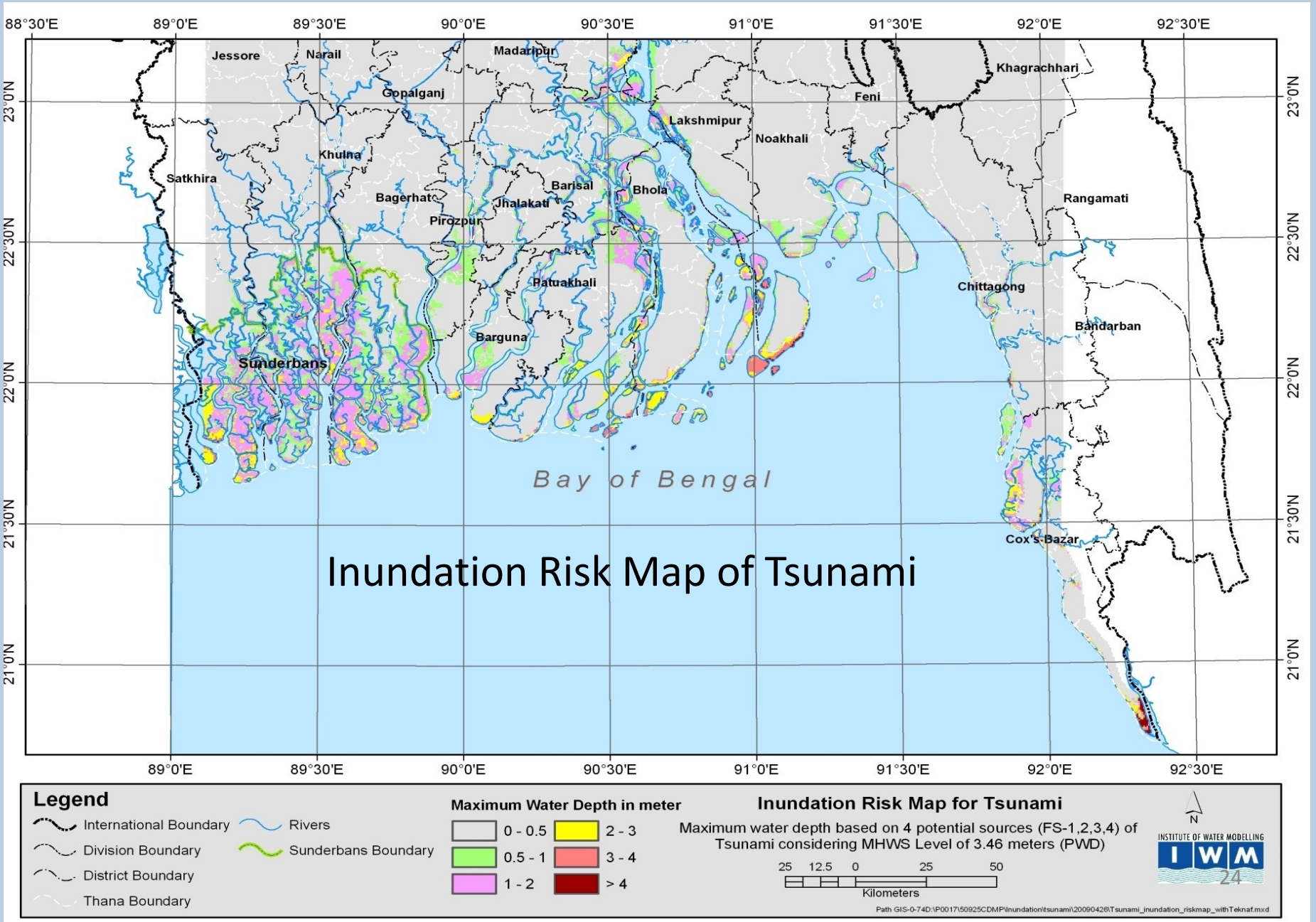
Data: Available Disaster Maps



Data: Available Disaster Maps

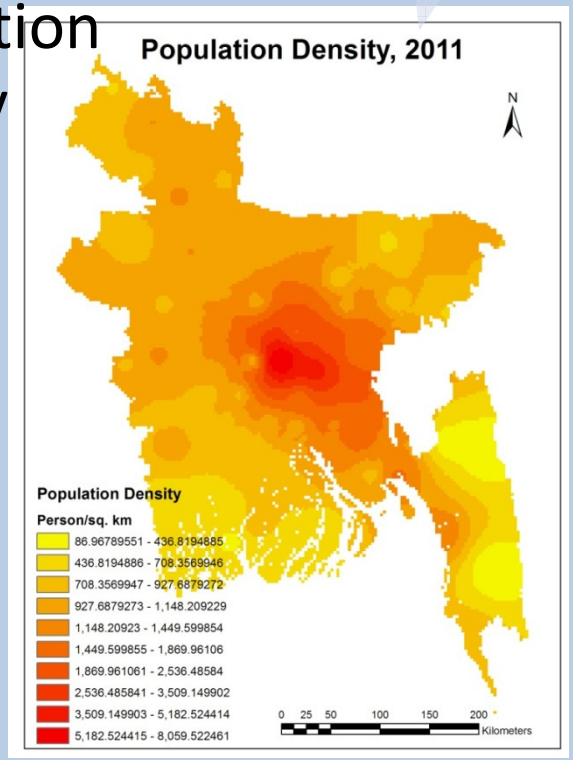


Risk Factors Considered

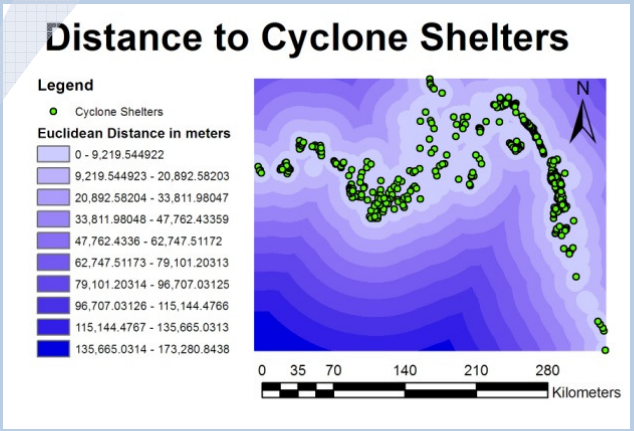
RISK MAP

Individual Risk Map

Population Density



Protective Measures



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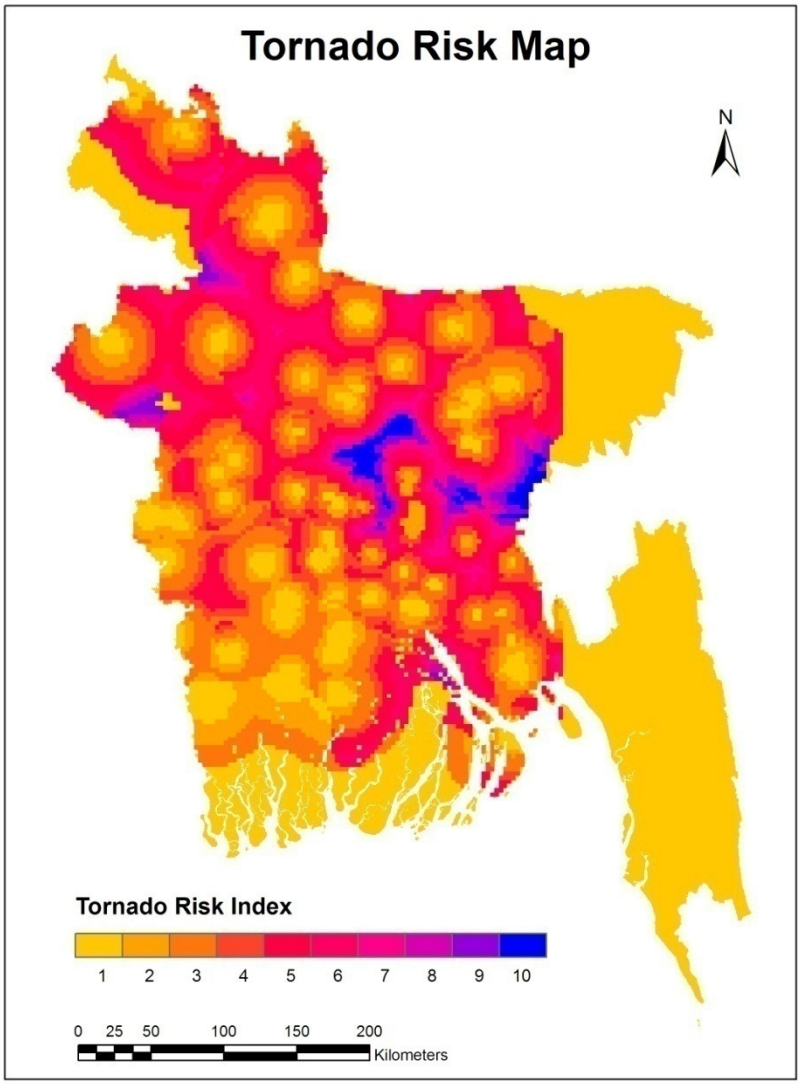
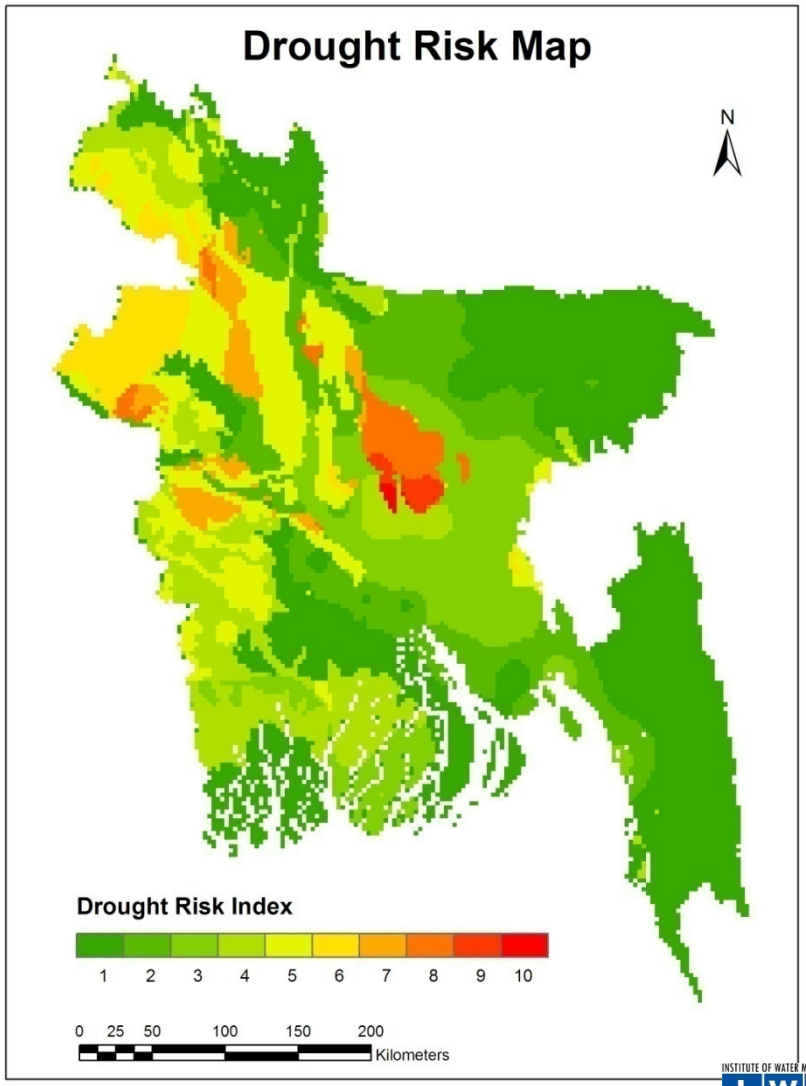
RISK MAP: RECLASSED IN 10 SCALE





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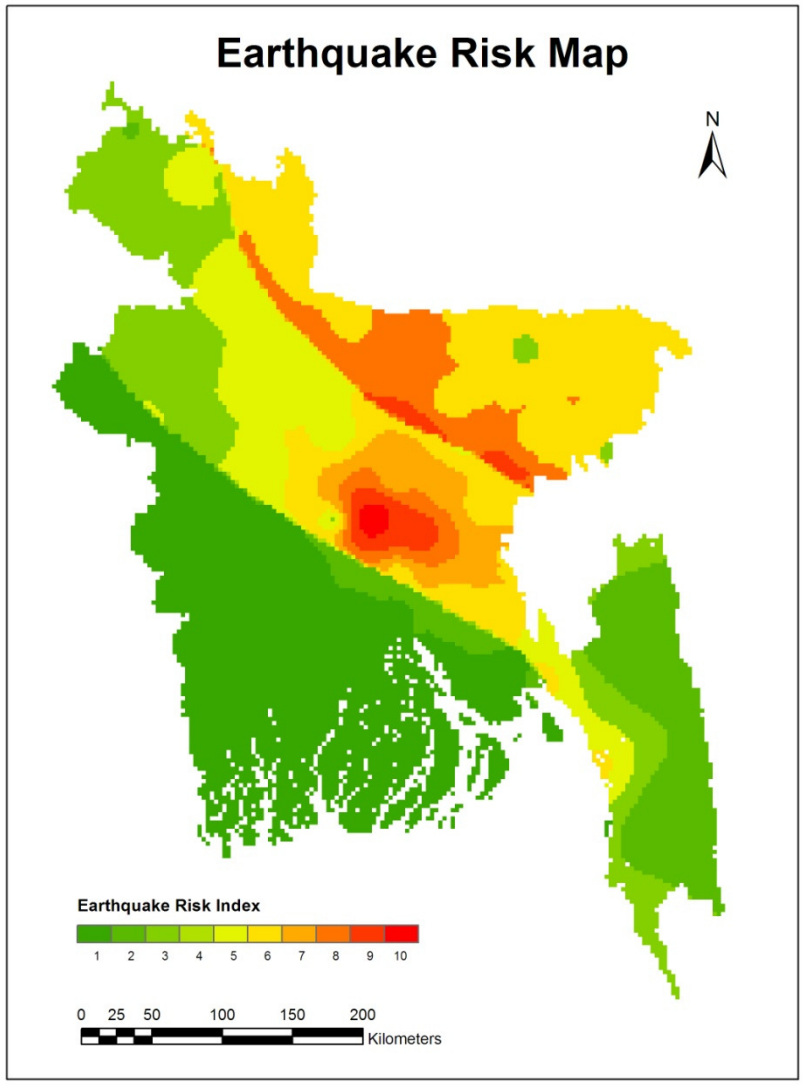
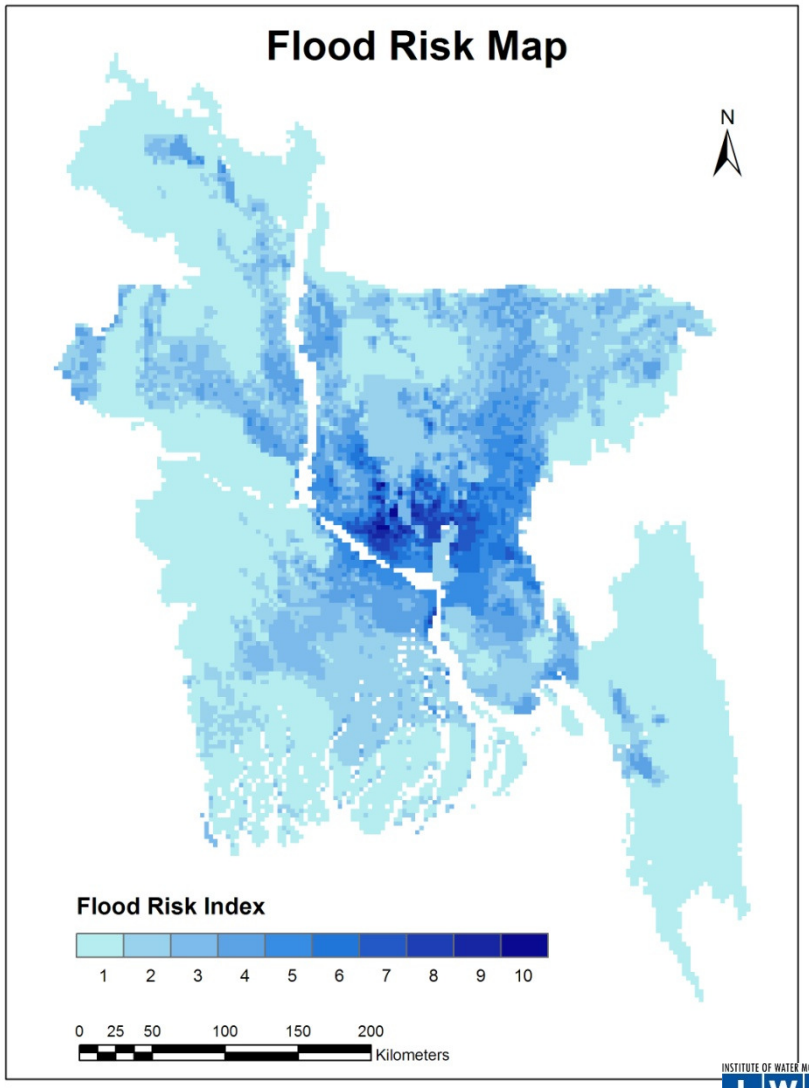
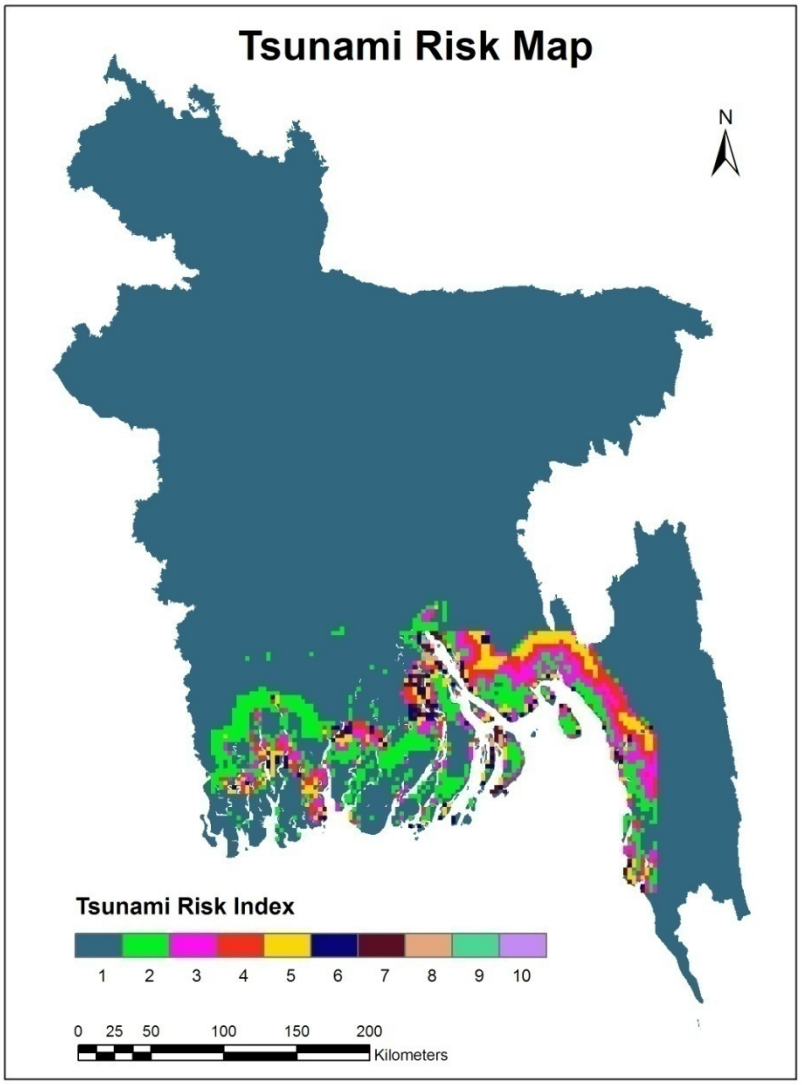
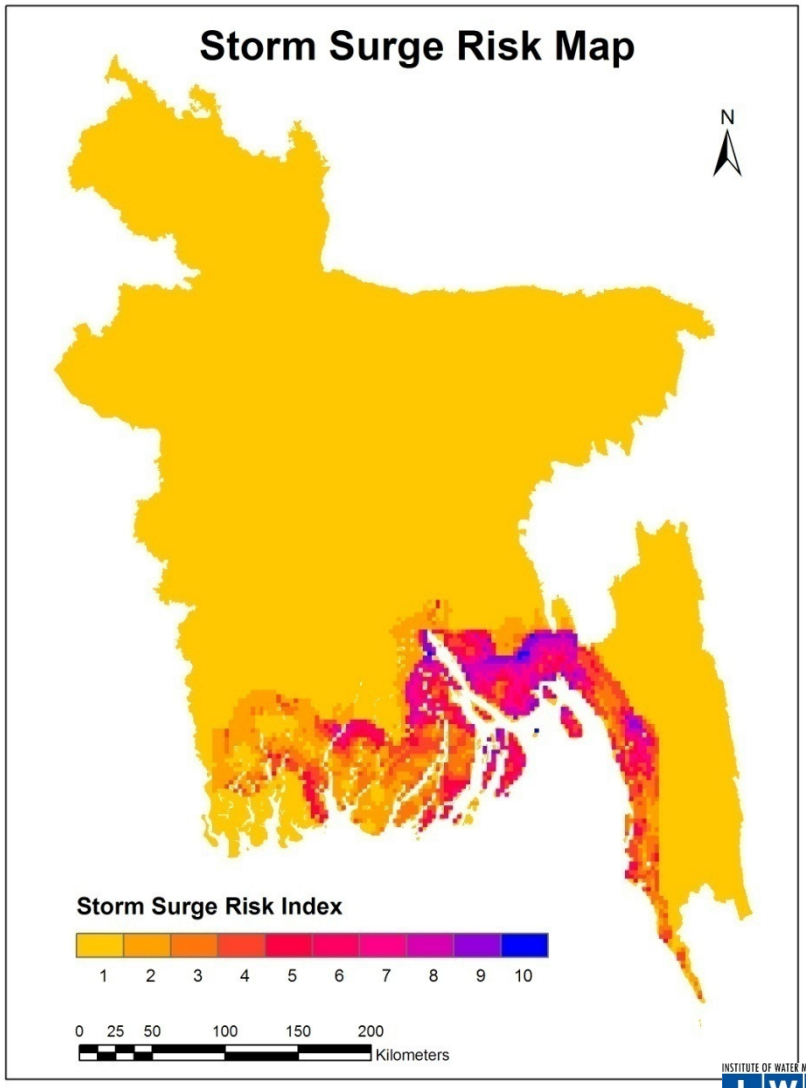




RISK MAP: RECLASSED IN 10 SCALE





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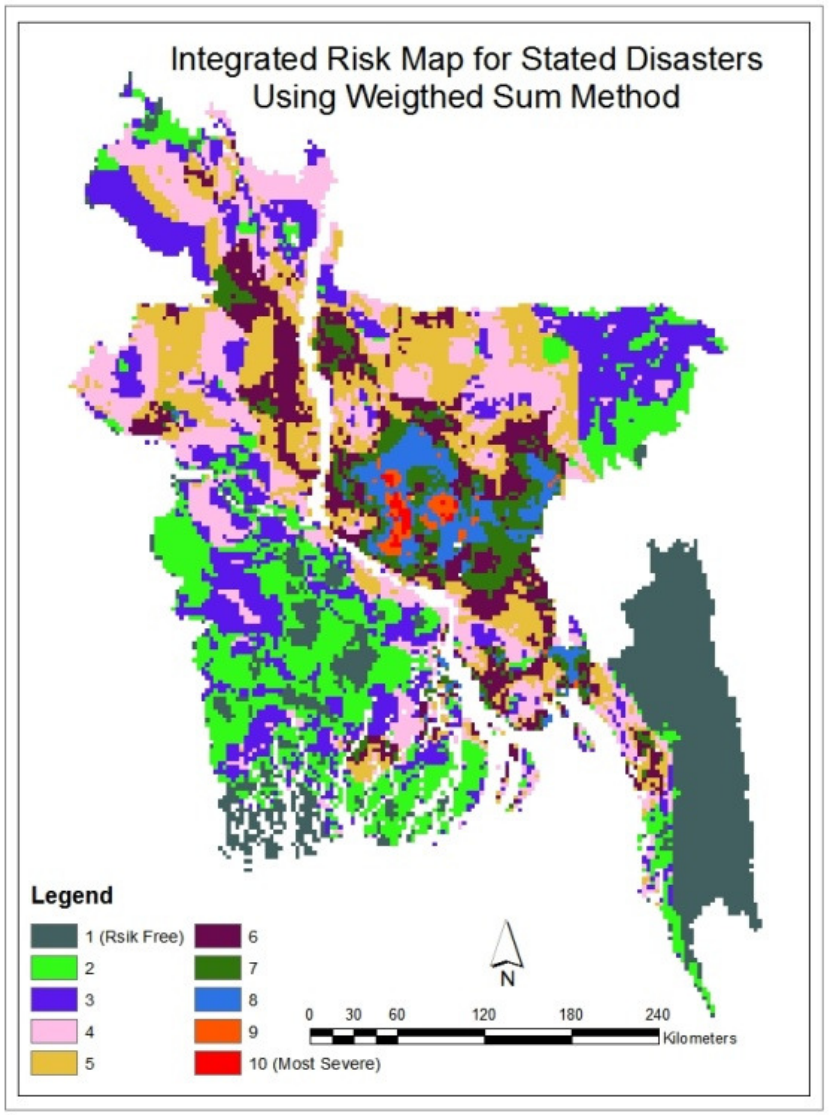
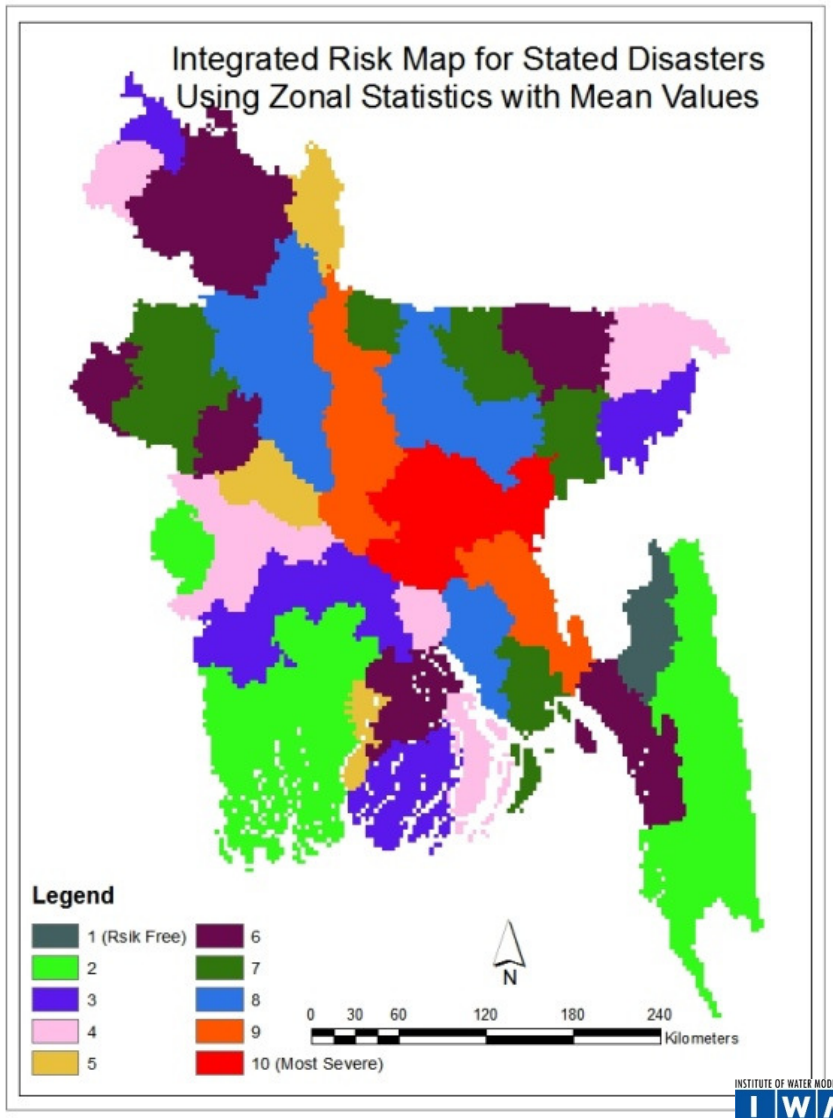
Combined Risk Map





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Results

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

Divisions	Indexes							
	2	3	4	6	7	8	10	Grand Total
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

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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

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THANK YOU