Institute of Water Modelling & its potential role as a DAN in Sentinel Asia

Presented by:-

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Institute of Water Modelling (IWM)

Bangladesh

Presentation Outline

- About IWM
- Area of Service
- IWM in Sentinel Asia
- EORs responded
- Case study of an EOR response
- Potential role of IWM as a DAN

ISO 9001:2015 CERTIFIED INSTITUTION

IWM Water Environment & Climate

- IWM is a Self sustaining, Not-for-profit Trust established In 1996 by the Government of Bangladesh

- Works in the field of **Water**, **Climate**, **Environment Engineering**, **ICT**, **Remote Sensing**

- Business registration also in Malaysia

- International Field Offices in Nepal & India

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IWM Water Environment & Climate

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Area of Service

- Integrated Water Resources Management
- Climate Change Impact Assessment – Adaptation and Mitigation Measures
- River Hydraulics and Morphology
- Flood Forecasting and Early Warning
- Groundwater, Irrigation and Drainage Management
- Water Supply and Sanitation
- Water Quality and Ecology
- Wave and cyclonic storm surge prediction
- Disaster impact assessment & mitigation
- Software management and IT solutions

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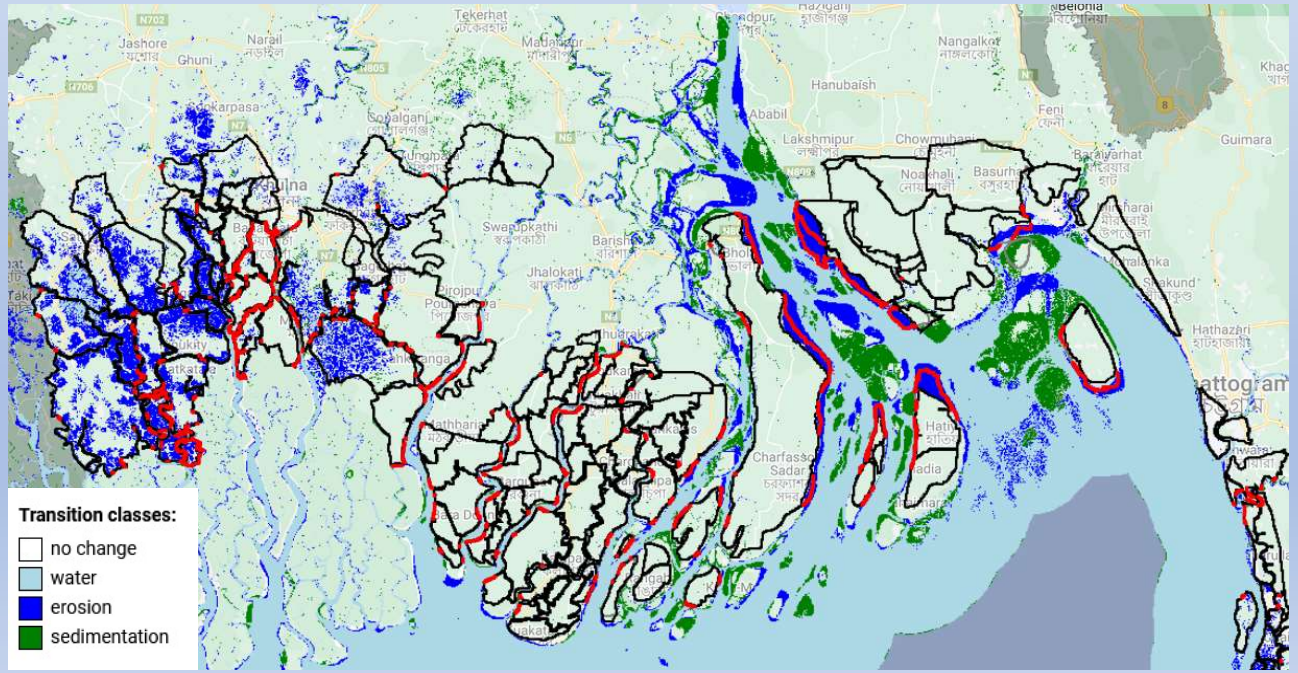
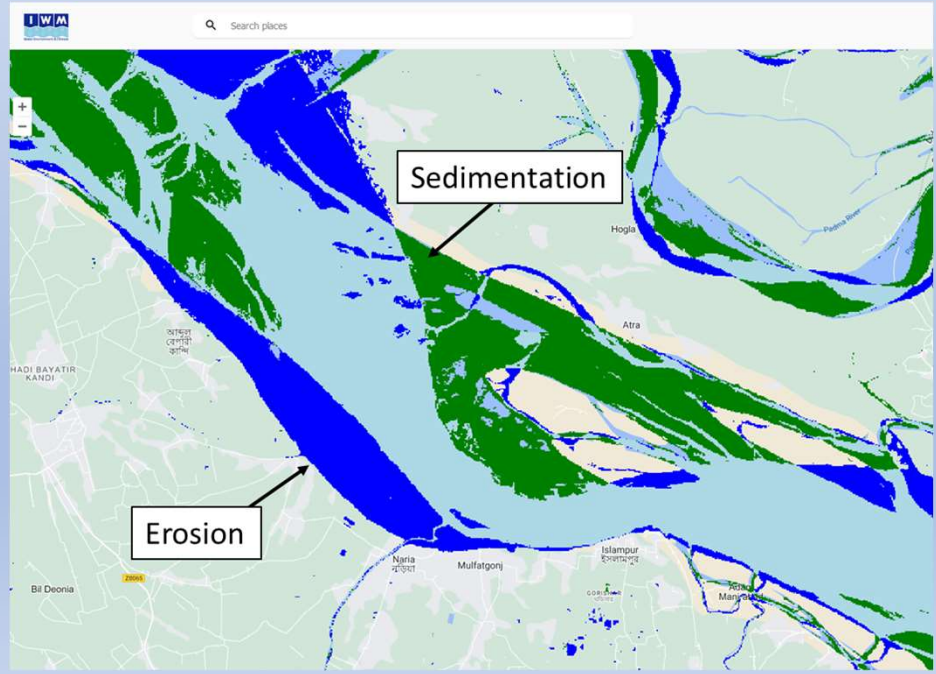
Spaced Data Based Disaster Impact Assessment & Planning

Bangladesh Erosion Monitor

- Cloud based geospatial analysis platform
- Connects global data collection with local available data to conduct erosion risk assessment.



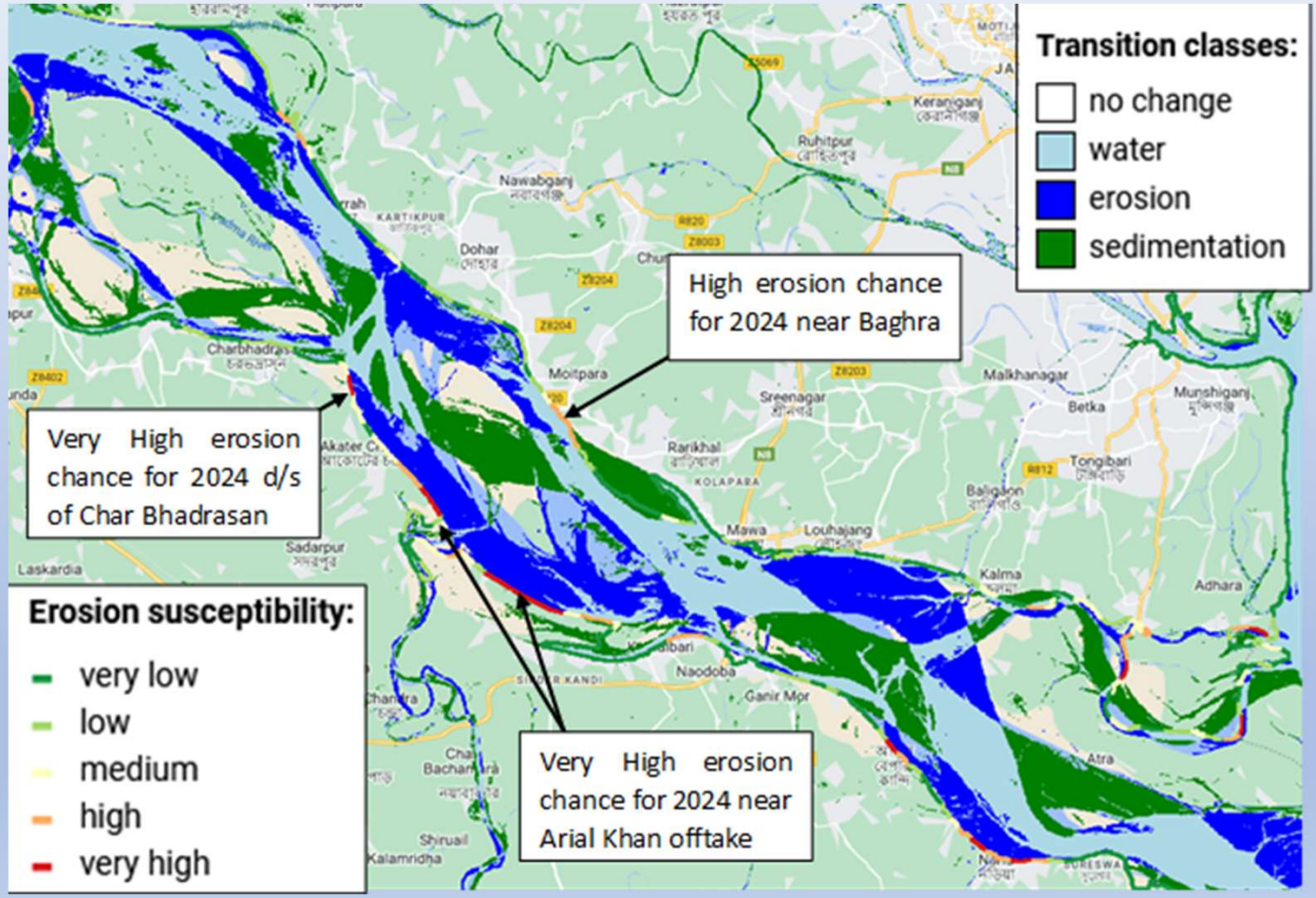


Spaced Data Based Disaster Impact Assessment & Planning

Bangladesh Erosion Monitor:

- Automatically analyzes the available LANDSAT images to provide the user erosion/deposition areas of a river/coast

- Based on the earth observation trend calculates which reaches are erosion prone in the upcoming monsoon.



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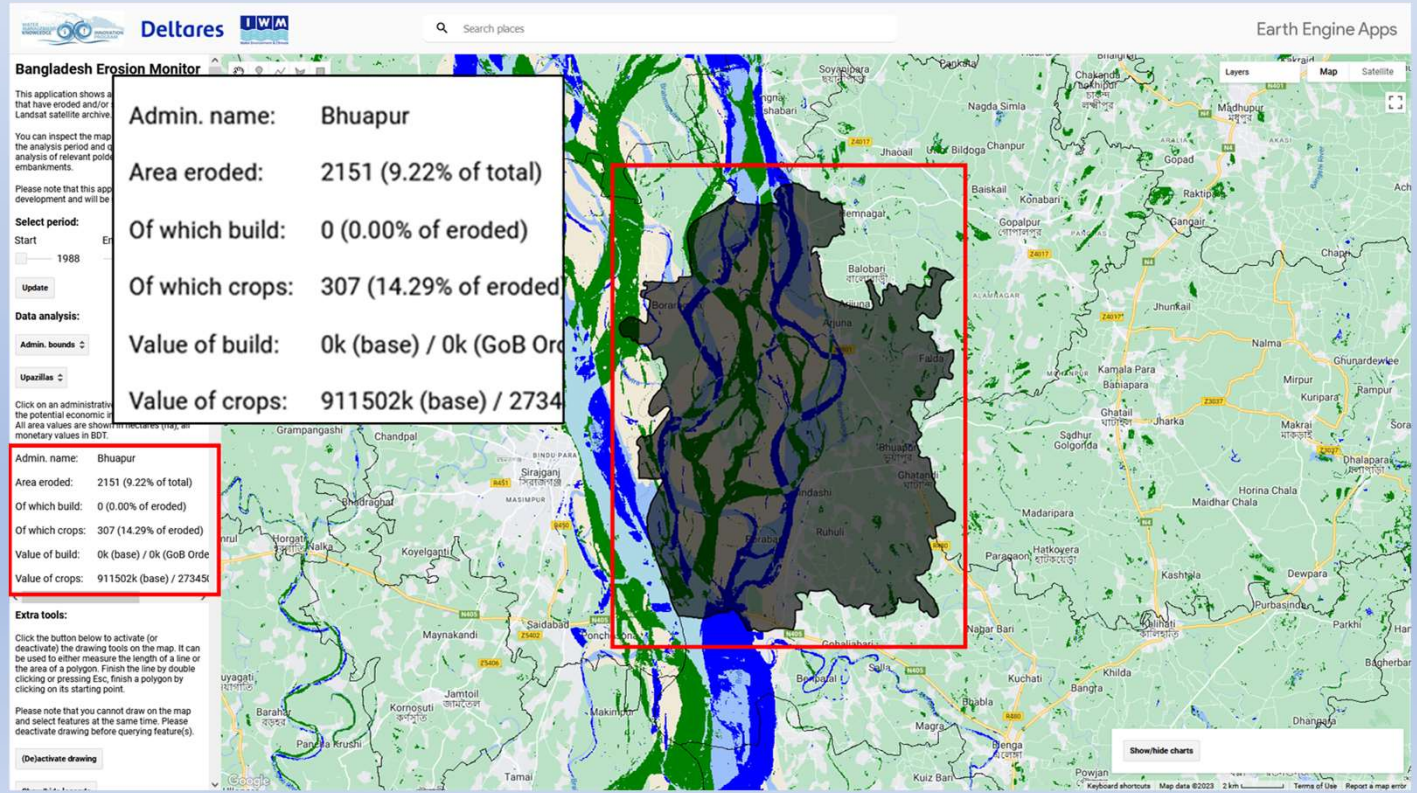
Bangladesh Erosion Monitor

- Provides the economic loss statistics for historical erosion at different administration level on-the-fly.



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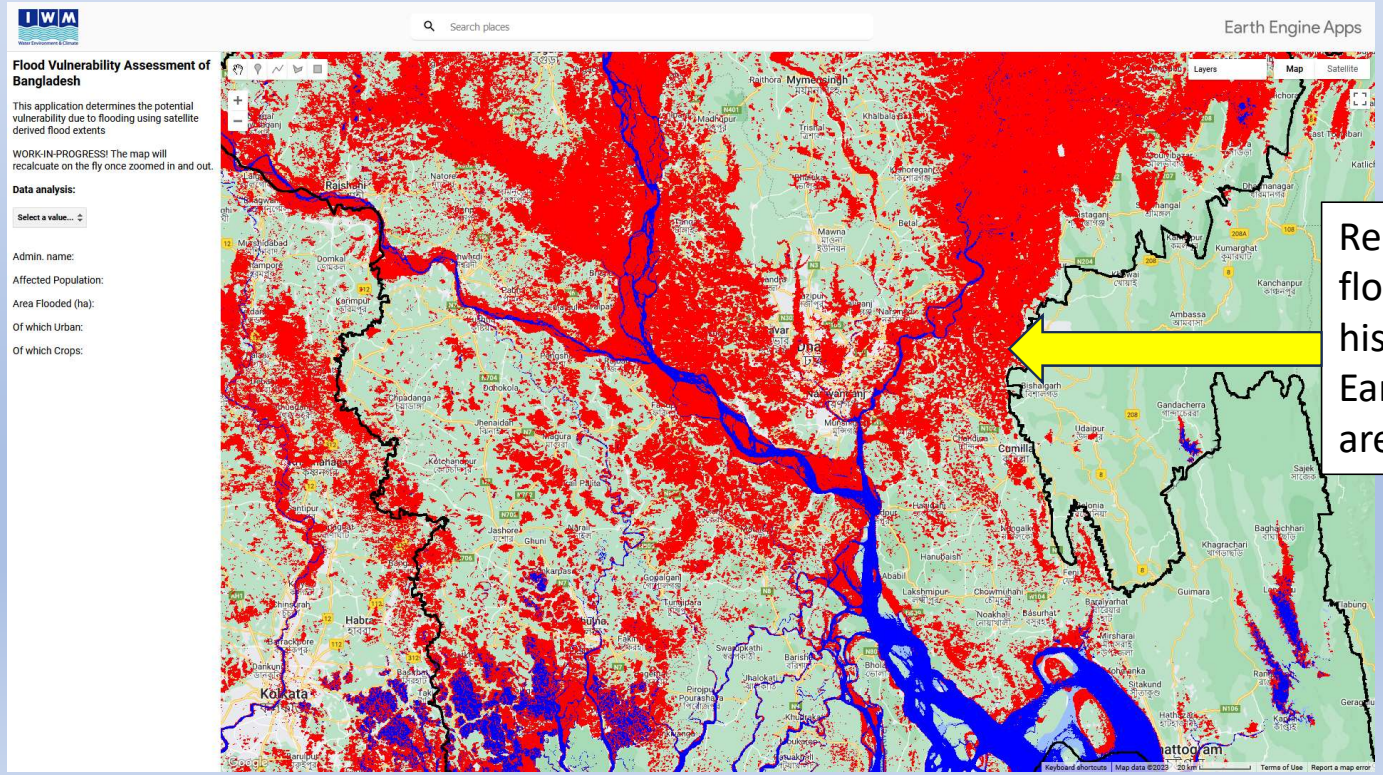
Spaced Data Based Disaster Impact Assessment & Planning

Bangladesh Flood Vulnerability

- Shows the area which have been effected by flooding based on MODIS data from 2001-2020



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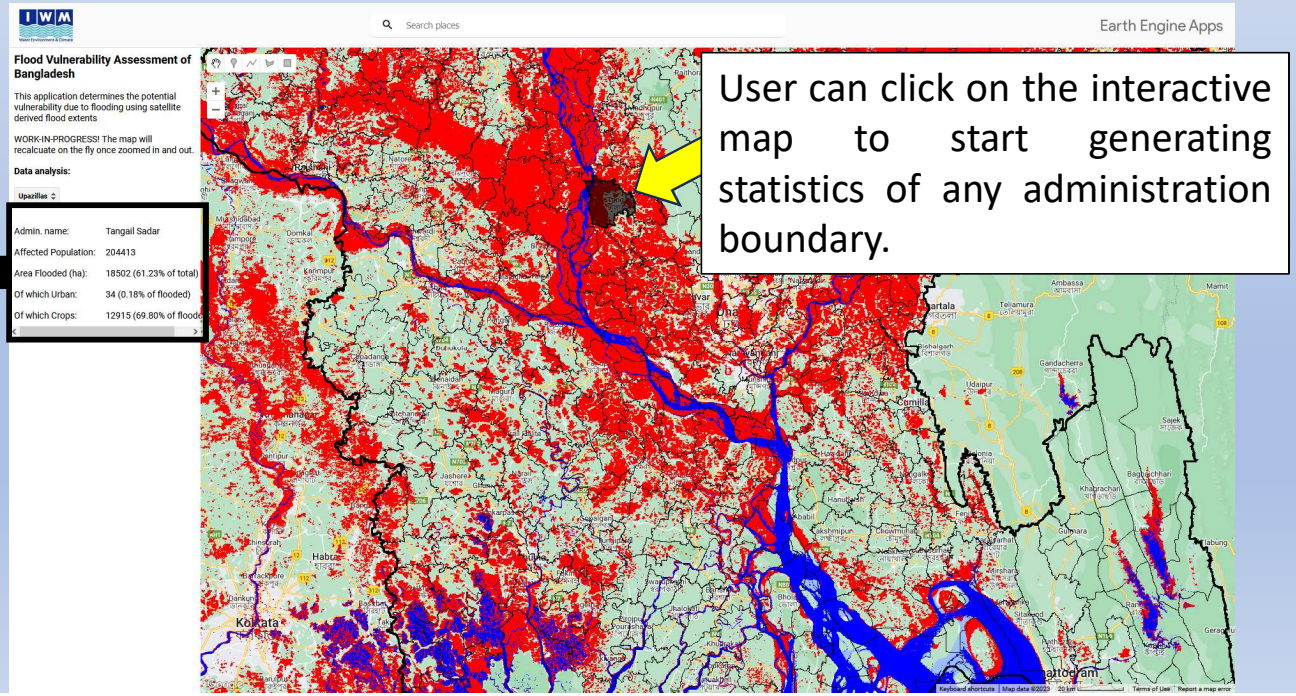
Spaced Data Based Disaster Impact Assessment & Planning

Bangladesh Flood Vulnerability

- Generates statistics of the potential number of people affected due to historical flooding, area of land which got flooded historically as well as the area of urban & croplands of any user selected administrative boundary.

Admin. name:	Tangail Sadar
Affected Population:	204413
Area Flooded (ha):	18502 (61.23% of total)
Of which Urban:	34 (0.18% of flooded)
Of which Crops:	12915 (69.80% of floode



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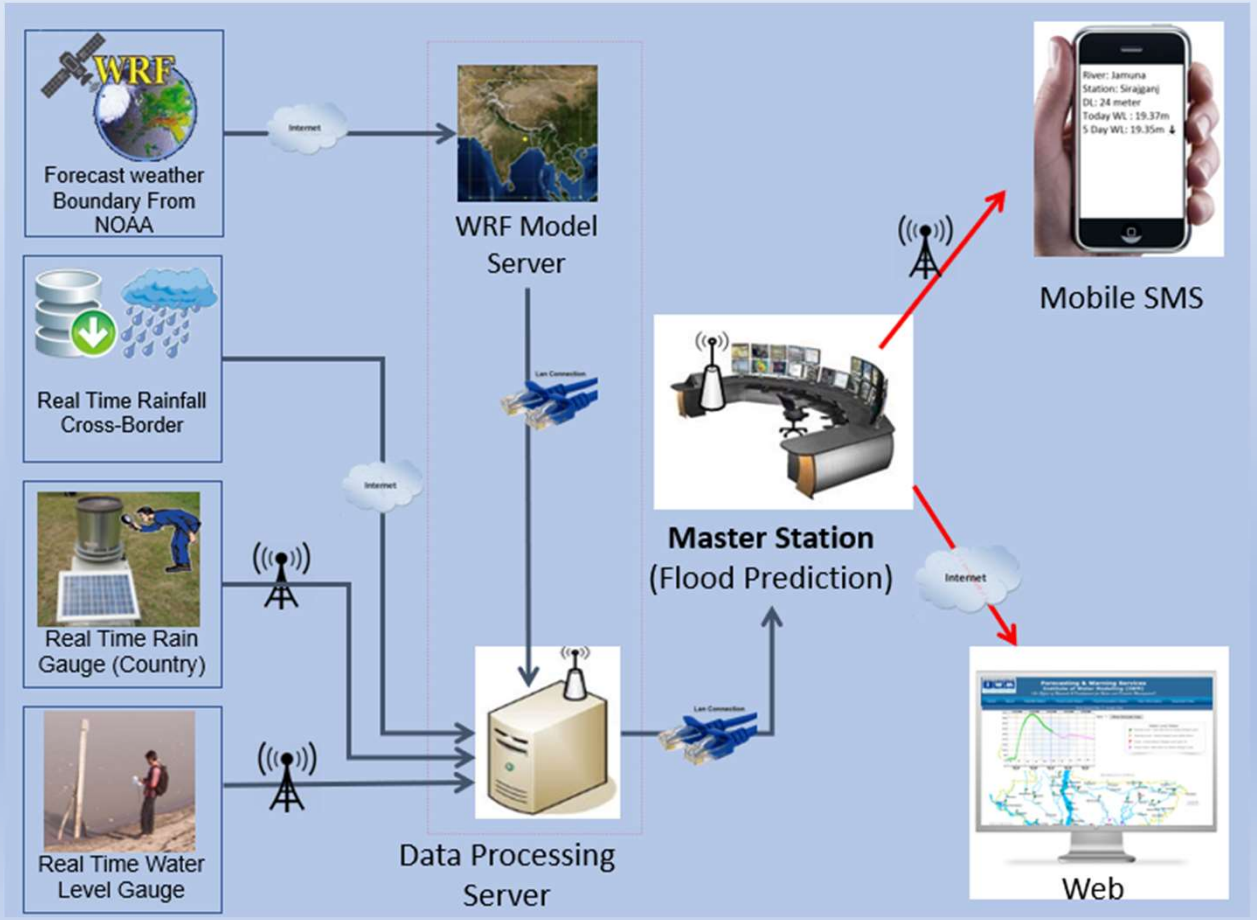
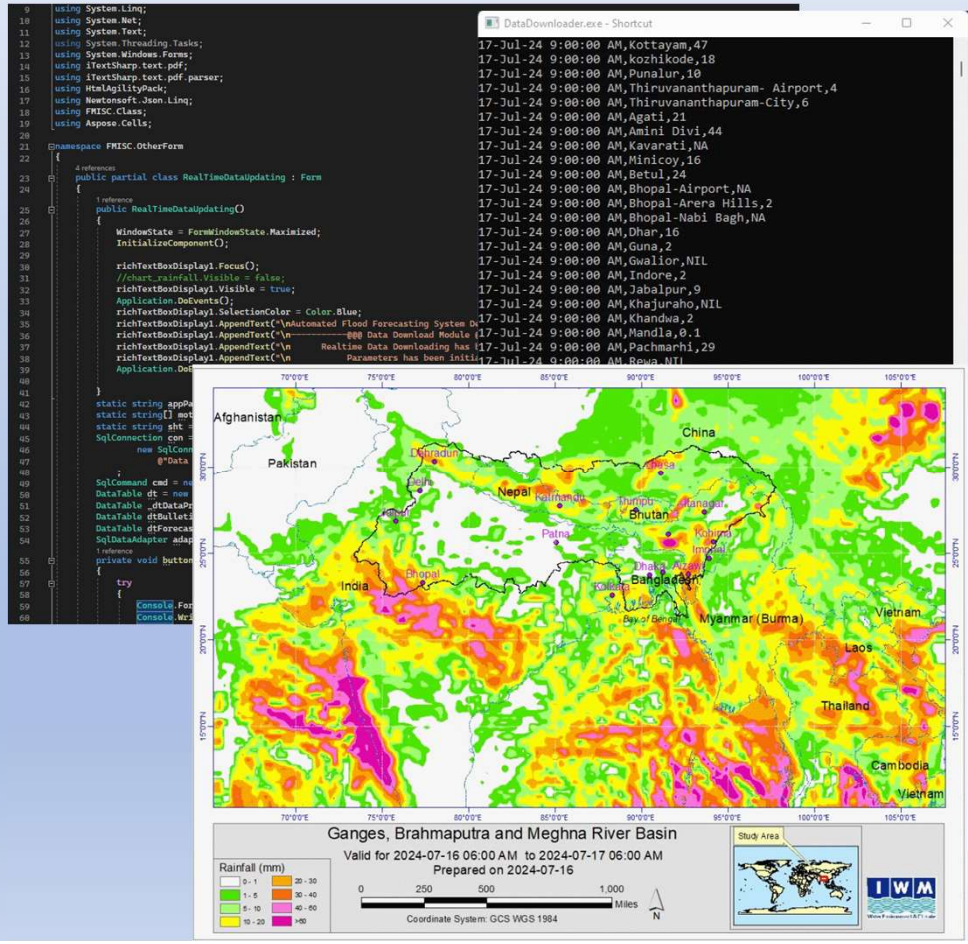
Flood and River Basin Management

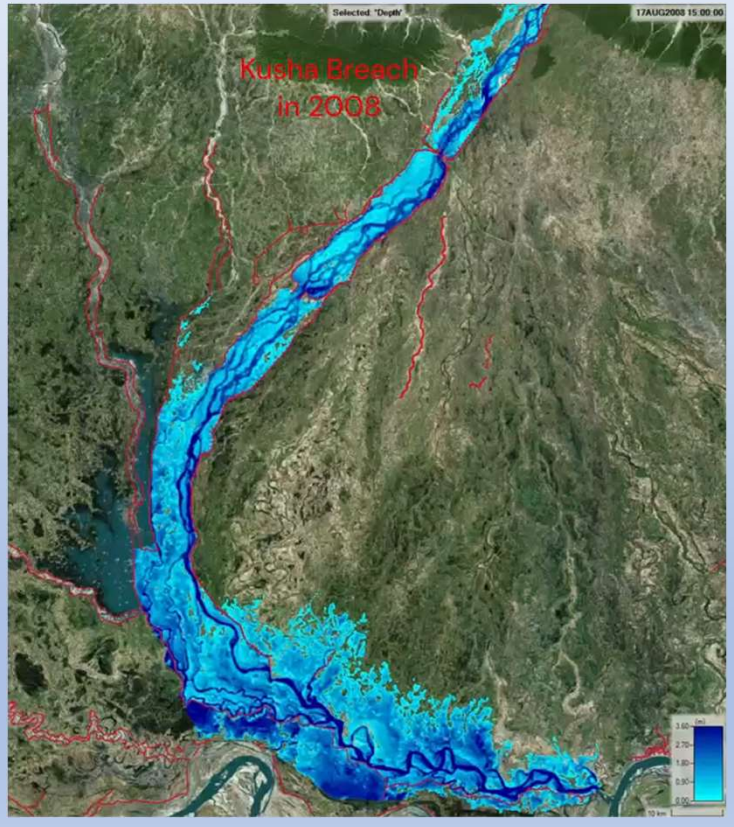
Automation in Flood Forecasting and Warning System

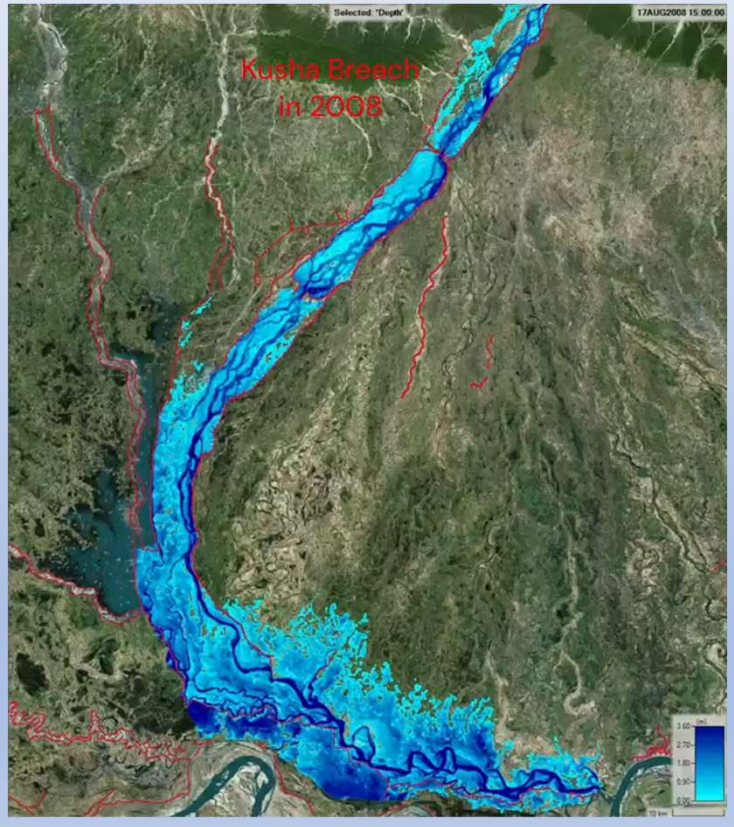




Embankment Breaching Modelling

- ✓ 2008 Koshi River Breach in HEC-RAS 2D
- ✓ Identify flood vulnerable area
- ✓ Emphasized the importance of regular maintenance, early warning systems, and effective disaster preparedness.





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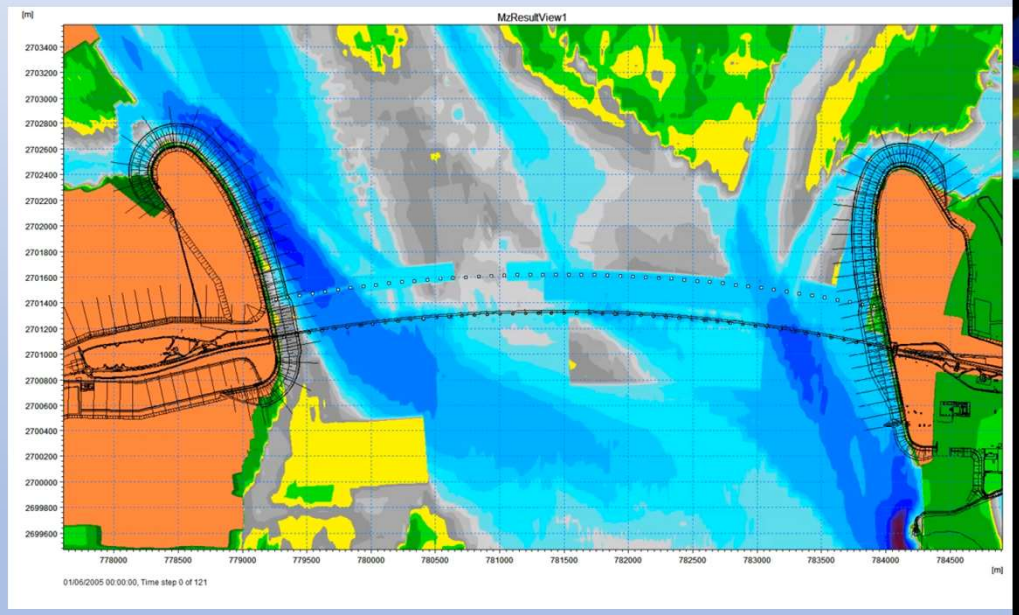
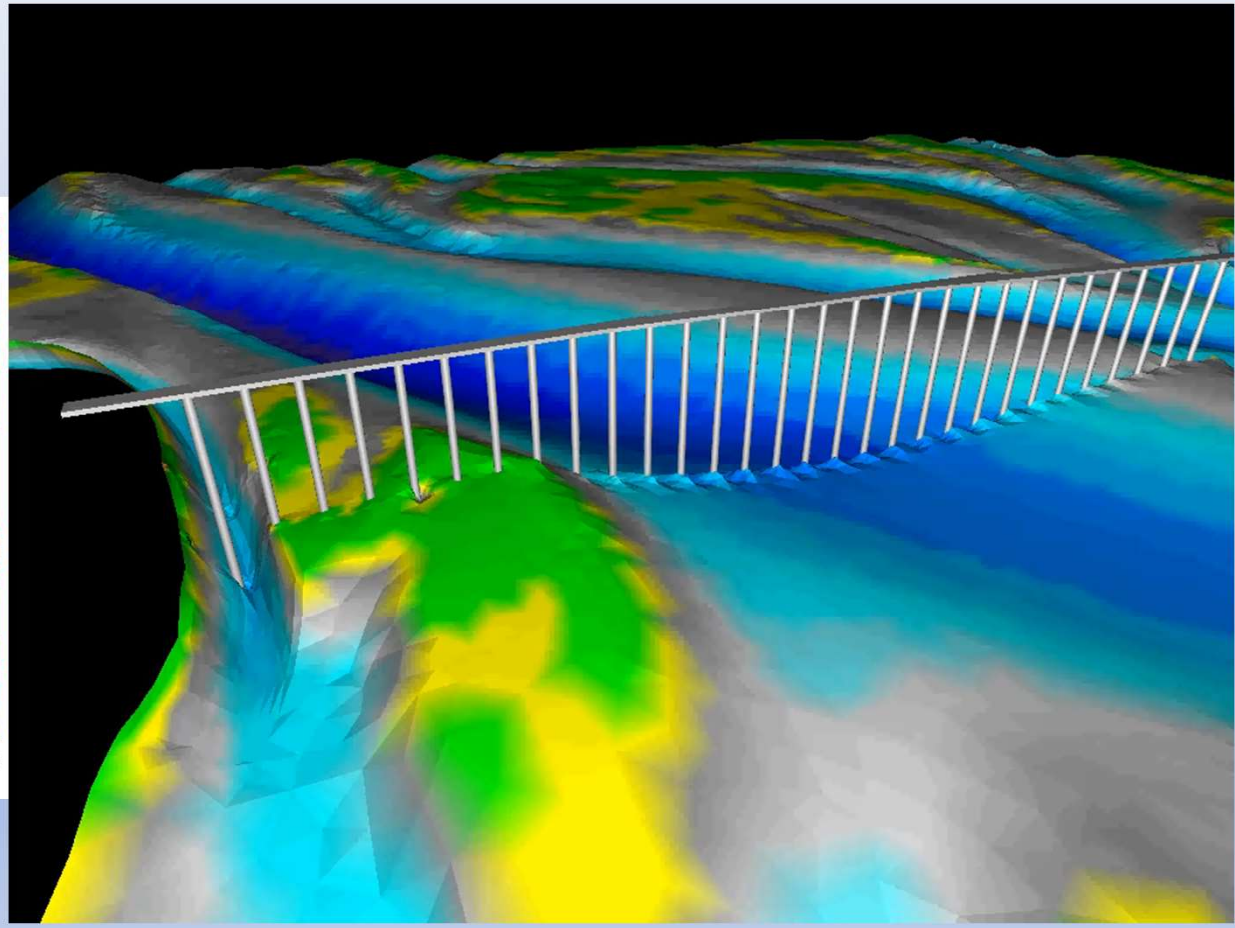
River Hydraulics & Morphology





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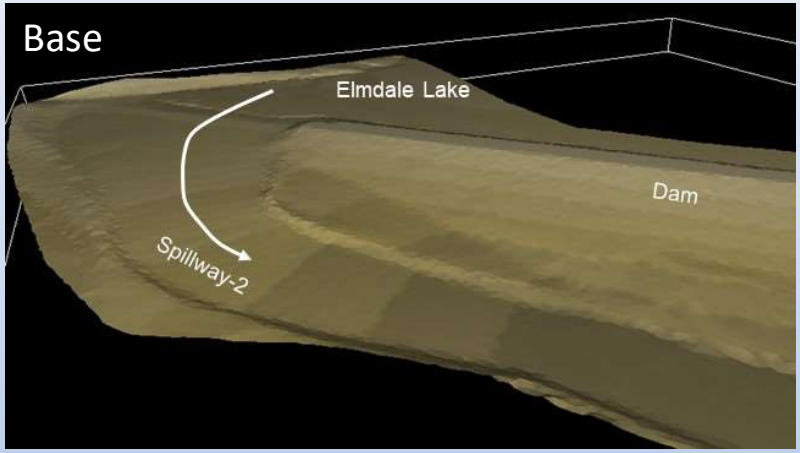
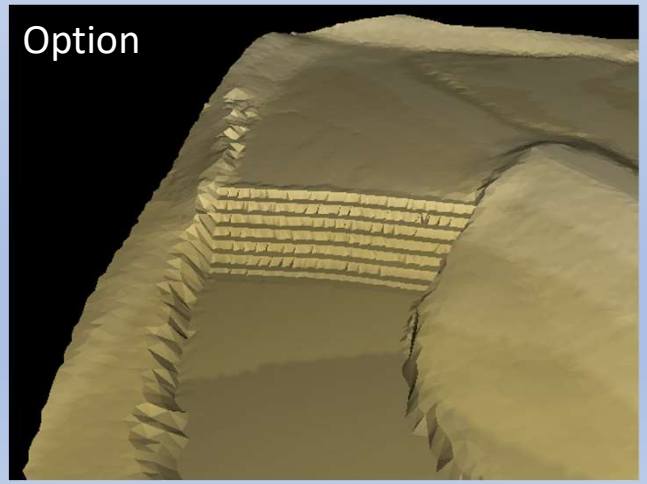
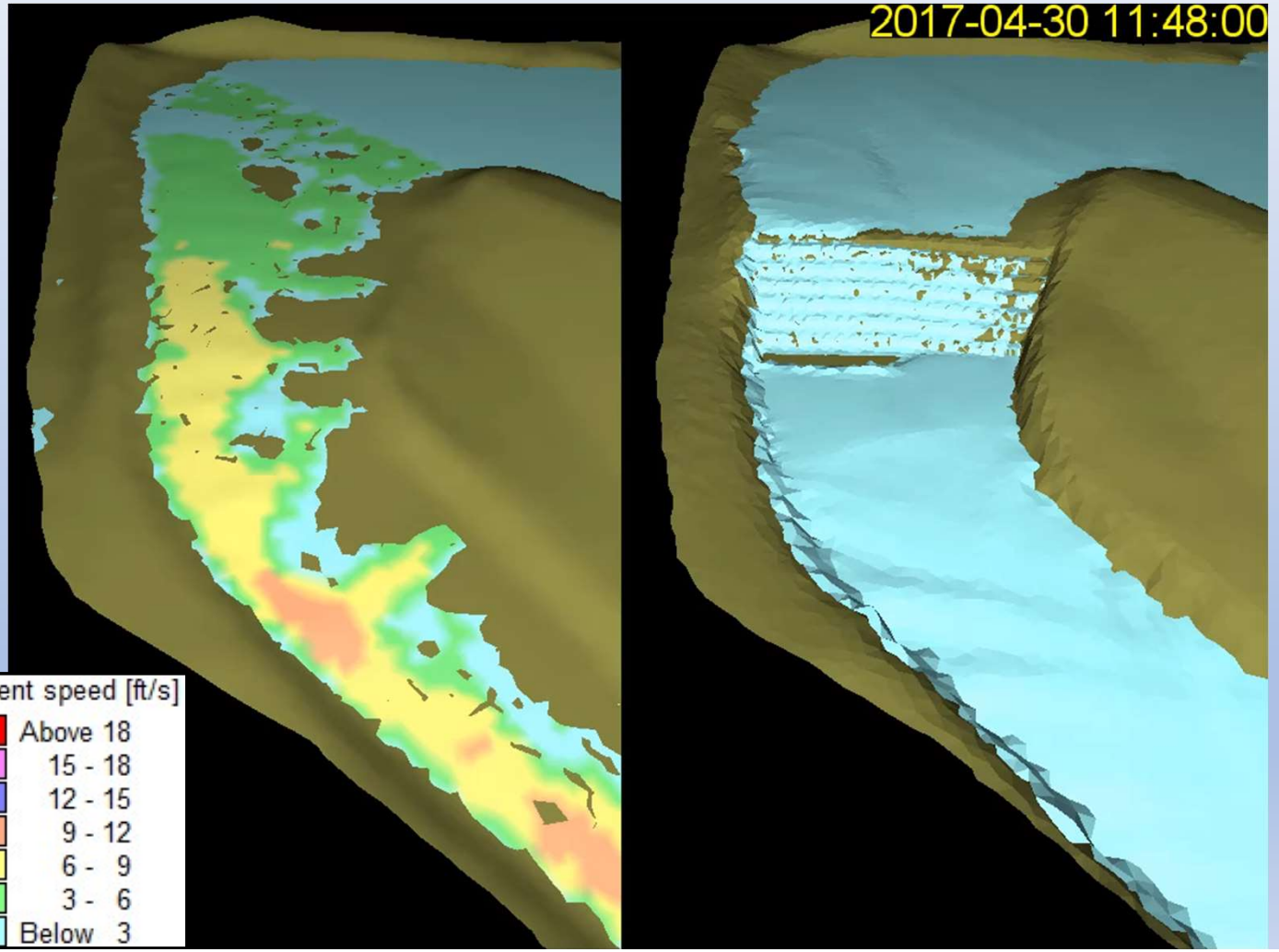
River Hydraulics & Morphology







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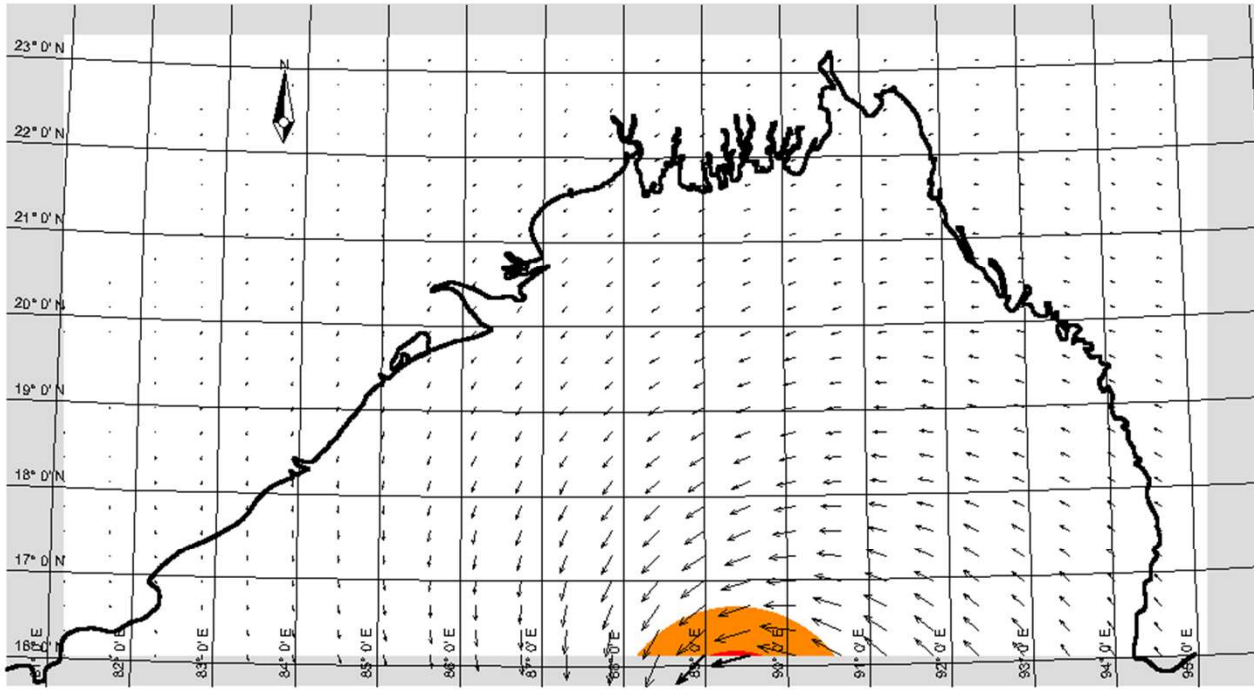
Storm Surge Modelling

Observed Track (Sidr, 2007)

Simulated Track SIDR, 2007



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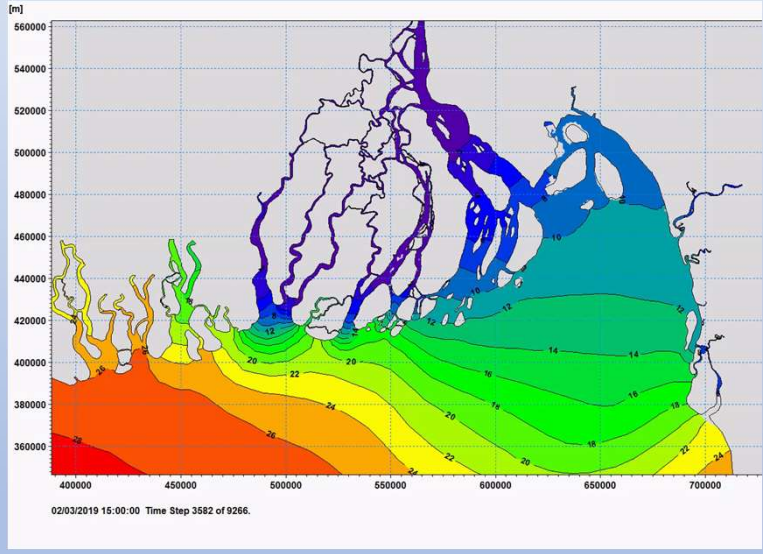
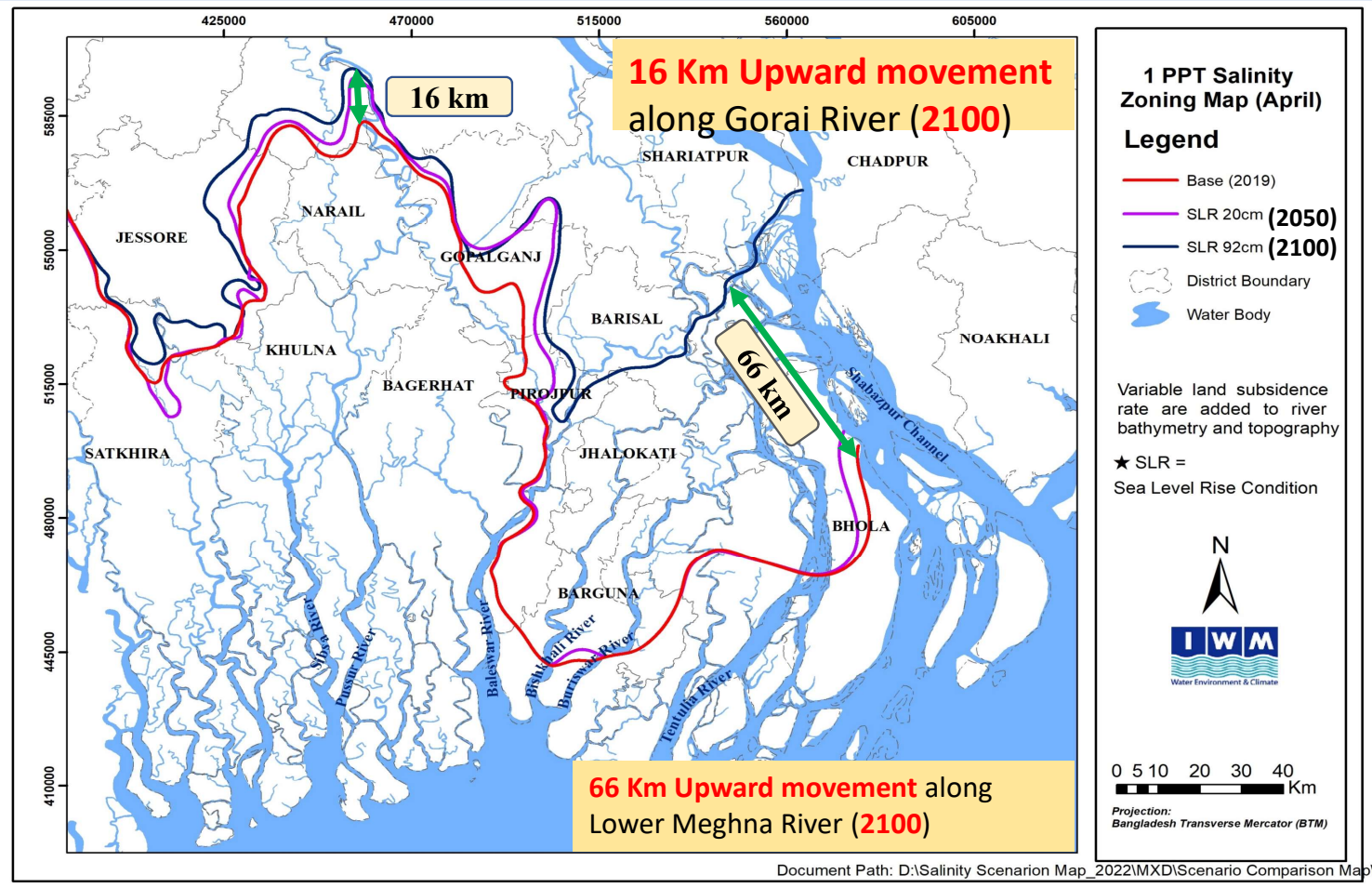
Salinity Intrusion due to Climate Change





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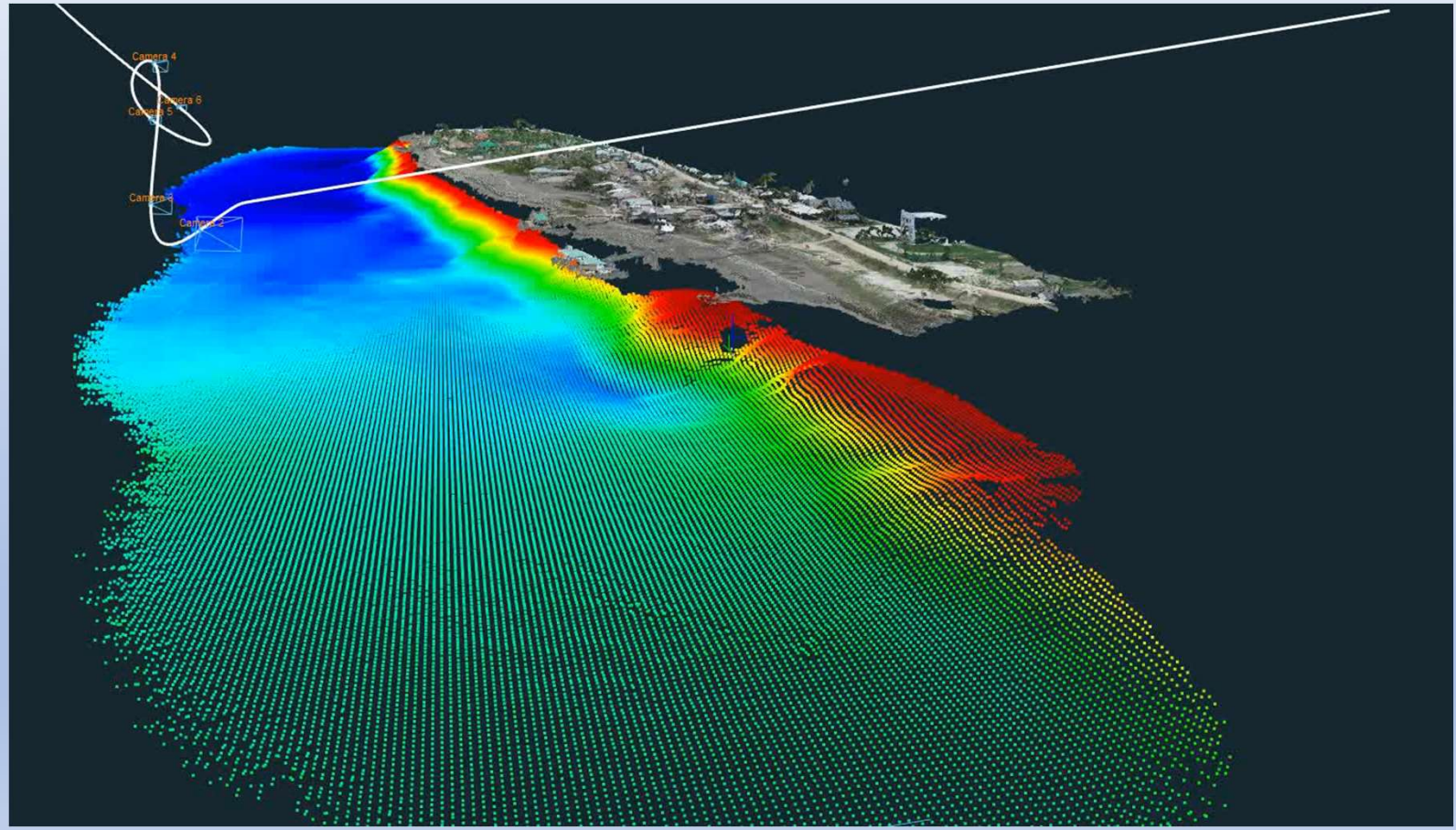
State of the art data collection system

- Topography Survey
- Bathometry Survey
- Hydrological Survey
- Water Quality Sampling
- Sediment sampling and Lab analysis



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IWM in Sentinel Asia

- Acts as a JPT and DAN member of Sentinel Asia.
- Applied for DAN Membership in 24th March, 2024.
- DAN Membership Approved in 19th April, 2024.

Currently Sentinel Asia has 119 Joint Project Team (JPT) members.
(102 organizations from 30 countries/regions and 17 international organizations)

No.	Country / Region	No.	Organization	Data Provider Node (DPN)	Data Analysis Node (DAN)
1	Armenia	1	Ministry of Emergency Situation (MES)		
2	Australia	2	CSIRO Office of Space Science and Applications (COSSA)		
		3	Geoscience Australia (GA)		
		4	Bureau of Meteorology (BOM)		
3	Bangladesh	5	Bangladesh Space Research and remote Sensing Organization (SPARRSO)		
		6	Bangladesh Water Development Board (BWDB)		
		7	Institute of Water Modelling (IWM)		○

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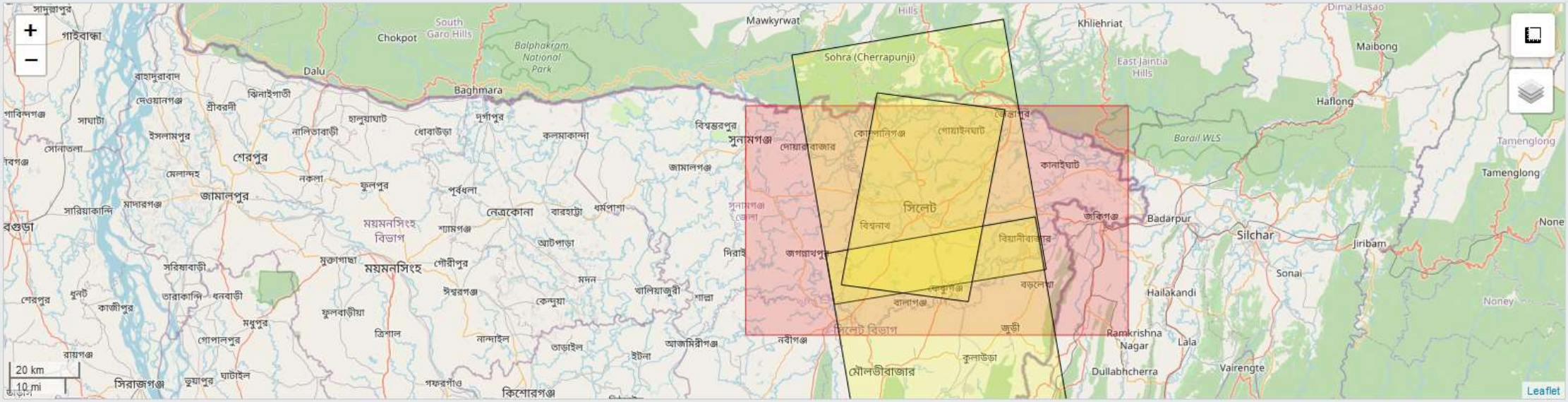
EORs Responded – Sylhet Flood June 2024

REQUEST INFORMATION AND TRACKING Ended

EOR Number: 20240601-Bangladesh-Flood-00506

Print



EOR Called	: 01/06/2024
ALOS-2 satellite overpass on	: 05/06/2024

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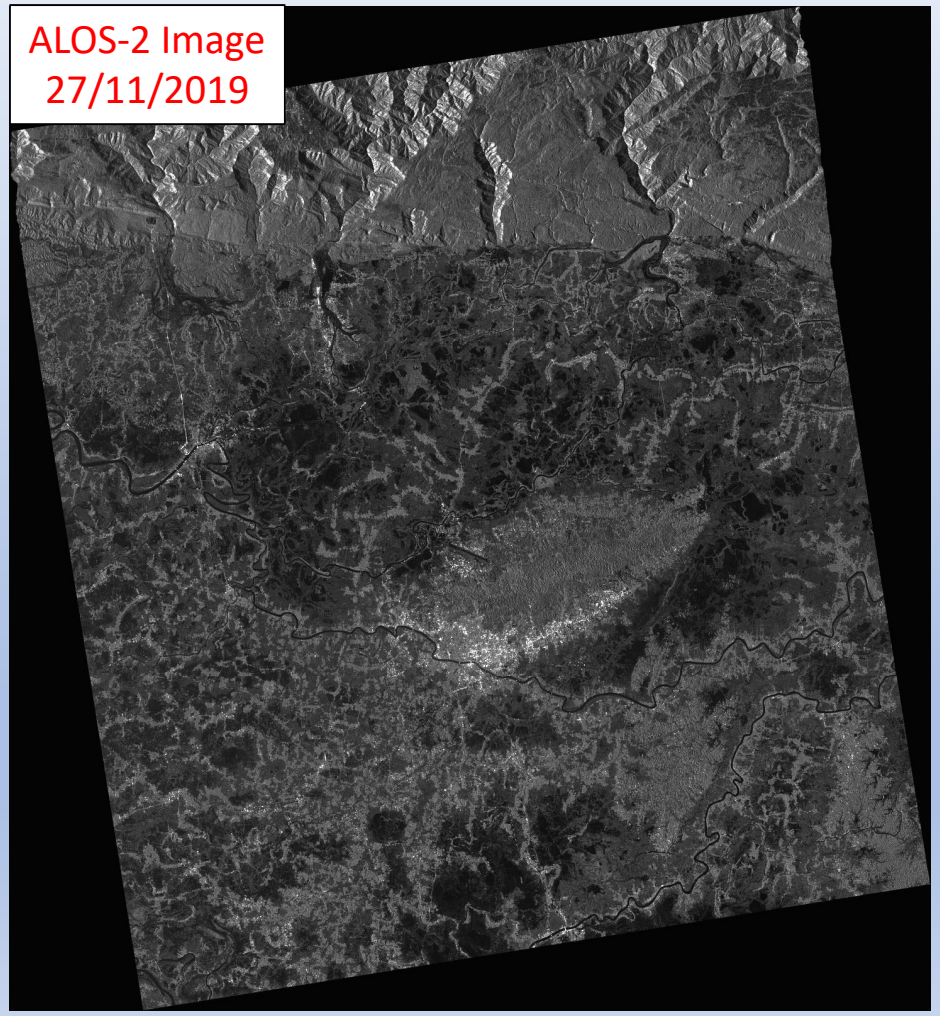
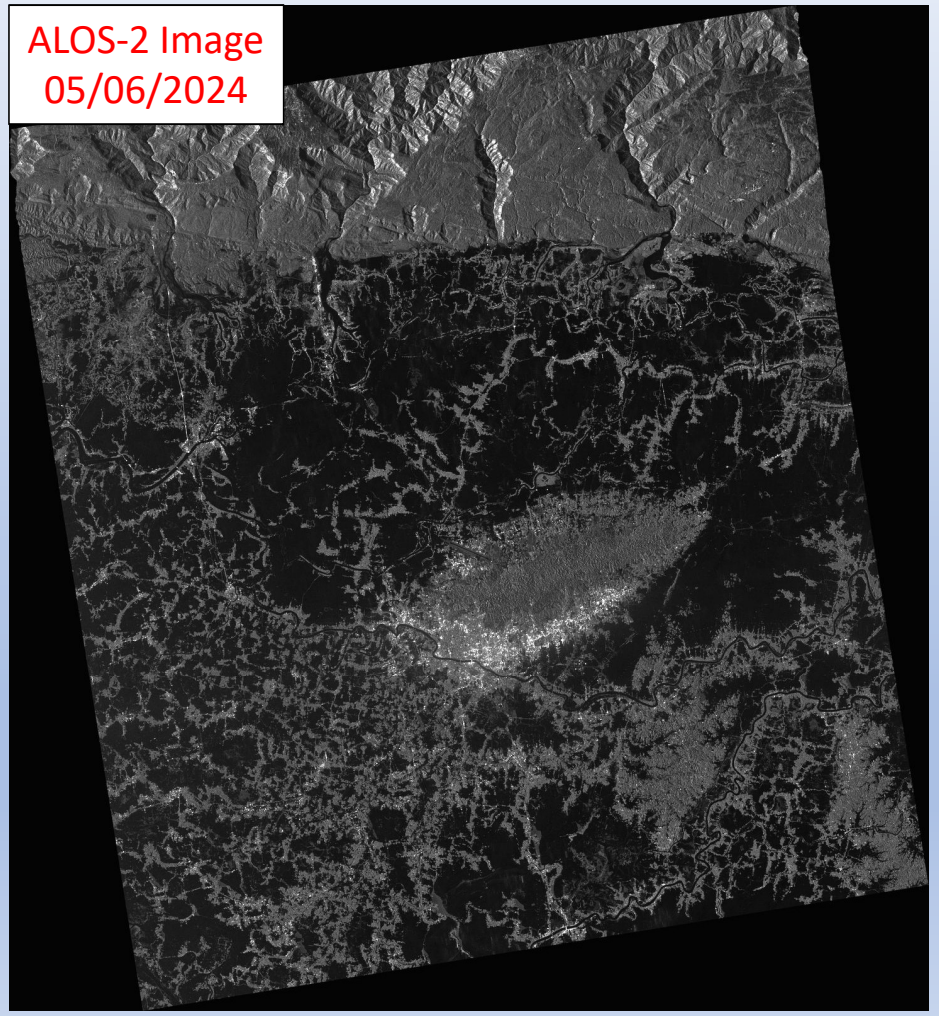
EORs Responded – Sylhet Flood June 2024

ALOS-2 Image
27/11/2019



ALOS-2 Image
05/06/2024



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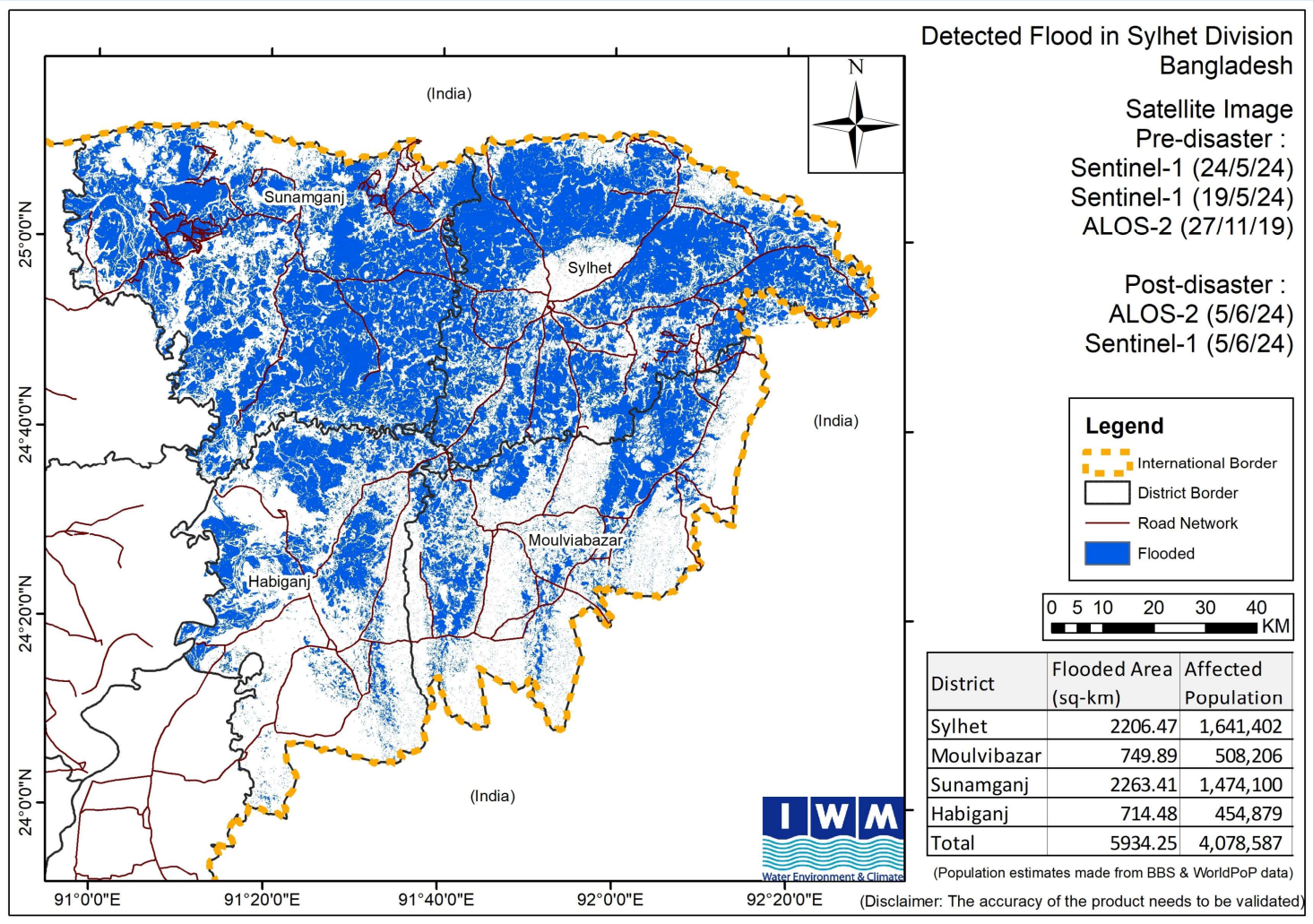
EORs Responded – Sylhet Flood June 2024



District	Flooded Area (sq-km)	Affected Population
Sylhet	2206.47	1,641,402
Moulvibazar	749.89	508,206
Sunamganj	2263.41	1,474,100
Habiganj	714.48	454,879
Total	5934.25	4,078,587

(Population estimates made from BBS & WorldPoP data)

(Disclaimer: The accuracy of the product needs to be validated)

Population effected estimates were made from available geospatial population database

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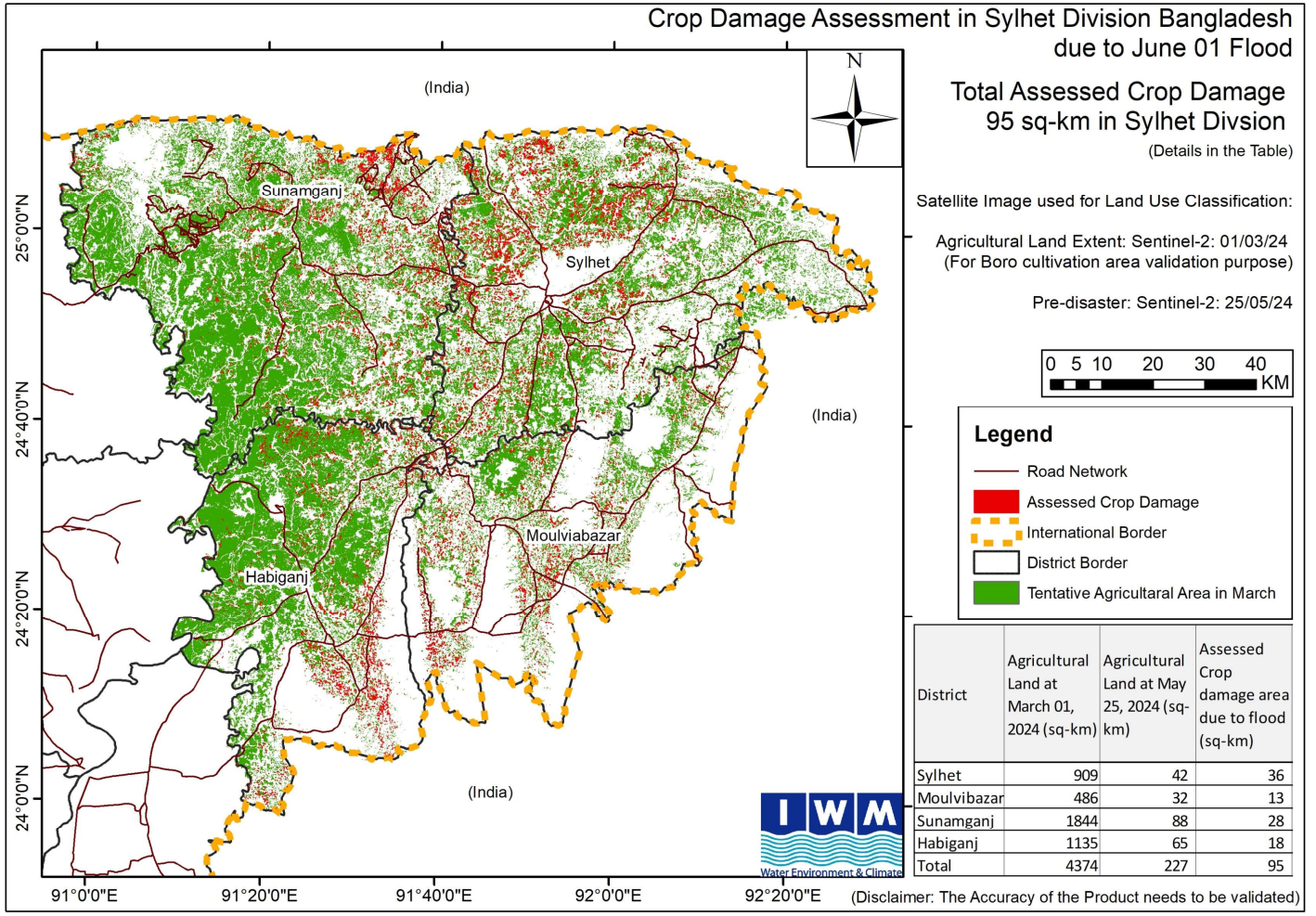
EORs Responded – Sylhet Flood June 2024

District	Image Classification (sq-km) (E)	BBS Data (2022-23) (sq-km) (O)	Accuracy (%) = $100x(1-\sqrt{\frac{(O-E)}{O}}$
Sylhet	909	875	96.05%
Moulvibazar	486	573	84.75%
Sunamganj	1,844	2,234	82.54%
Habiganj	1,135	1,228	92.41%
Total	4,374	4,910	89.08%

District	Agricultural Land at March 01, 2024 (sq-km)	Agricultural Land at May 25, 2024 (sq-km)	Assessed Crop damage area due to flood (sq-km)
Sylhet	909	42	36
Moulvibazar	486	32	13
Sunamganj	1844	88	28
Habiganj	1135	65	18
Total	4374	227	95



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Potential role of IWM as a DAN

- Provide response to the EOR in the quickest possible time.
- In case of Bangladesh, use local knowledge to provide more accurate VAP.
- Combine different global & local EO dataset to assess the impacts of a disaster.
- Has the capacity to carry out detailed disaster impact analysis & develop tools for overall strategic planning purposes.
- Combine Earth Observation Data with process based modelling tools.

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Request to other JPTs & DPNs

- Please call EORs early. Forecast models most of the time can provide 1 to 2 days lead time before the disaster strikes. Calling EOR after the disaster strikes, make it very hard to capture the data during disaster.
- Try to reduce the lag time between EOR and DPN. Swift availability of data only makes the response faster.
- Sometimes only data of post-disaster is provided by the DPNs. Data for both pre-disaster & post-disaster aids in preparing a more accurate VAP.

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THANK YOU