Use of SBT and ICT in DRM in Bangladesh

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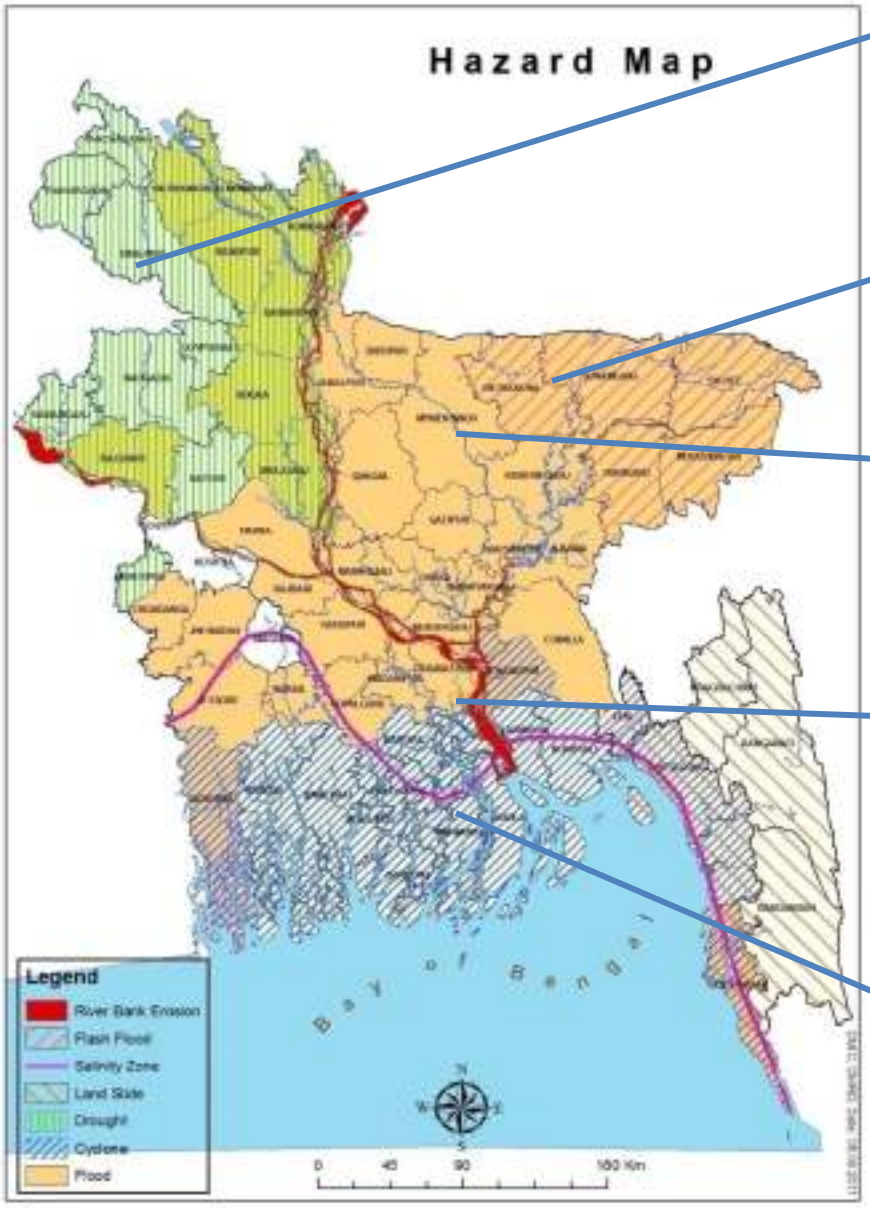
Country Profile: Bangladesh

- Total Geographic Area : 147,570 km^2
- Total population : 142.319 million
- Population density: 1174/km^2
- Pop^n density in Coastal areas: 1000/km^2
- Total Urban Population : 42 million
- Population in Dhaka (mega city): 15 million
- Floodplains: 80% of total areas
- Located at fragile deltaic flood-plain
- Around 300 rivers **(57 Trans boundary rivers)**
- High-risk to recurrent natural disasters

BD Hazard Profile



DROUGHT
Affects 8.3 million ha land
In 2006, reduced food grains by 1 million tons
Loss of grazing fields, dried ponds, water shortage

FLASH FLOOD
Damages standing crops
Damages infrastructures and facilities
Unpredictable, uncertain

FLOOD
Inundates more areas, increases river erosion
Breaches embankments, damages infrastructures
Loss of crops, fisheries, livestock, biodiversity

SALINITY INTRUSION
Sea level rise, damage to Sundarbans watersheds
Damages crop lands
Spreading intrusion from 1.5 to 2.5 Mha (2007)
Lack drinking water, burden to women & children Projected displacement: 6-8 m by 2050

CYCLONE
Remain to be the deadliest and most destructive hazard Recurring event Lingering aftermath, complex recovery Improved preparedness (CPP, shelters, embankments)

Major Hazards in Bangladesh

- Flood and Flash Flood
- Cyclone and Storm Surge
- River Bank Erosion
- Tornado
- Landslide
- Drought
- Earthquake
- Lightening

Vulnerability Profile

Hazards	Flood	Flash Flood	Drought	Cyclone salinity
Vulnerable land area (%)	61.09	23.09	45.89	31.99
Vulnerable population (%)	71.47	26.75	45.73	26.71

One of the most densely populated countries

Persistent rural poverty

Fast urbanization with growing urban poor

Major Disasters in Bangladesh

Year	Disaster	Death
1970	Cyclone	500,000
1988	Flood	1,708
1988	Cyclone	4,000
1989	Drought	800
1991	Cyclone	138,868
1996	Tornado	545
1997	Cyclone	550
1998	Flood	918
2004	Flood	747
2007	Flood	800
2007	Cyclone(SIDR)	3,406
2009	Cyclone(Aila)	190
2016	Lightening	222

Major Earthquakes Affecting Bangladesh

Date	Name of Earthquake	Magnitude (Richter)	Intensity at Dhaka (EMS)	Epicentral Distance from Dhaka (km)
10 January, 1869	Cachar Earthquake	7.5	V	250
14 July, 1885	Bengal Earthquake	7.0	VII	170
12 June, 1897	Great Indian Earthquake	8.7*	VIII+	230
8 July, 1918	Srimongal Earthquake	7.6	VI	150
2 July, 1930	Dhubri Earthquake	7.1	V+	250
15 January, 1934	Bihar-Nepal Earthquake	8.3	IV	510
15 August, 1950	Assam Earthquake	8.5	IV	780

Economic Losses Due to Floods Cyclones in Three Decades

- 1987 floods — US$ 1.0 billion
- 1988 floods — US$ 1.2 billion
- 1998 floods — US$ 2.8 billion
- 2004 floods — US$ 2.3 billion
- 2007 floods — US$ 1.1 billion
- 2007 Cyclone (Sidr) — US$ 2.1 billion
- 2009 Cyclone (AILA) — US$ 1.1 billion

Total: US$ 11.6 billion

Disaster Context

Due to impact of climate change the potential impact area is increasing with increasing of population at risk

Communities are facing modified risks due to change in intensity and frequency of the hazards

Difficulty in monitoring upcoming hazards

Use of space-based technology could contribute to ensuring a wider provision of relevant information for disaster risk reduction, strengthen early warning systems and monitor disaster's impact to provide effective emergency response.

Use of Space-based Info: Present Status

Space-based information and products are in progressing stage for DRR in Bangladesh

DRR institutional structure is well established

Working level Capacity exists
SPARRSO, SOB, BMD, FFWC, CEGIS, IWM and DDM

Cyclone prediction: Proven and effective example of using space based information

Flood Forecasting: Space based information is using for local flood modeling

Spatial databases exist with projects

Capacity assessed for DRR
TAM carried out by UN-SPIDER in 2011

TAM Recommendations

The recommendations focus on the challenges and opportunities in the following specific areas:

- Policy and coordination,
- Capacity building and awareness raising,
- Information management and sharing,
- Data and access
- Emergency communication

Follow up Action Taken

- Multi-hazard Risk Vulnerability Assessment Modeling and Mapping (MRVA) Cell has been established at DDM in 2013
- Nation wide multi-hazard risk vulnerability assessment is undertaken by engaging an international consulting firm
- Damage and Need Assessment (DNA) Cell has been established at DDM in 2013
- Online DNA tool is developed and trained field level key staffs
- Applying Remote Sensing in River Basin Management Project has been piloted supported by JAXA/ADB in the two flood prone villages

Follow up Action Taken….

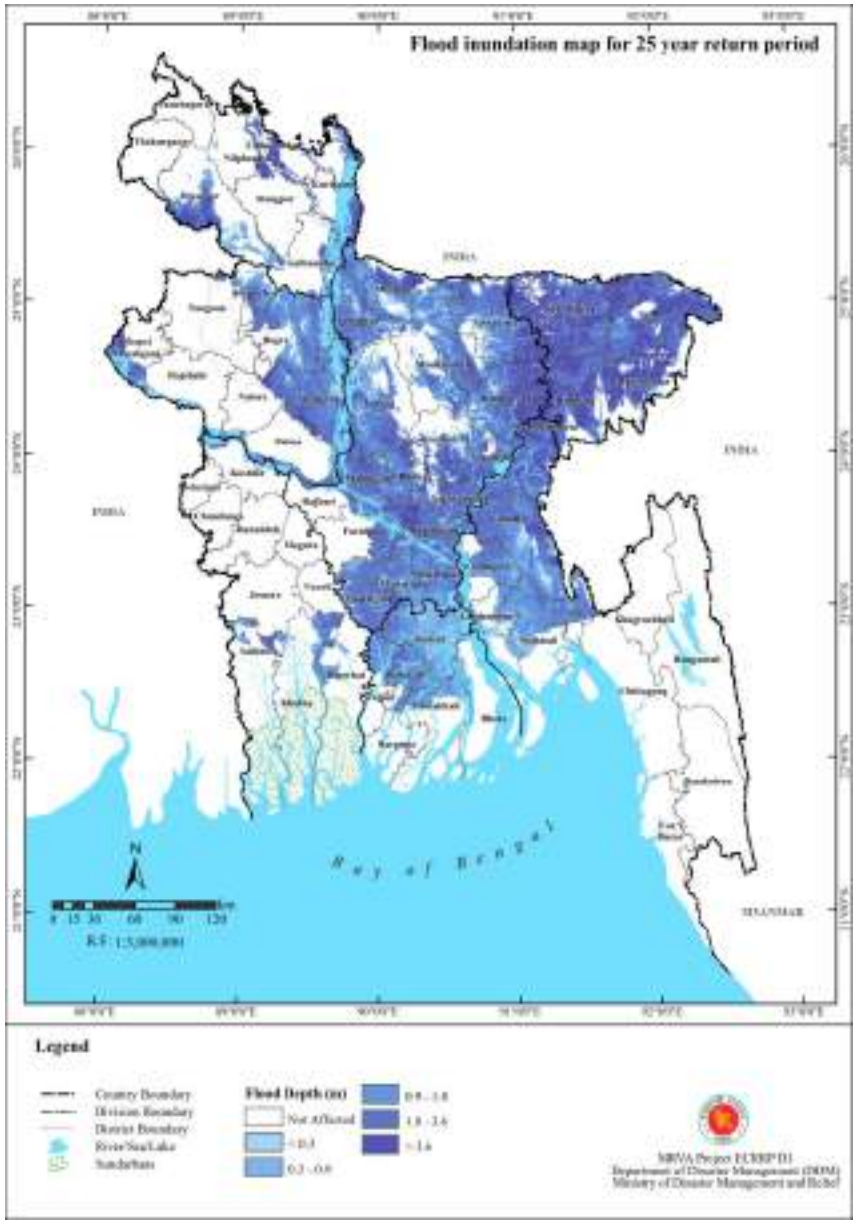
- Inter-active Voice Response Service (IVR) is introduced for timely dissemination of Early Warning/Forecasting from any mobile phone
- 50 academic and sector professionals were trained in space technology for Flood Risk Assessment and DNA supported by UN-SPIDER in 2013 and 2014
- National seminar on “Space Technology Application for Monitoring Earth Resources, Disaster and Climate Change Impacts has been organized at national level
- SOP has been drafted for the implementation of TAM recommendations
- National Disaster Management Policy is framed out with provision for the use of SBT and ICT in DRM in 2015

Multi-hazard Risk and Vulnerability Assessment (MRVA)

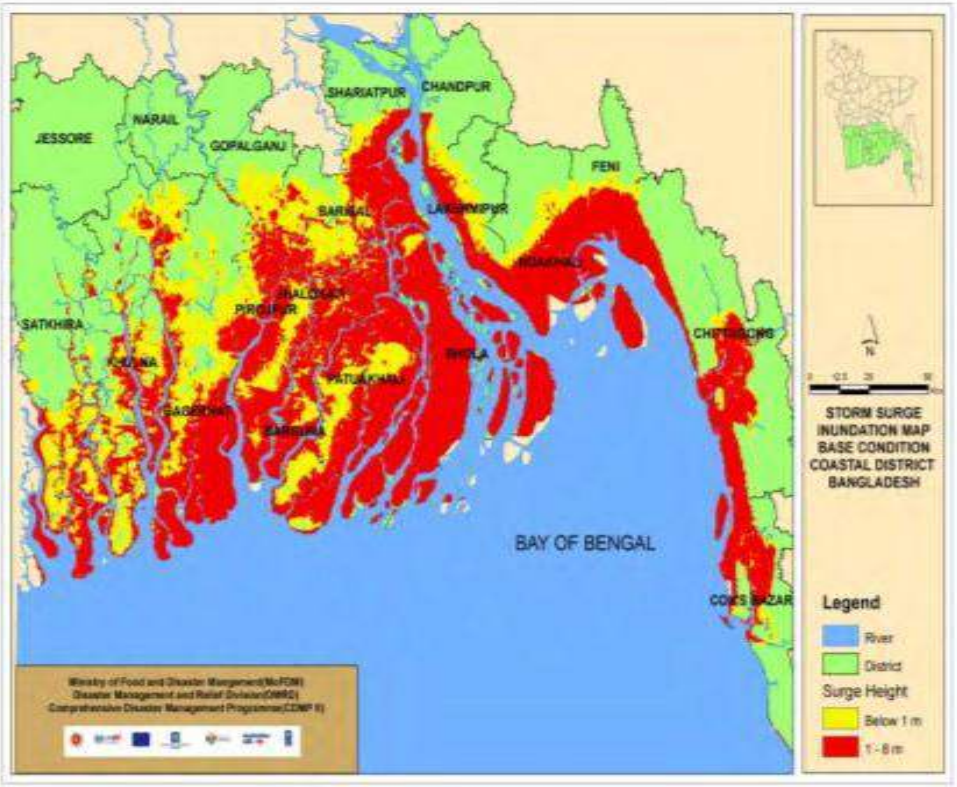
Hazard Assessment at a Glance

Hazard	Return Period							
	10	25	50	100	150	200	500	1000
Flood		√	√	√	√			
Cyclone & Storm Surge		√	√	√				
Earthquake			√	√		√	√	√
Landslide	Not Applicable							
Tsunami			√	√		√	√	√
Drought	√		√	√				
Technological	Not Applicable							
Health	Not Applicable							

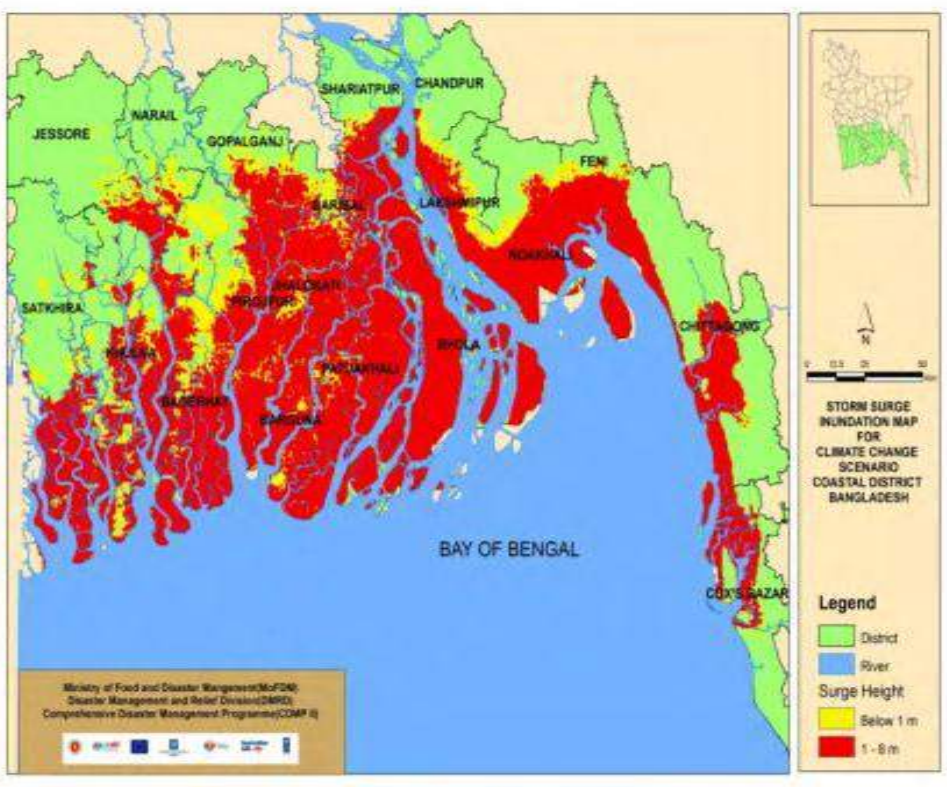
Flood and Landslide Hazard Assessment



Storm Surge Risk Assessment



Base Condition

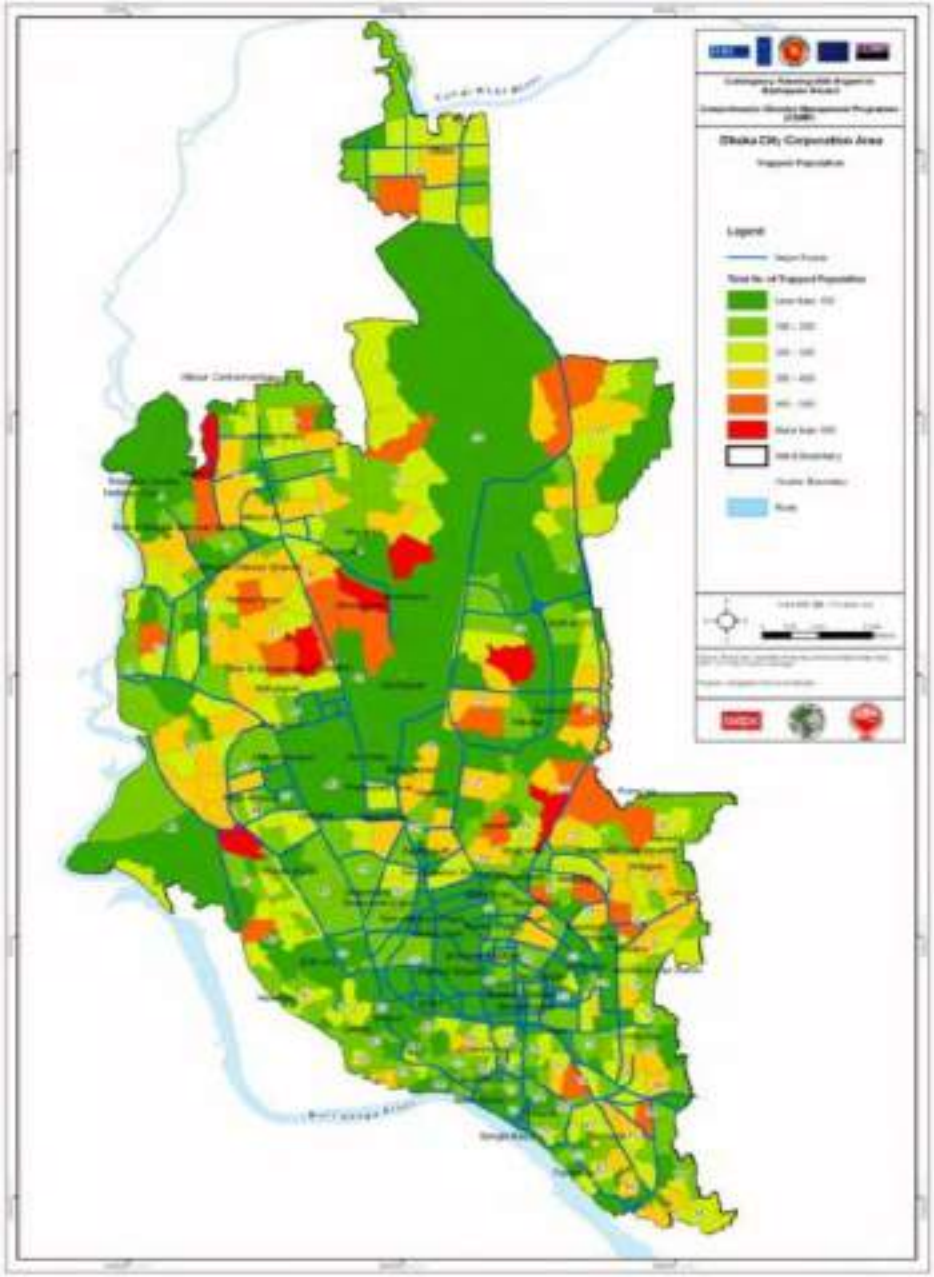


Climate Change Condition

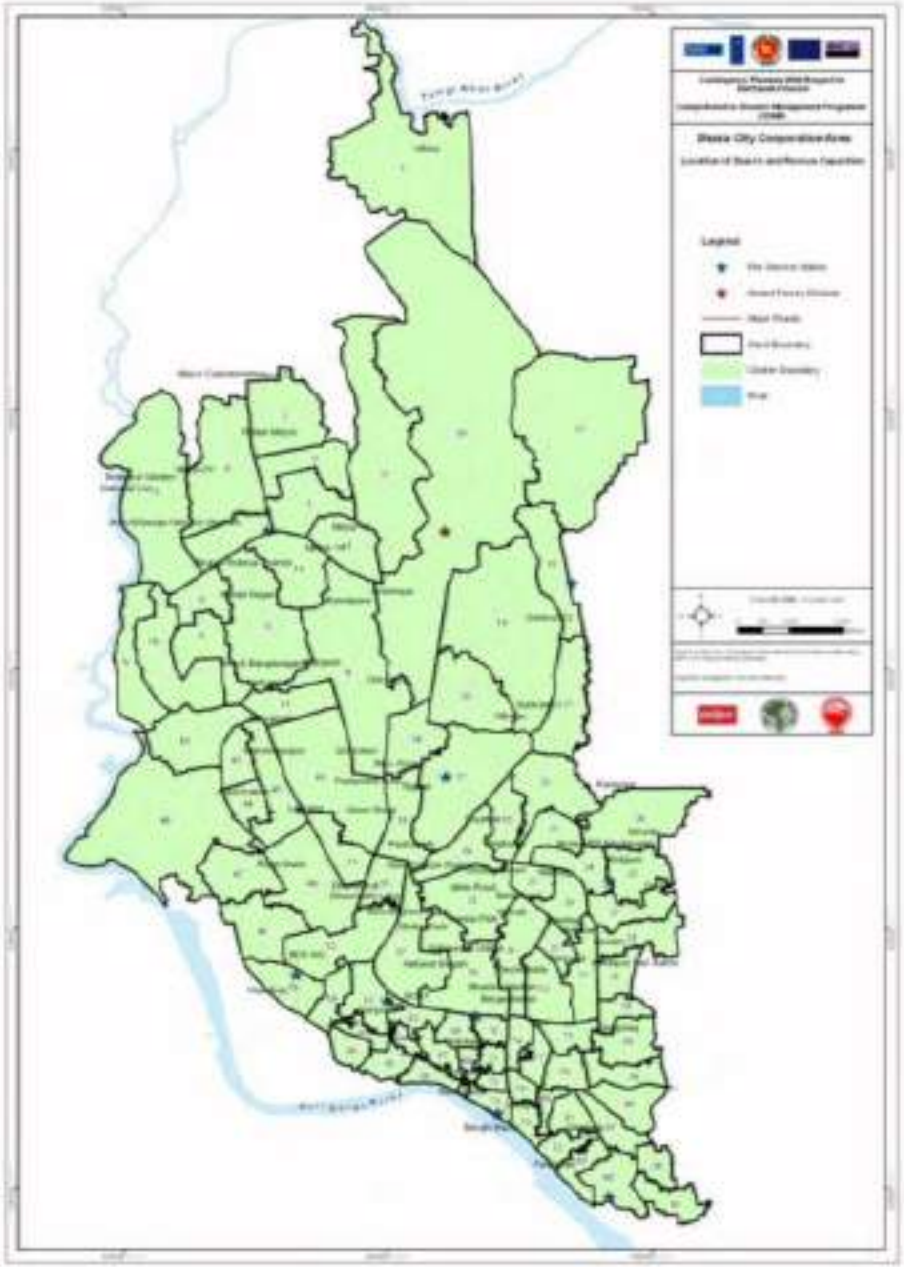
An area of 20,745 km^2 will be inundated by more than 1m water depth in the changing climate

Earthquake and Drought Hazard Map

TRAPPED POPULATION IN DHAKA CITY



LOCATION OF SEARCH AND RESCUE CAMP



Improvement of Early Warning and Dissemination Systems

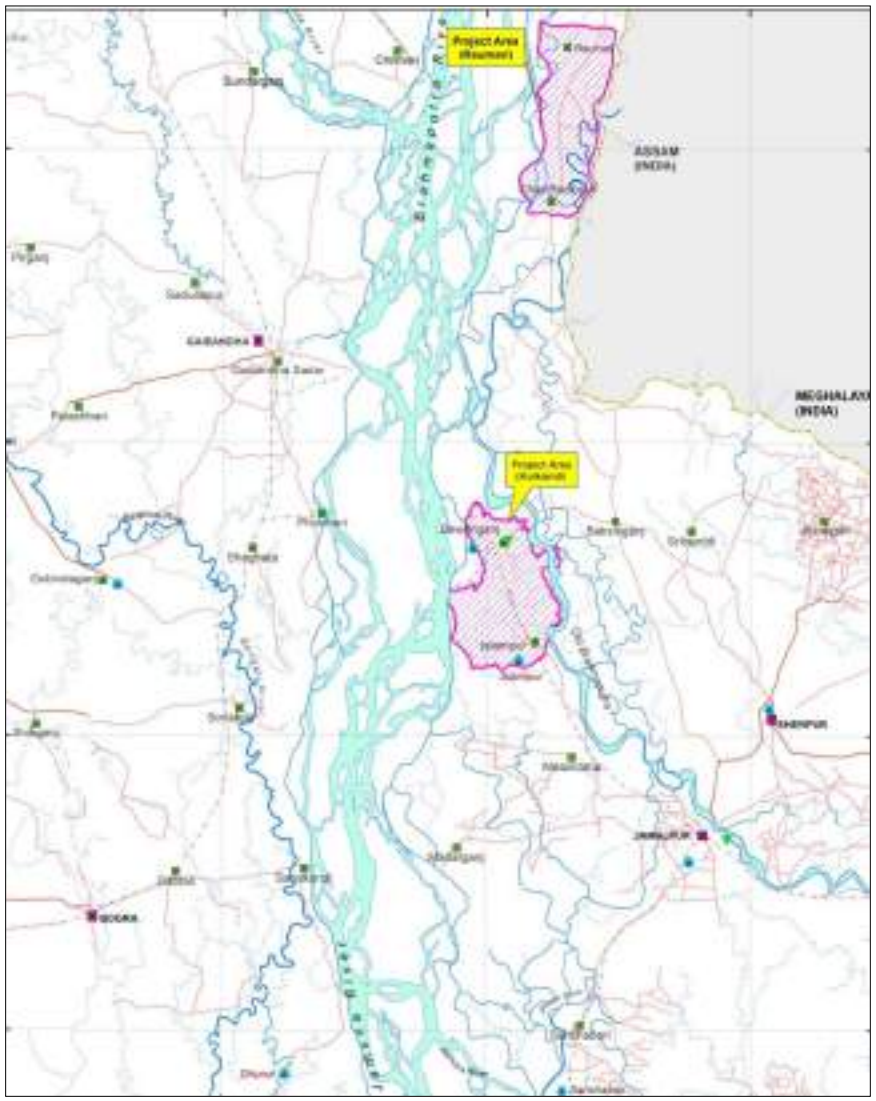
Applying Remote Sensing Technology in River Basin Management

Develop strategies and programs for flood risk reduction by applying SBT and ICT

Improve existing flood risk management systems in target area with EO satellite data including GSMaP

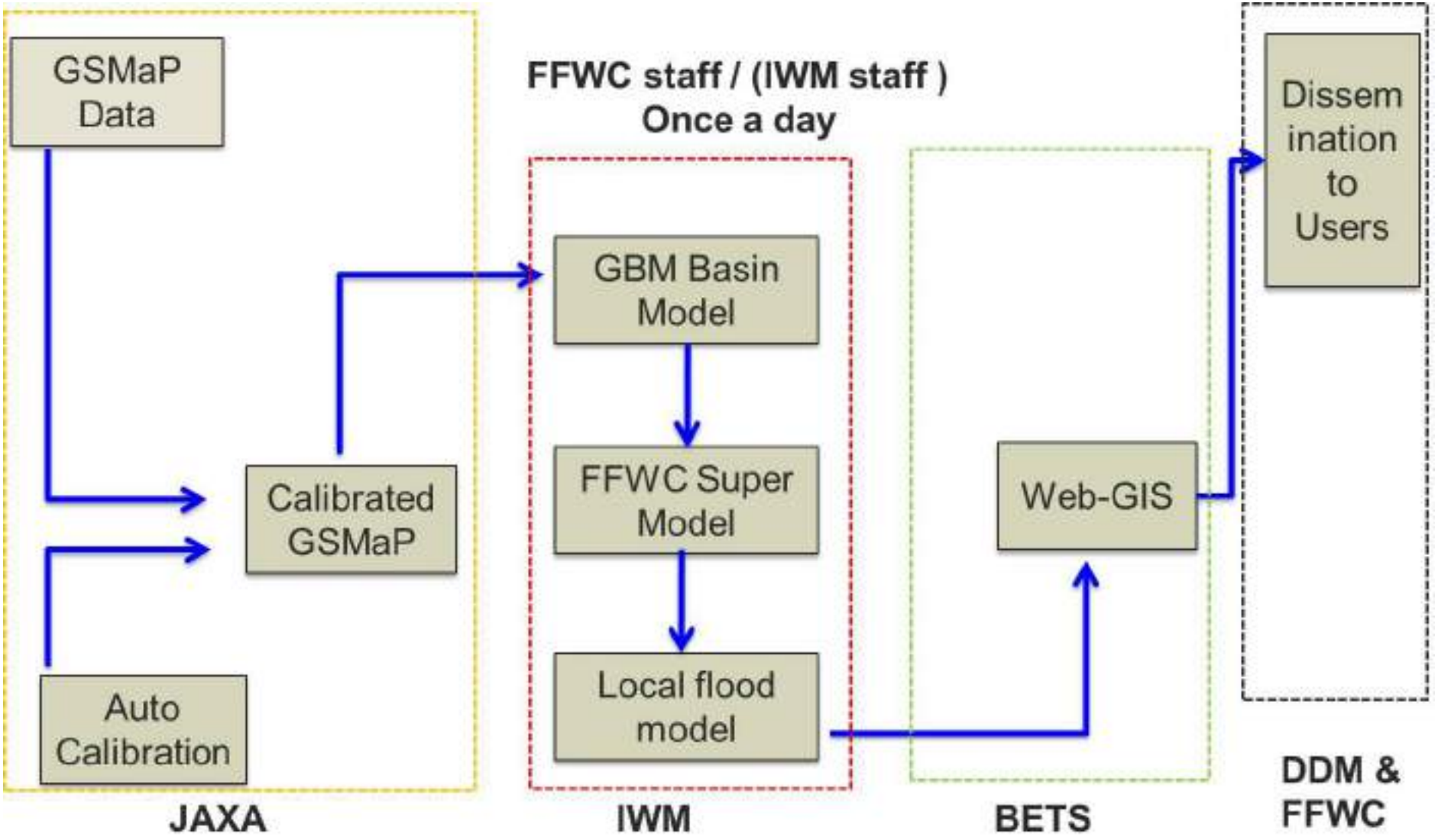
Develop methodology to make detailed flood hazard map and forecasting/ warning in local level

Meet demand of end users by increasing lead-time

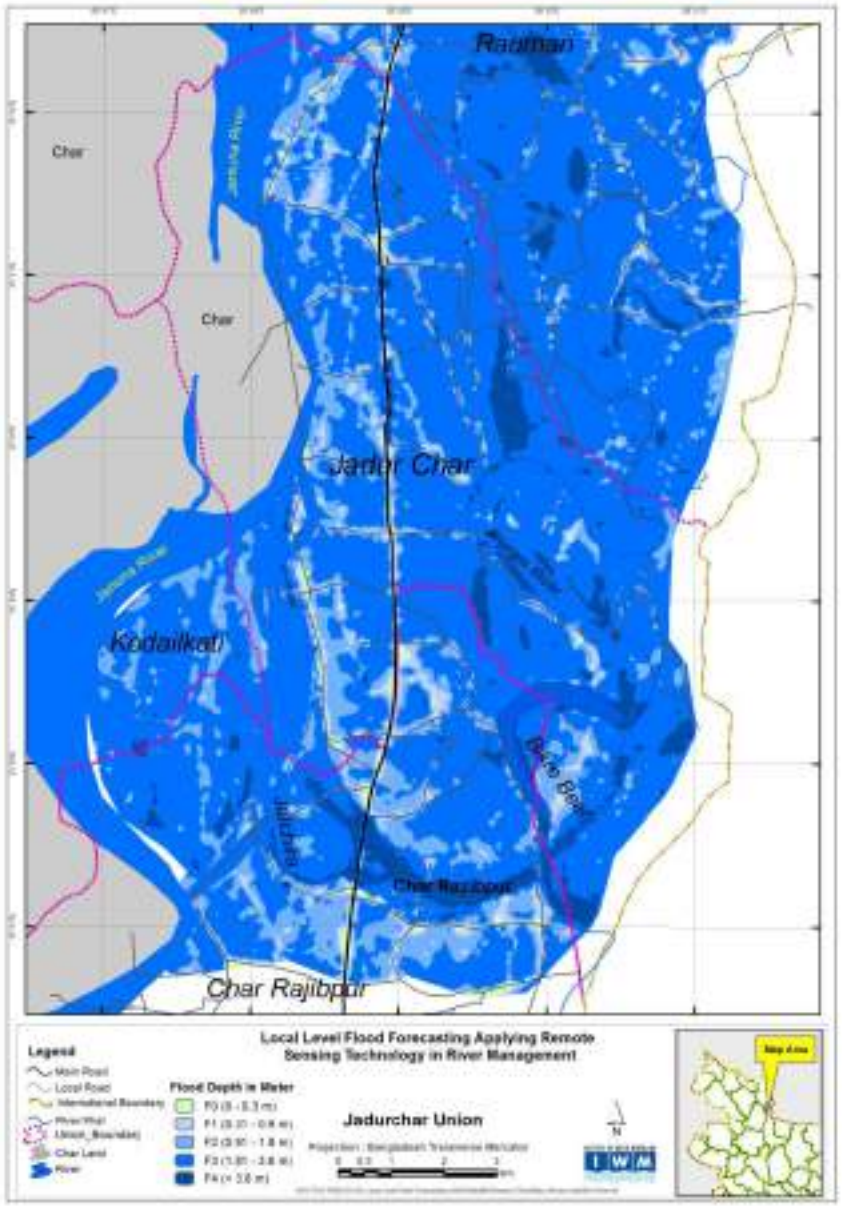


Implementation Mechanism

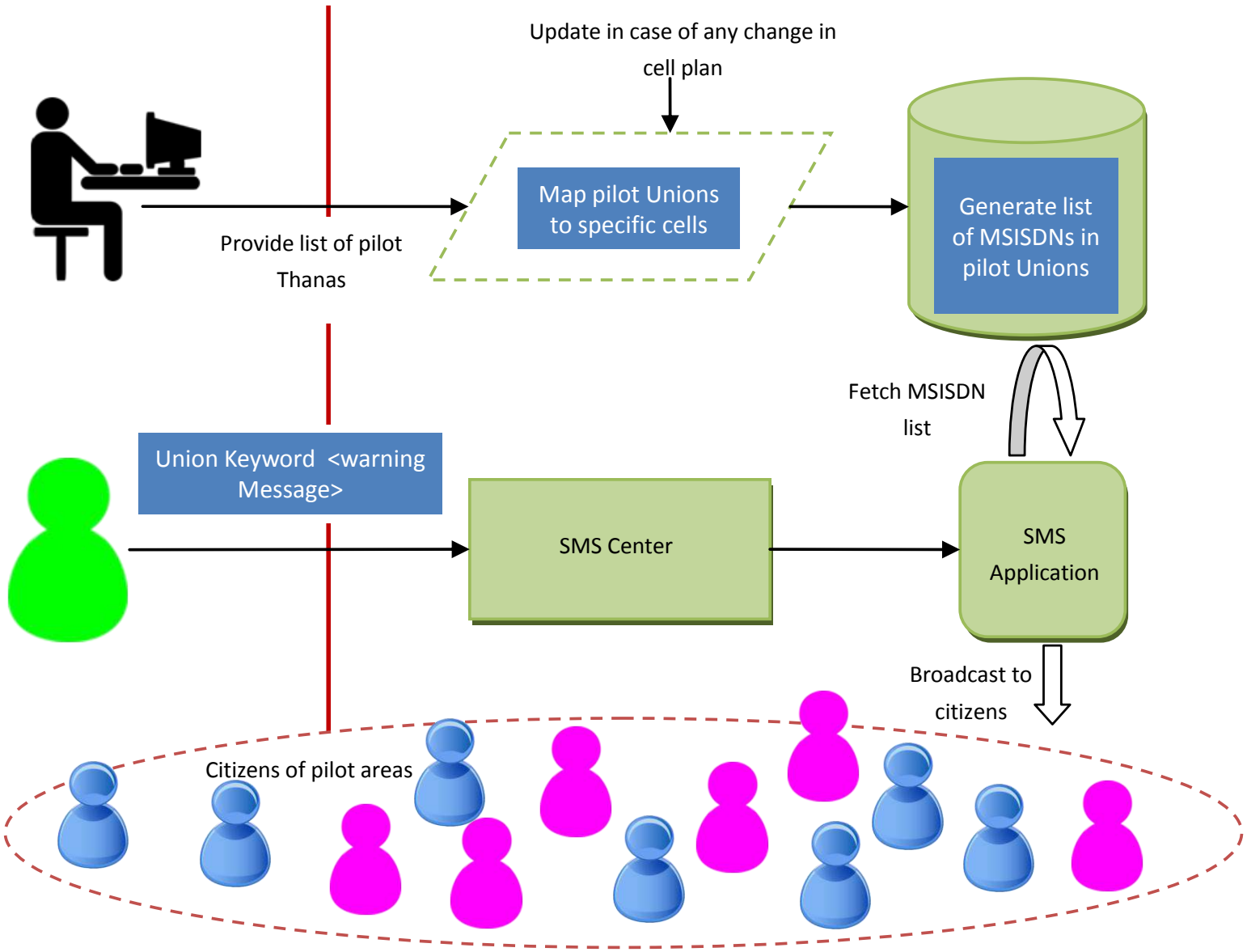
Applying Remote Sensing Technology in River Basin Management



5-day Flood Inundation Forecast



SMS Early Warning Dissemination System Flow



Interactive Voice Response Service (IVR)

- **Dial 1 0 9 4 1 / 1090 from any mobile**
- **1 For Sea going fishermen**
- **2 For River port warning**
- **3 For Daily Weather Bulletin**
- **4 For Cyclone Warning**
- **5 For Flood Forecast**
- **6 For back to the main menu**

Development of Database

GIS-RS Based Building Inventory Database

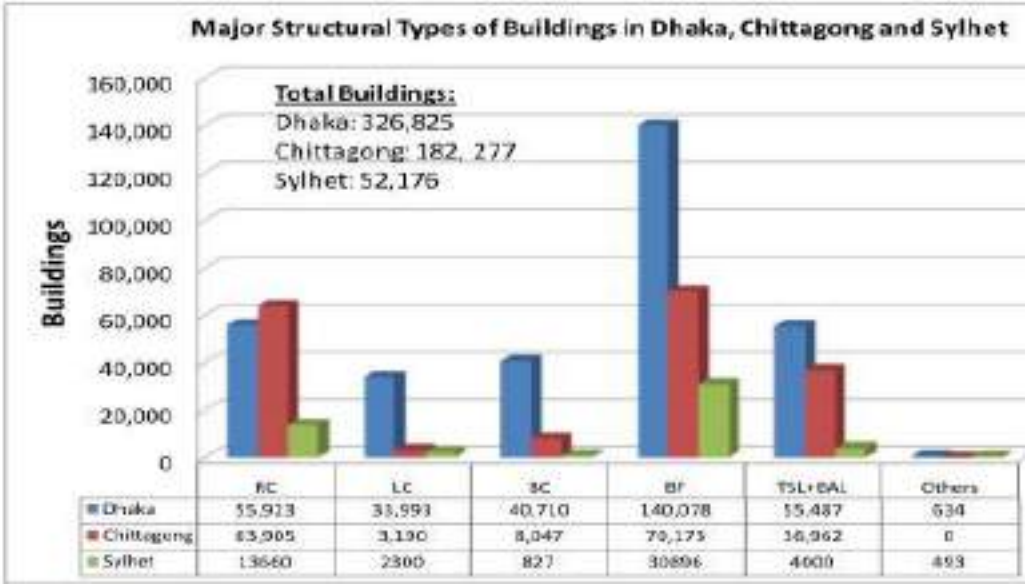
Image of a part of Dhaka City after Geo-referencing

Physical Features after digitization

Dhaka : 327000

Chittagong : 183000

Sylhet : 52, 000



Online Shelter Database

Challenges

- Launch own satellite (Bangabandhu-1 Satellite)
- Effective use of space information during emergency response and post- disaster damage and need assessment (PDNA)
- Further Strengthen Early Warning by providing timely access to the space-based information and technologies
- Enhance existing local capacity

Way Forward

- Building network and platform with international/ regional data and technology providers
- Capacity development for both EO and end users departments
- NSDI to avoid duplication and redundancy
- Incorporation of space technology for DRR-CCA to policy and plan

Conclusion

- Space Science and Remote Sensing Technology is still development stage in Bangladesh, but a considerable progress has achieved in developing structure and setting of tools and equipments
- The association of DDM/MoDMR to the international missions can help integrating DM programmes to the global systems
- International educational institutions could help by carrying out disaster related research, by offering higher education and training for Bangladeshi students and professionals, and
- Lastly, Space information should be easily available for developing countries like Bangladesh and distributed in such a format that everybody could use without much effort and technical knowledge.


Thanks for attention