



**United Nations International Conference on Space-based Technologies for Disaster Risk Reduction
“Building Resilience through Integrated Applications”**



**23-25 October, 2017
Beijing China**

Status of Using of Space-based and In-situ Information in DRR in Bangladesh

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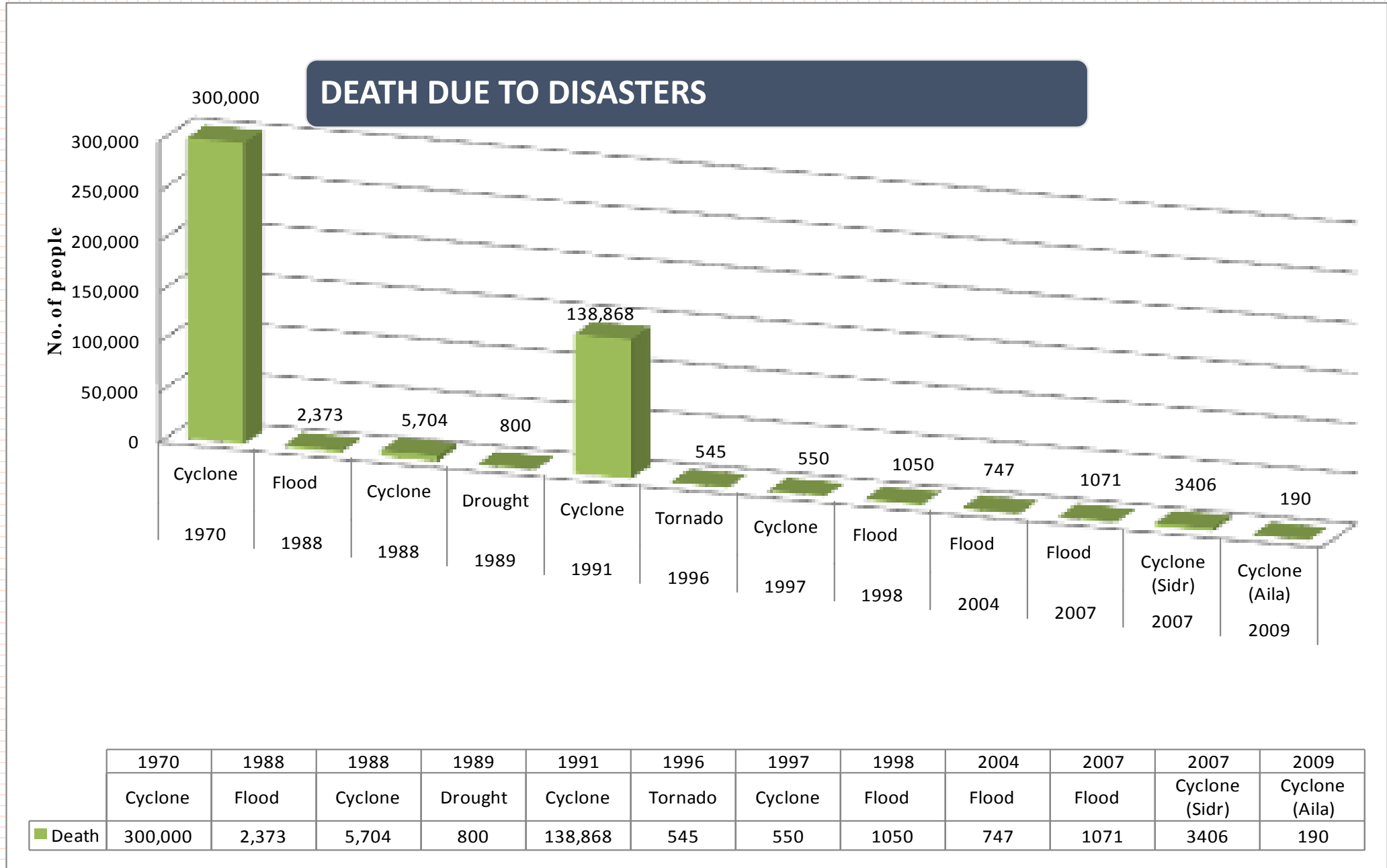


Introduction (University of Dhaka)

- ❖ *Department of Disaster Science and Management (DSM) is only 4 years old*
- ❖ *An outcome of UNDP managed Comprehensive Disaster Management Programme (CDMP)*
- ❖ *Blending of science with social aspects*
- ❖ *Teachers from multidiscipline – Geology, Geography, Anthropology, Development Studies, Computer Science, Civil Engineering, Urban and Regional Planning, RS & GIS.*
- ❖ *Use of Geoinformatics in Disaster Management (19 credits out of 160 (around 12%))*



Death due to Disaster



Mission of BD Govt:

To bring a paradigm shift in disaster management from conventional response and relief to a more comprehensive risk reduction culture



Risk Reduction Approach



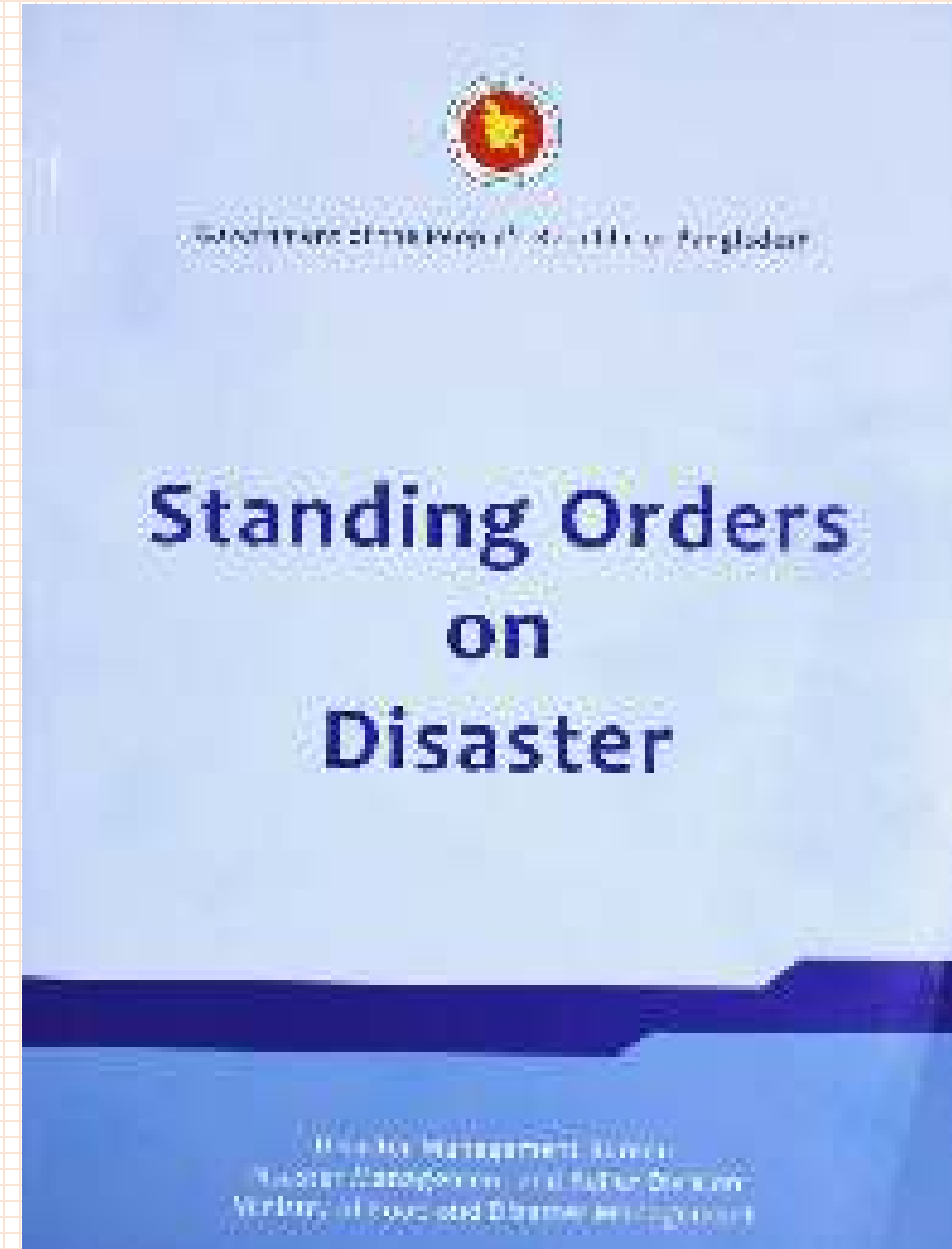
DRR BELIEF

PEOPLE AND THEIR IMMENSE CAPACITY TO COPE WITH, IS OUR BEST RESOURCE TO DISASTER AND RISK MANAGEMENT.

Standing Orders on Disaster

- The standing order (2010) creates the opportunity to establish disaster management committee at every level.
- The standing orders for disaster management provide ample scope for the Government, NGOs and private sectors to think locally and plan need based program involving the community.
- Different committee and their responsibilities during normal, warning, onset and post-disaster

Disaster Law 2012



Form – D: Stock and Flow

APPENDIX 14

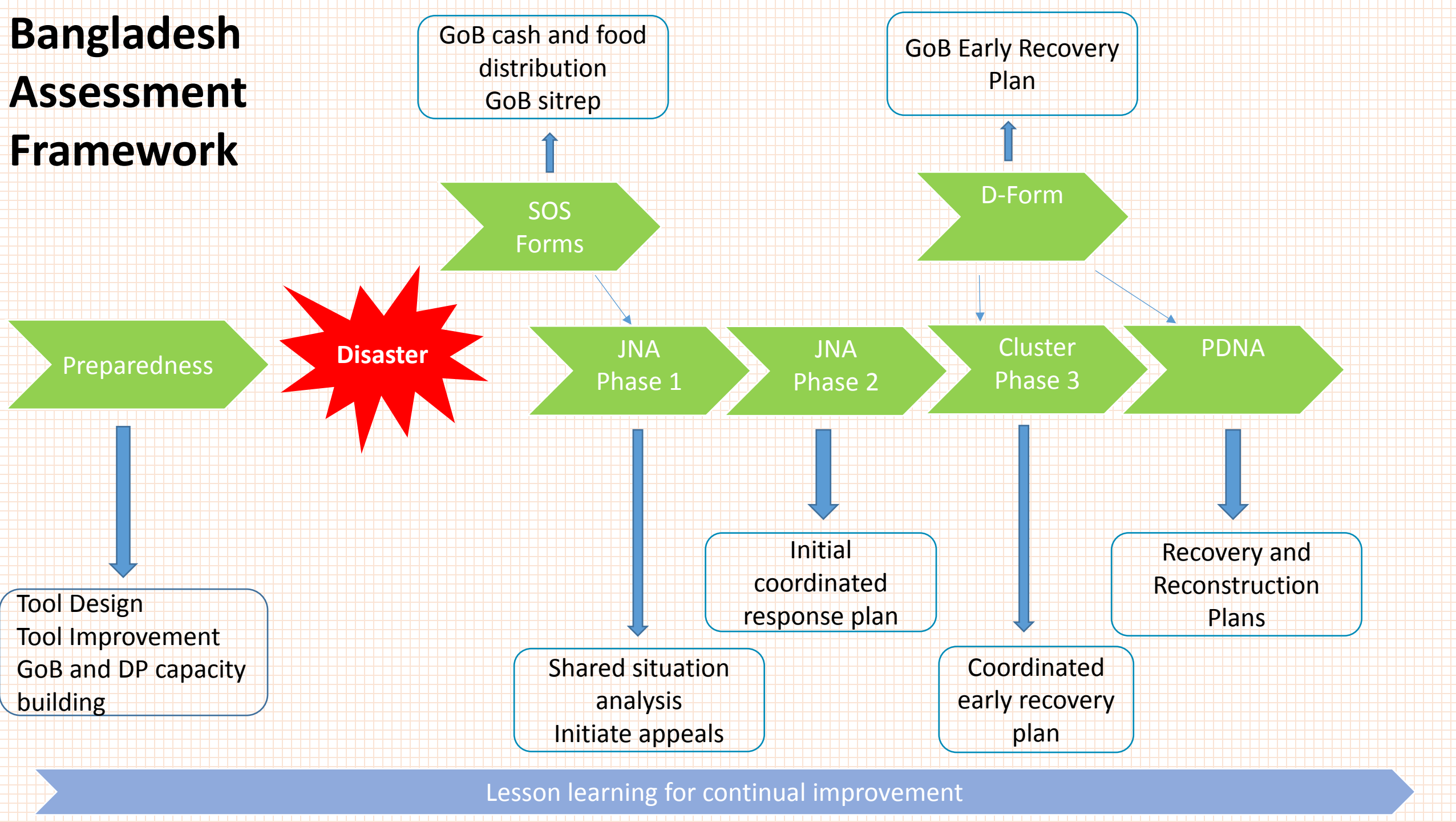
Form for Assessment of Damage and Loss Form D

Chairman, Upazila Disaster Management Committee will collect detailed information from Union Parishads and various departmental officers and fill up this form and send to the EOC at Disaster Management & Relief Division with a copy to Disaster Management Bureau through the Deputy Commissioner.

1	2	3	4	5					6	7	8	9	10	11	
Name of Upazila	Total Union (No.)	Total area (sq.km)	Clear Area (sq.km)	Total population (No.)					Total families/ households	Cost of house Tk./Unit	Repairing Cost of house Tk./Unit	Other information (damaging materials used)	Total disaster (死者/傷者/罹災人口)	Informant (Name)	
													Baseline data/ Basic statistics		
Name of Upazila	Affected Union (No.)	Affected Area (sq.km)	Affected Clear Area (sq.km)	Affected population (No.)	No. of dead (Injured/ Cracked)	No. of injured	No. of missing people	No. of Hospitalized	Number of affected families	No. of house (Fully damaged)	No. of houses (Partially damaged)	No. of 1-rooms/ 2 parts house damaged	Shelter used during disaster (sq.m)	Established Shelter	Self-aid / Change emergency shelter

11		12		13		14		15		16		17			
Sheep and goat (No.)		Cattle and buffalo (No.)		Poultry (Chicken and Duck) (No.)		Total crop land/Seed bed		Other assets (Bamboo, fisheries, shrimp etc)		Total Power Coverage / Gas/ Water Lines and related equipment (unit)		Other infrastructures (mobile houses, cold storages, godowns, public & private establishments)			
Death and washed out sheep and goats		Death and washed out cattle and buffalo including farms		Death and washed out poultry, including farms		Totally damaged		Partially damaged		Damaged other assets (Bamboo, fisheries, shrimp, Gas, fish, Aquaculture etc)		Damaged Power/ Coverage / Gas/ Water lines and related equipment		Damaged other infrastructures (if any)	
												Full	Partial	Full	Partial

Bangladesh Assessment Framework



Department of Disaster Management

Department of Disaster Management

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- 6. [Link]

Services & Programs

Disaster Preparedness

Disaster Early Warning

Disaster Response

Disaster Recovery

Our Vision & Values

Our Mission

Multi Hazard Risk and Vulnerability Assessment Modeling and Mapping

Sl. No	Description
1	MHRA Atlas Volume-1 Part-1 (File Size : 19.5MB)
2	MHRA Atlas Volume-1 Part-2 (File size : 19.5MB)
3	MHRA Atlas Volume-2 (File Size : 19.6MB)
4	MHRA Atlas Volume-3 (File Size : 10.1 MB)



Space Research and remote Sensing Organization (SPARRSO)

HOME TECHNICAL SETUP GROUND STATIONS ACTIVITIES RESEARCH TECHNOLOGY COLLABORATION

- Organization
- Vision
- Mandate
- Governor
- Organogram
- Activities
- Manpower
- Citizen's Charter



SATELLITE PICTURES FROM SPARRSO GROUND STATION

RESOURCES FOR SATELLITE IMAGE INTERPRETATION

PROJECT

LATEST NEWS

CONTACT US

FEEDBACK

- LYZ SATELLITE IMAGE
- MISAT SATELLITE IMAGE
- TERRA SATELLITE IMAGE
- AQUA SATELLITE IMAGE
- MET DATA RECEIVED AT SPARRSO

Geoportals Maps, Images, Earthfiles

Publications Annual Report, Newsletter, Journal

Achievements

Photo Gallery

User's Services

Library SOURCES

CEANS Coastal Elevation Analysis & Monitoring System		NDMS National Digital Mapping System		SDMS Satellite Data Monitoring System	
DMS Digital Mapping System		CRUST Coastal Research & Mapping System		SCMS Satellite Data Monitoring System	
MFMS Marine Fisheries Monitoring System		NWIMS National Water Monitoring System		SATS Satellite Data Monitoring System	

Survey of Bangladesh (SOB)

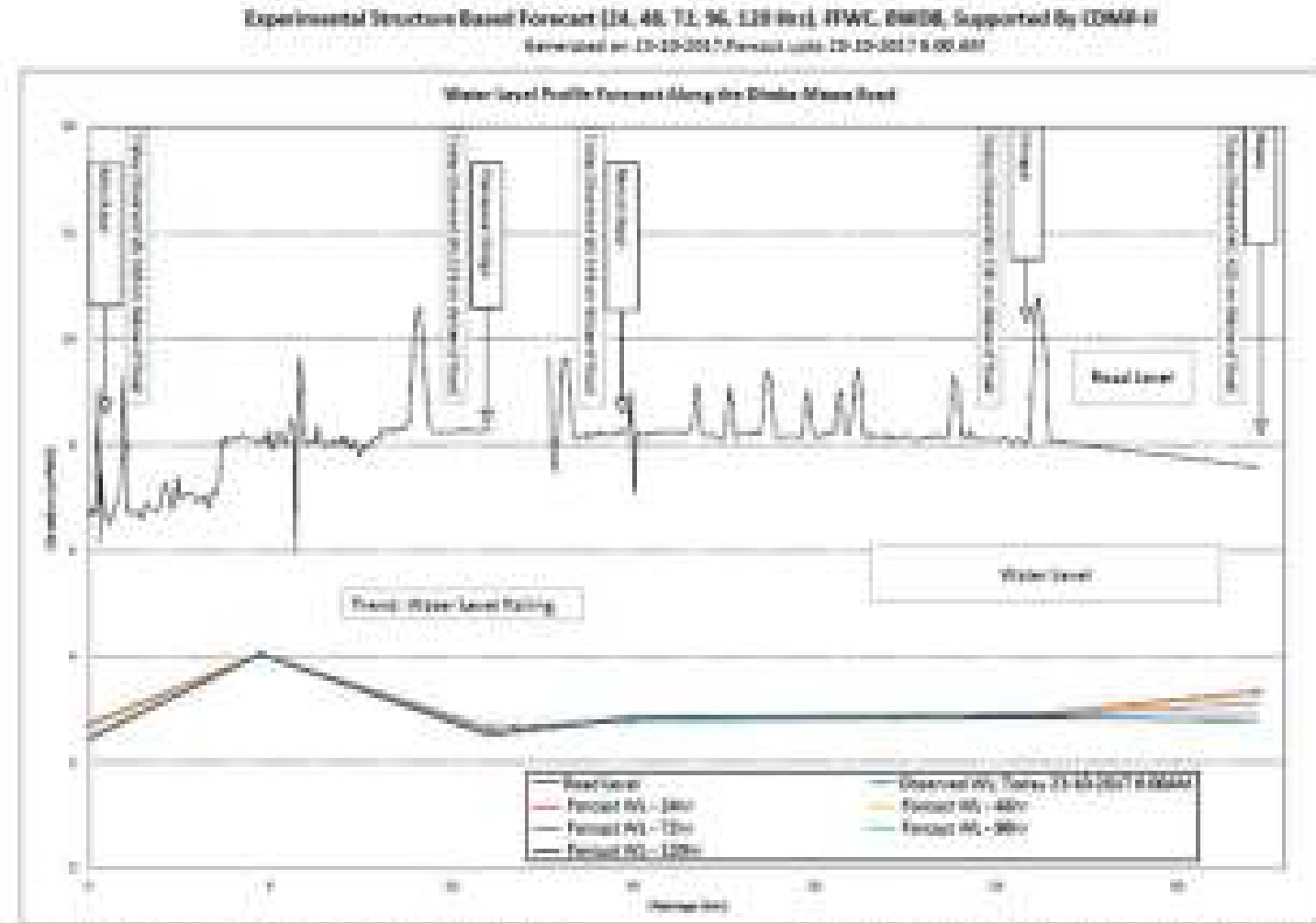


The screenshot shows the homepage of the Survey of Bangladesh (SOB) website. The header features the SOB logo and the text "Survey Of Bangladesh". Below the header is a navigation menu with links for Home, About Us, Organizational Policy, Services, Downloads, News, Contact Us, and Home Office. The main content area is divided into several sections: "Welcome Message" with a list of services, "Services" with links to Location, Photogrammetry, and Outposts; "Map of Topographical Map" with a description of the map's purpose; "Registration" with links to Home, Organizational Policy, and Contact Us; and "About Us" with links to Home, Organizational Policy, and Contact Us. On the right side, there is a profile section for a user named "Admin" with a photo and a list of services.

Basic Information

- Metadata: Specification: ISO 19139.
- Projection System:
 - Reference Ellipsoid: WGS84
 - Grid Name: BUTM2010.
- Datasets for 1:25,000 and 1:5,000 Geo-databases
 - Administrative Boundary
 - Building and Structure
 - Facilities
 - Forest
 - Geodetic Control Point
 - Hydrographic Feature
 - Industrial
 - Relief
 - Transportation
 - Vegetation

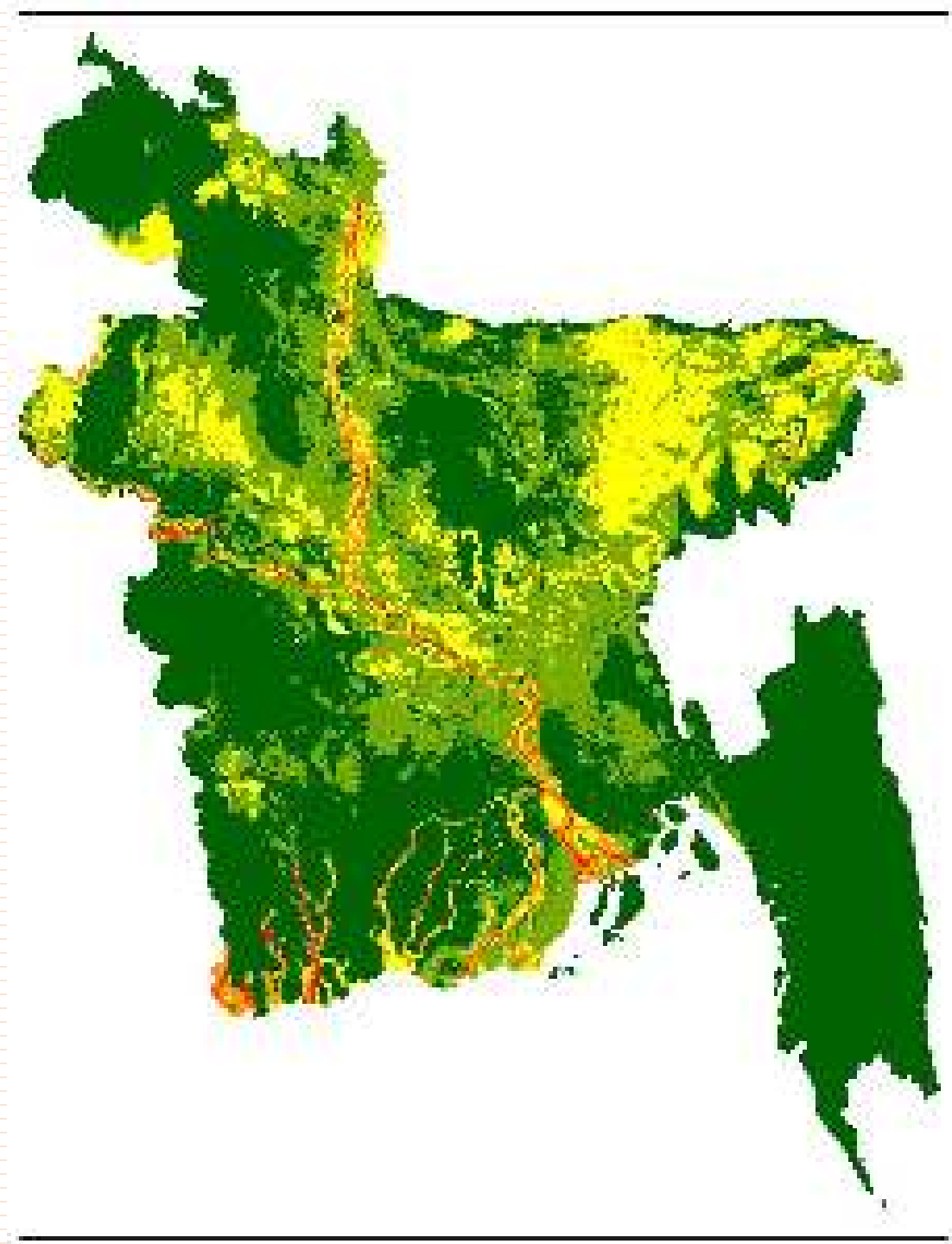
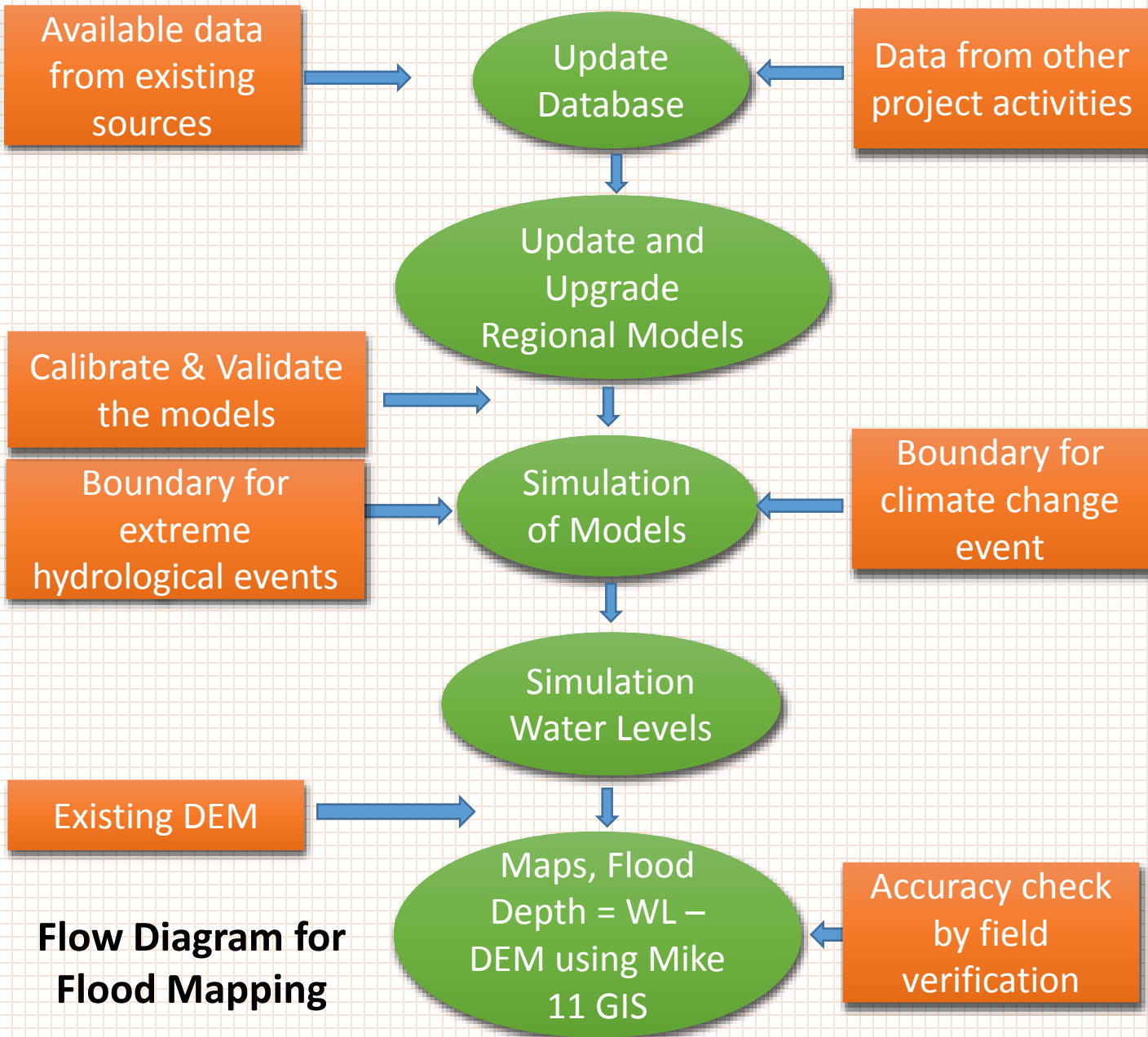
Flood Forecasting and Warning Centre (FFWC)



1) Water level forecast changes in case of any change in the observed data.
 2) Water level forecast changes in case of any change in the observed data in the forecast period.
 3) Water level forecast changes in case of any change in the observed data in the forecast period.

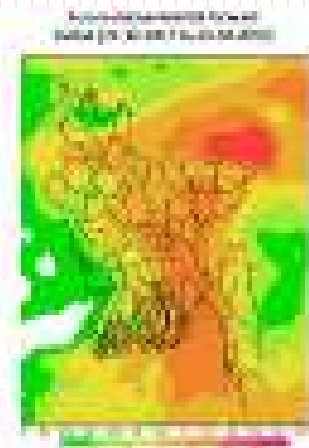
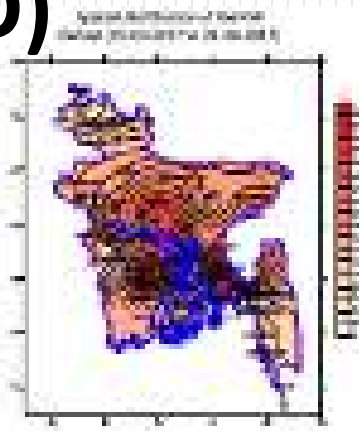
4) Water level forecast changes in case of any change in the observed data in the forecast period.
 5) Water level forecast changes in case of any change in the observed data in the forecast period.

Flood Inundation Depth Map

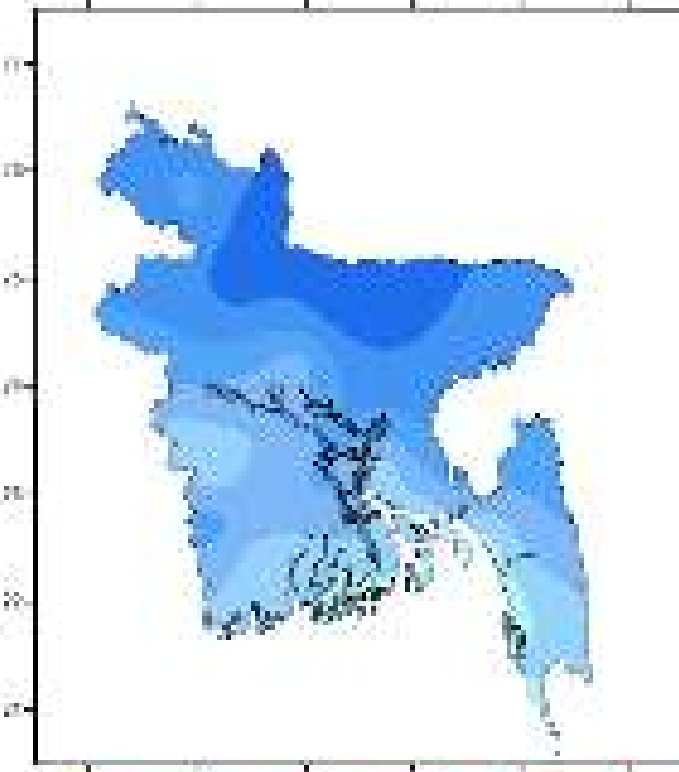


BD Meteorological Department(BMD)

The screenshot shows the official website of the Bangladesh Meteorological Department. At the top, there is a banner with the department's name in Bengali and English. Below the banner, there is a navigation menu. The main content area features a weather forecast for Dhaka, including a current weather icon (partly cloudy), a 5-day forecast with icons and temperatures, and a detailed hourly forecast. A central map of Bangladesh shows weather icons for various regions. On the right side, there is a profile picture of a man and a vertical menu with various options.



Deviation of Minimum Temperature (°C) during March 2017



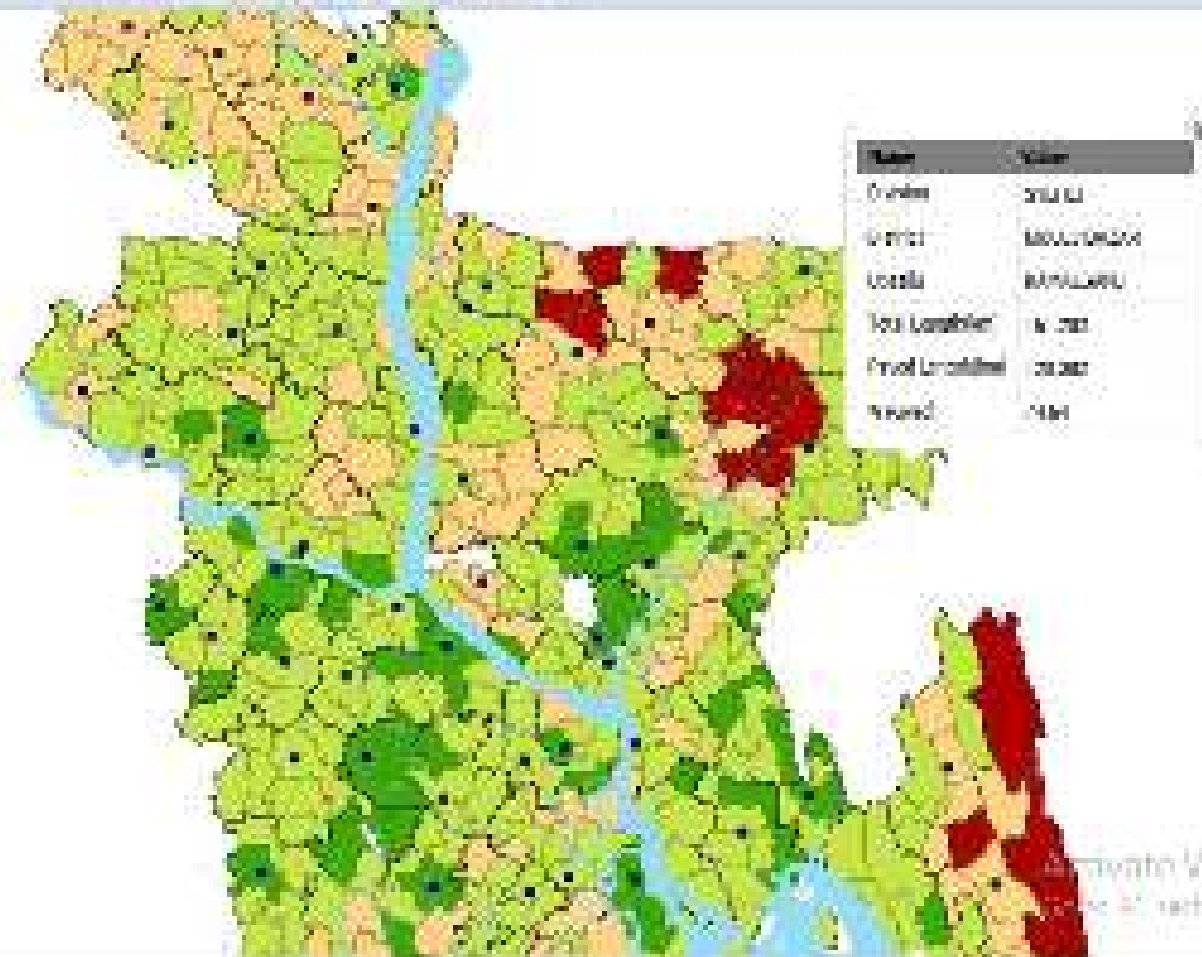
Local Government Engineering Department (LGED)



Local Government Engineering Department (LGED)
GIS Section

GIS Portal

Map 2014: Lower % of Forest Cover of Bangladesh (2011)



Bangladesh Bureau of Statistics (BBS)

- Census Data
- Household data
- Economic Data
- Geocode/Place-code
- GIS Maps

LGED Provides-

- Roads/Bridges/Culverts
- Growth Center/Rural Market
- Primary School (also PED)

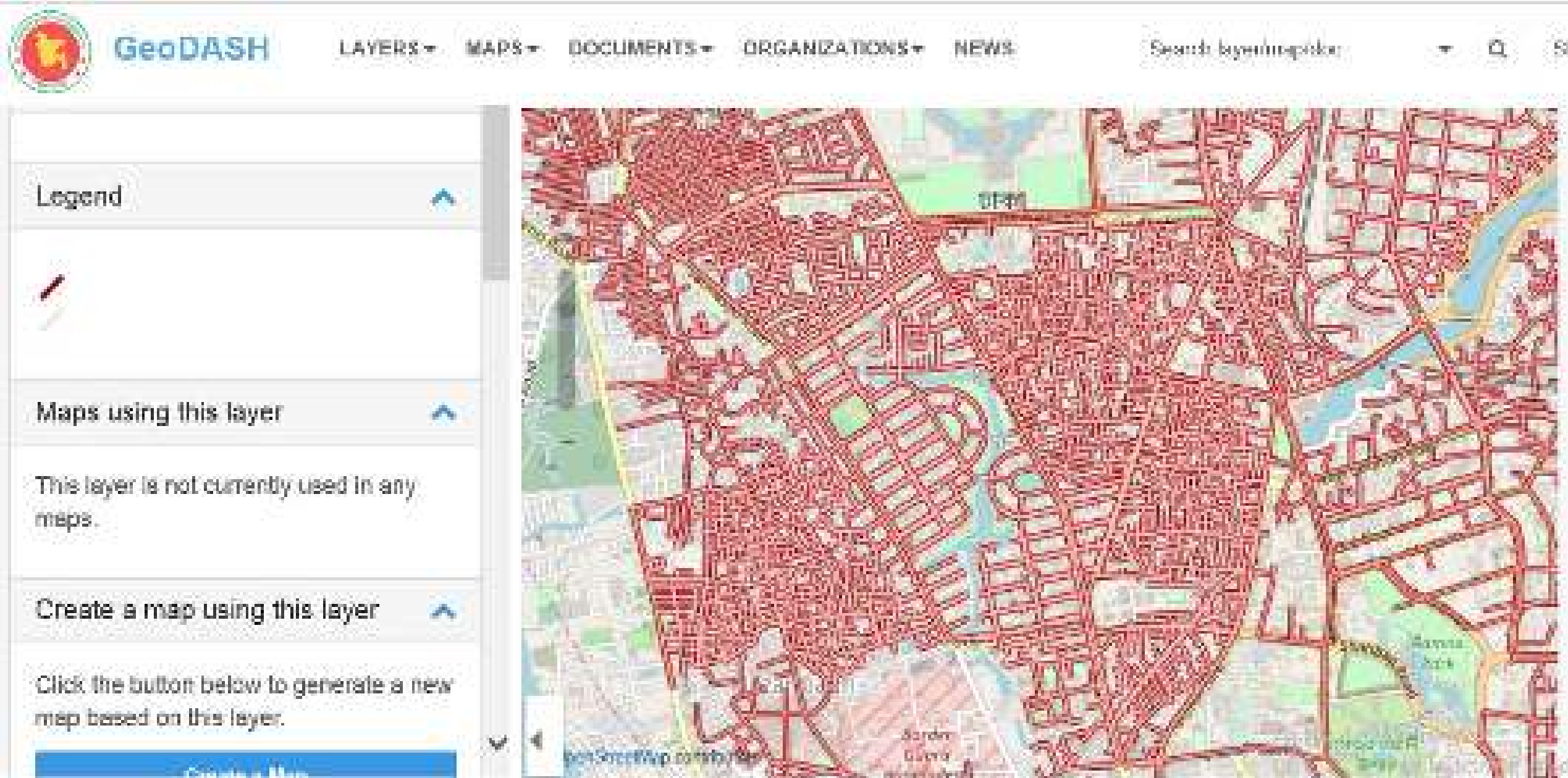
RHD Provides

- Highways/Large Bridges

DDM provides –

- Cyclone/Flood Shelters etc.

GeoNode Implementation for Geospatial Data Sharing (GeoDASH)



The screenshot displays the GeoDASH web application interface. At the top left is the GeoDASH logo, which features a globe with a red and yellow map of Africa. To the right of the logo is the text "GeoDASH". The navigation menu includes "LAYERS", "MAPS", "DOCUMENTS", "ORGANIZATIONS", and "NEWS". A search bar is located on the right side of the navigation menu, containing the text "Search by enter a place".

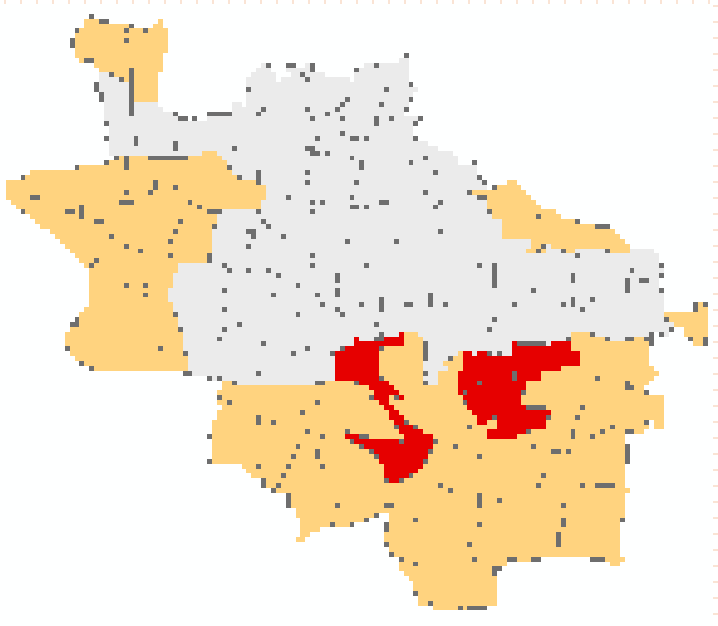
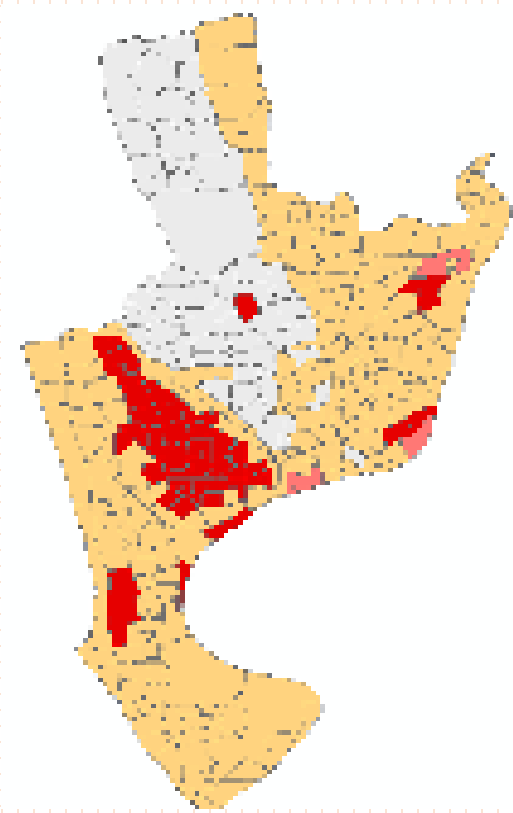
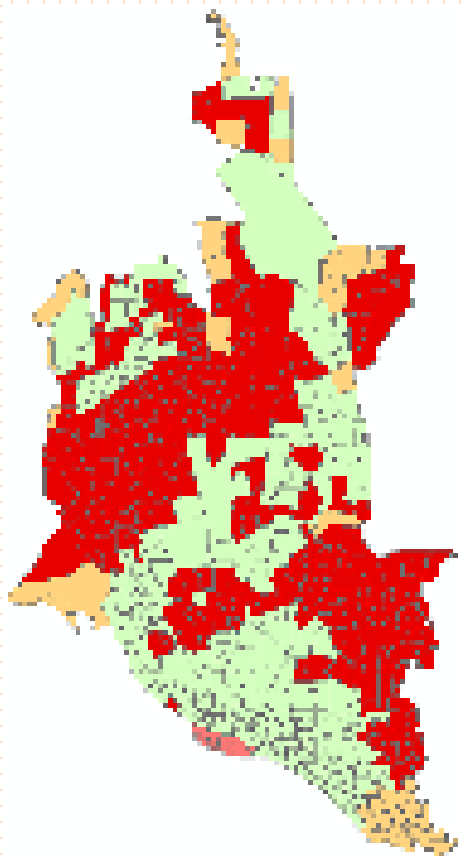
The main content area is divided into two sections. On the left is a sidebar with the following elements:

- Legend**: A section with a blue arrow pointing up.
- Maps using this layer**: A section with a blue arrow pointing up.
- This layer is not currently used in any maps.**: A text message.
- Create a map using this layer**: A section with a blue arrow pointing up.
- Click the button below to generate a new map based on this layer.**: A text message.
- create this**: A blue button.

On the right is a map showing a street network overlaid on a satellite image. The street network is rendered in red lines. The map includes labels for "DPR", "Sardin", "Glen", and "Riverside Park". A scale bar is visible at the bottom left of the map.

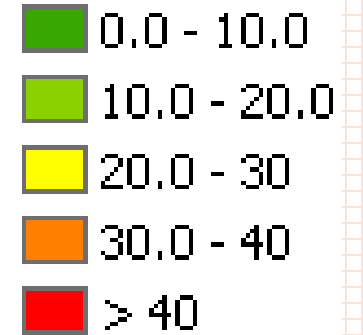
**SEISMIC MICROZONATION
AND
VULNERABILITY / DAMAGE ASSESSMENT**

Potential Zone for Soil Liquefaction

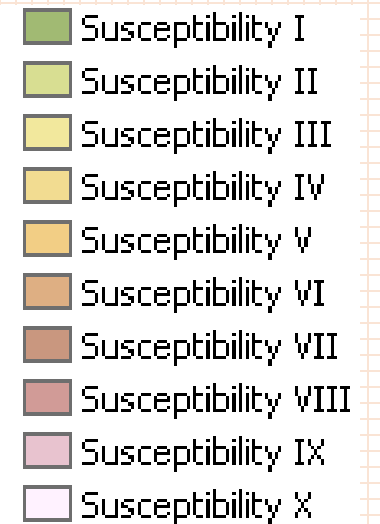
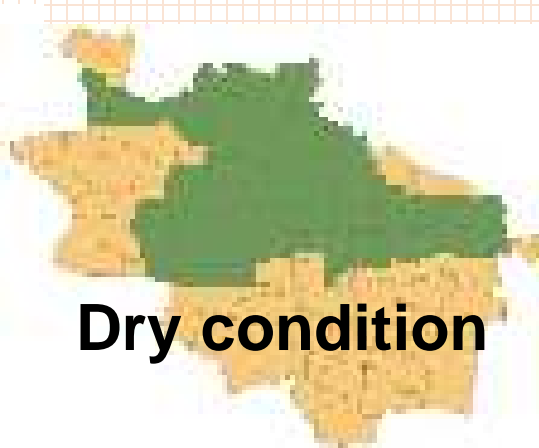
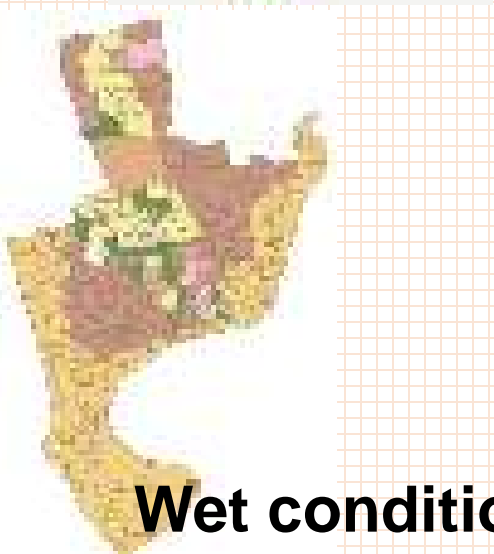


SUSCEPTIBLE ZONE FOR EARTHQUAKE INDUCED LANDSLIDE

Digital Elevation Model

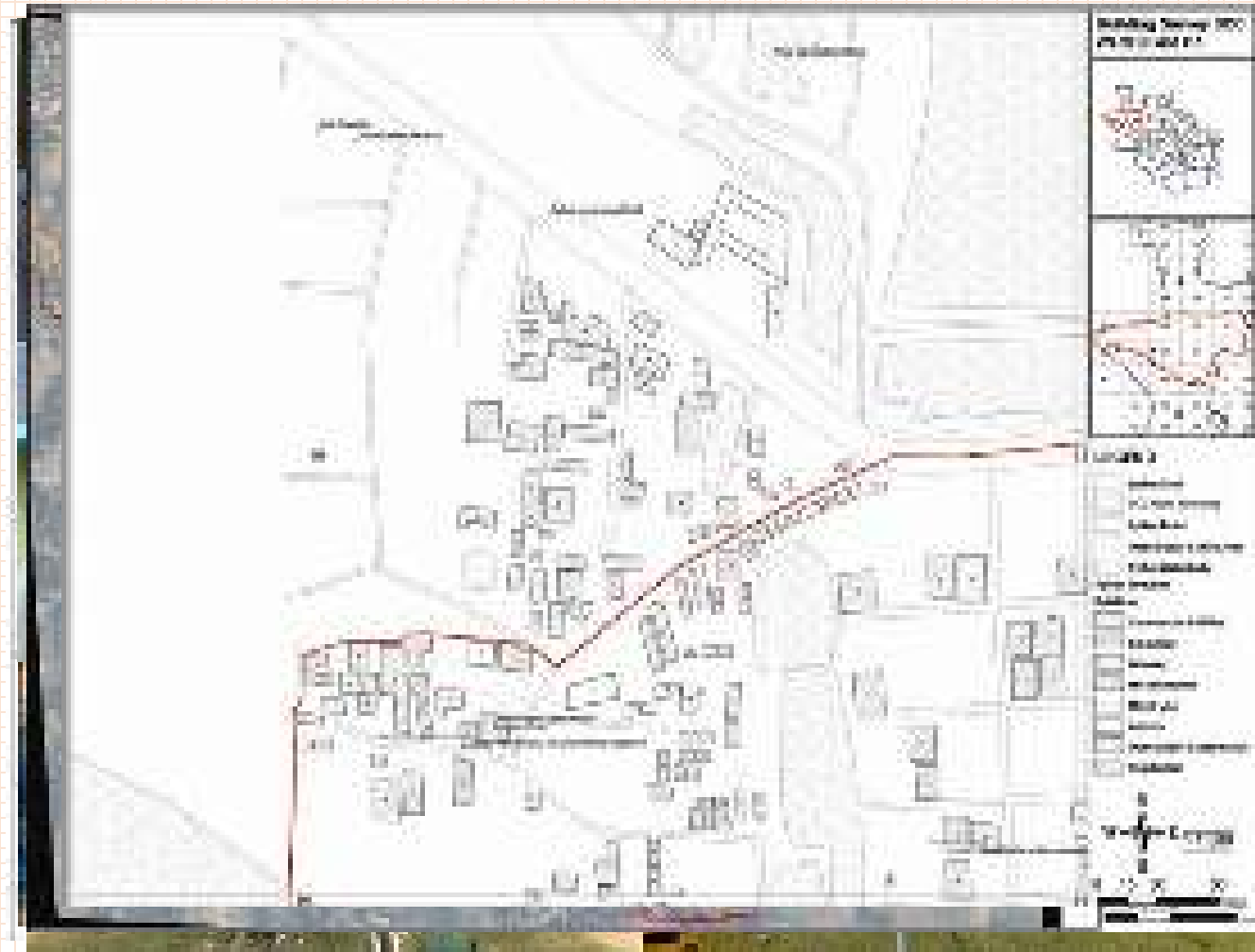


Landslide susceptible



BASE MAP PREPARATION

- **Quickbird Image**
 - 60cm resolution
 - Georeferenced and projected in BTM
 - Physical feature survey



PHYSICAL FEATURES AND INFORMATION INCORPORATED IN THE BASE MAP

No	Physical Features	Attribute Information
1	Building	Building use, land use, structure type, storey number, structure name
2	Road	Pavement material, width, number of lane, length
3	Railway	Type (Broad gauge and Meter gauge)
4	Water body	Type (river, lake, khal, dighi, pond, marshy land)
5	Open Space	Type (play ground, park, graveyard)
6	Lifeline features	Type (Gas, Water, Electricity etc)

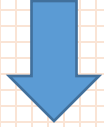
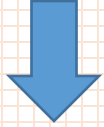
Field Survey Work

Level 0

Level I

Level II

Level III



- **Structural type (36 types)**
- **Occupancy class (33 classes)**
 - **Number of stories**
- **Building age (<10, 10-30, >30 yr)**
- **Number of occupants (day, night)**
- **Visible physical condition (*poor, average, good*)**
- **Vulnerability factors (*soft story, heavy overhang etc.*)**
 - **Photos of building**

Level I

+

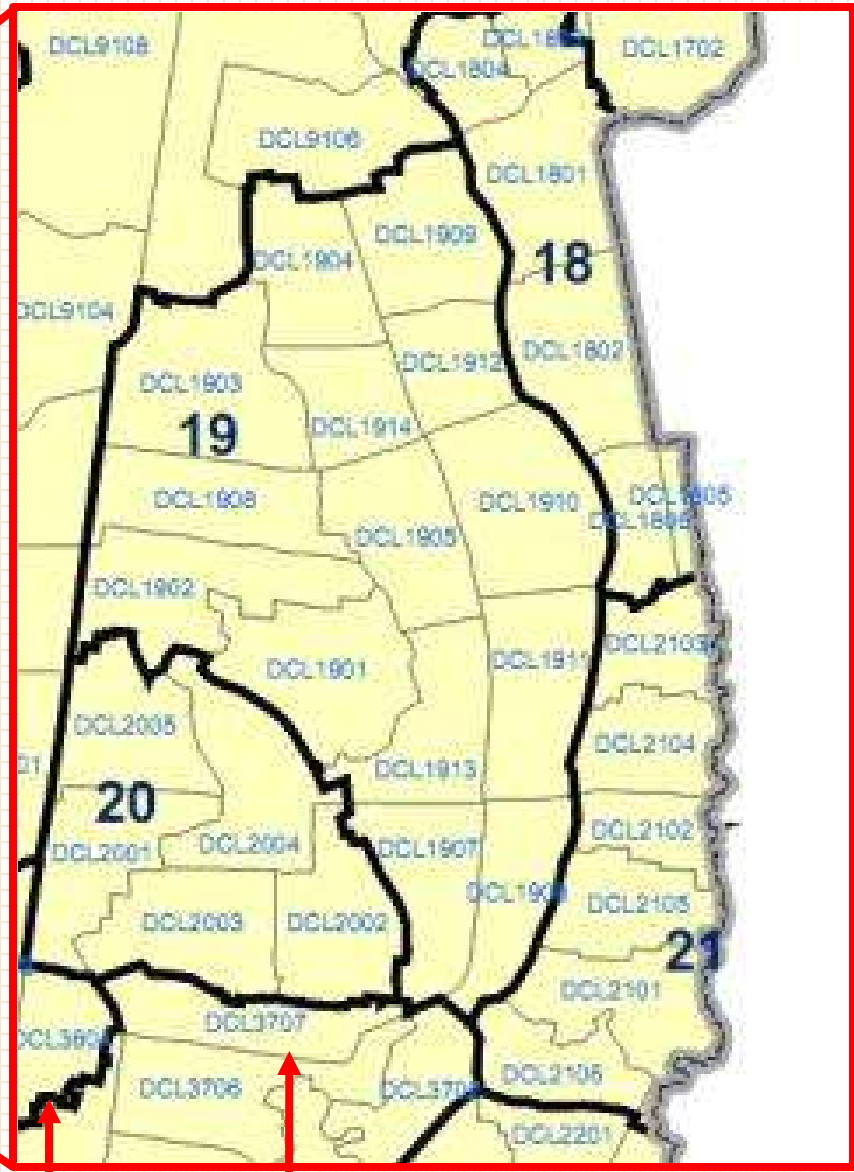
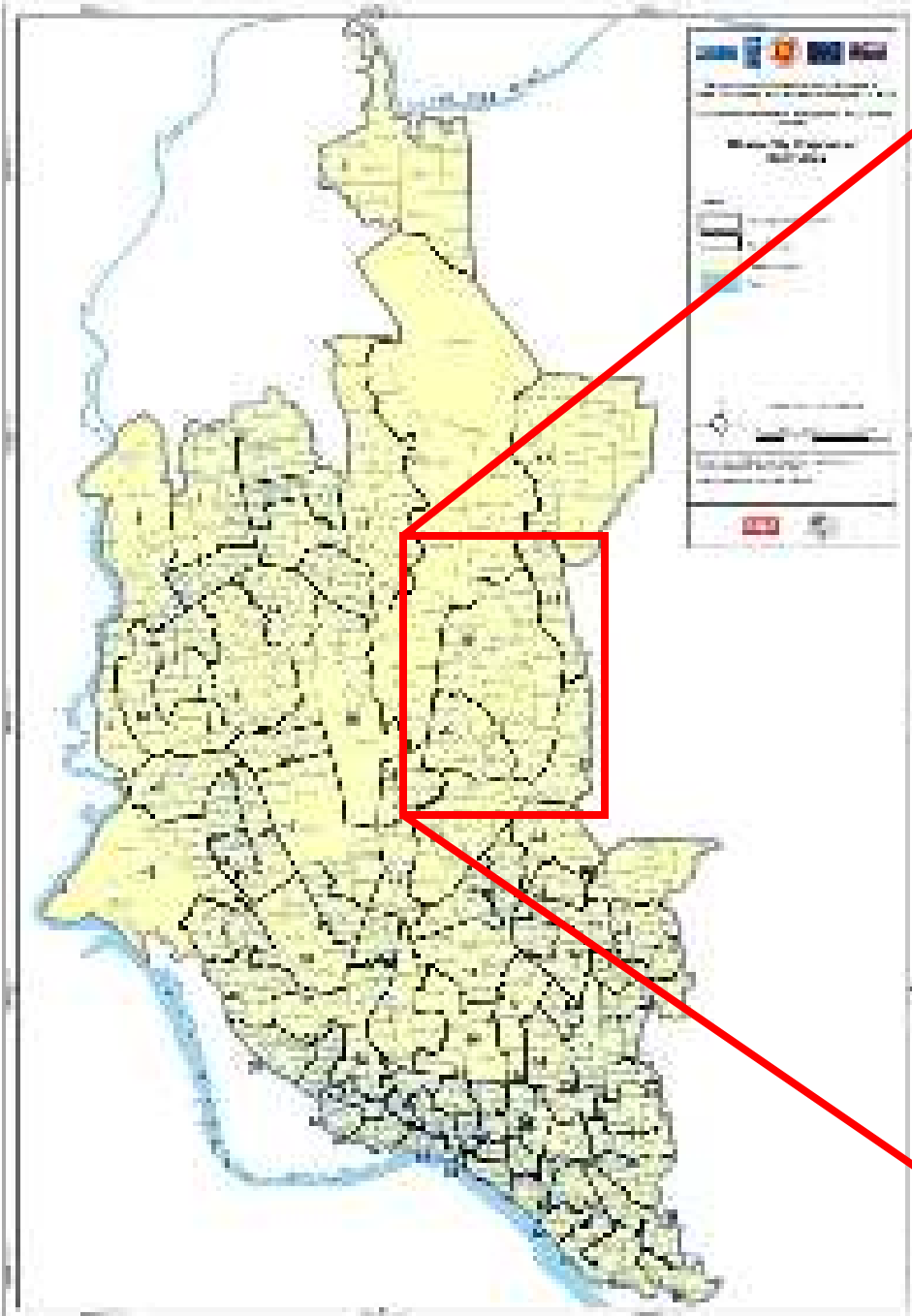
- **Plan sketch**
- **Dimensions of key building components (column size, wall layout etc.)**
- **Slab system (cast-in-place, pre-cast)**
- **Vulnerability details (short column, floor opening etc.)**

SAMPLE SIZE OF THE BUILDING SURVEY

Town	All Buildings in Database (No.)	Level I Survey		Level II Survey	
		No.	%	No.	%
Dhaka	326,825	8,741	2.67	875	0.27
Chittagong	182,277	6,175	3.39	494	0.27
Sylhet	52,176	3,536	6.78	507	0.97
Total	561,278	18,452	3.29	1,876	0.33

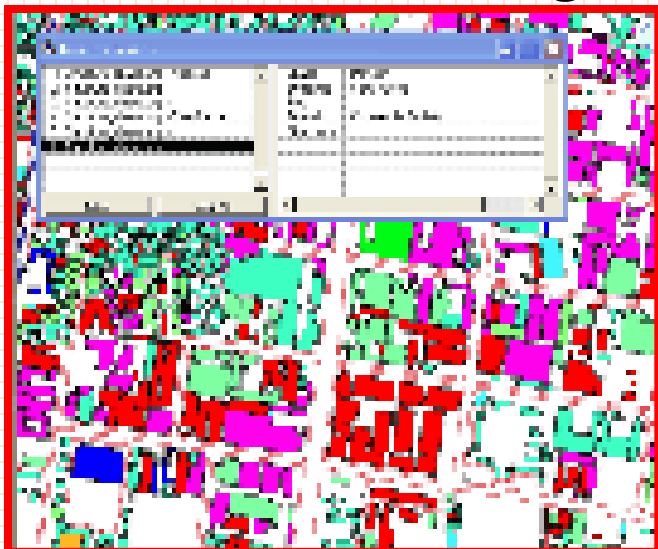
Note: Level I survey rate = 10 buildings/1 team/1 day
 Level II survey rate = 1-2 buildings/1 team/1 day
 1 team = 2 man, 1 day = 8 working hour (8.00-17.00)

CLUSTER BOUNDARY MAP



Ward Boundary
Cluster Boundary

GIS-based Building Inventory Database:



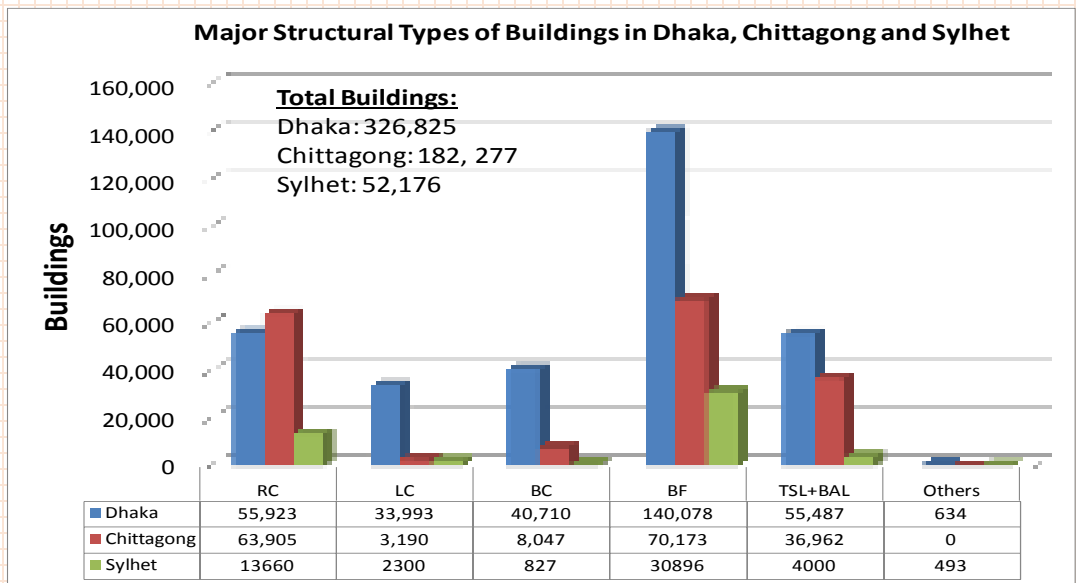
Dhaka : 327000



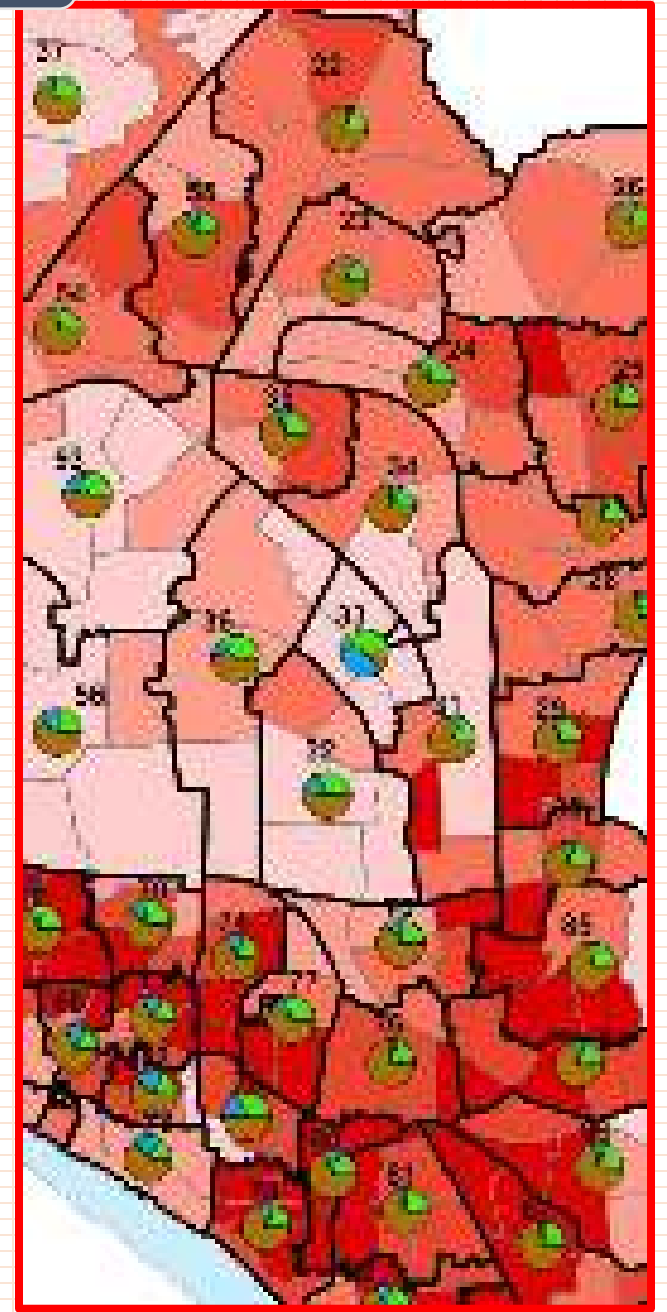
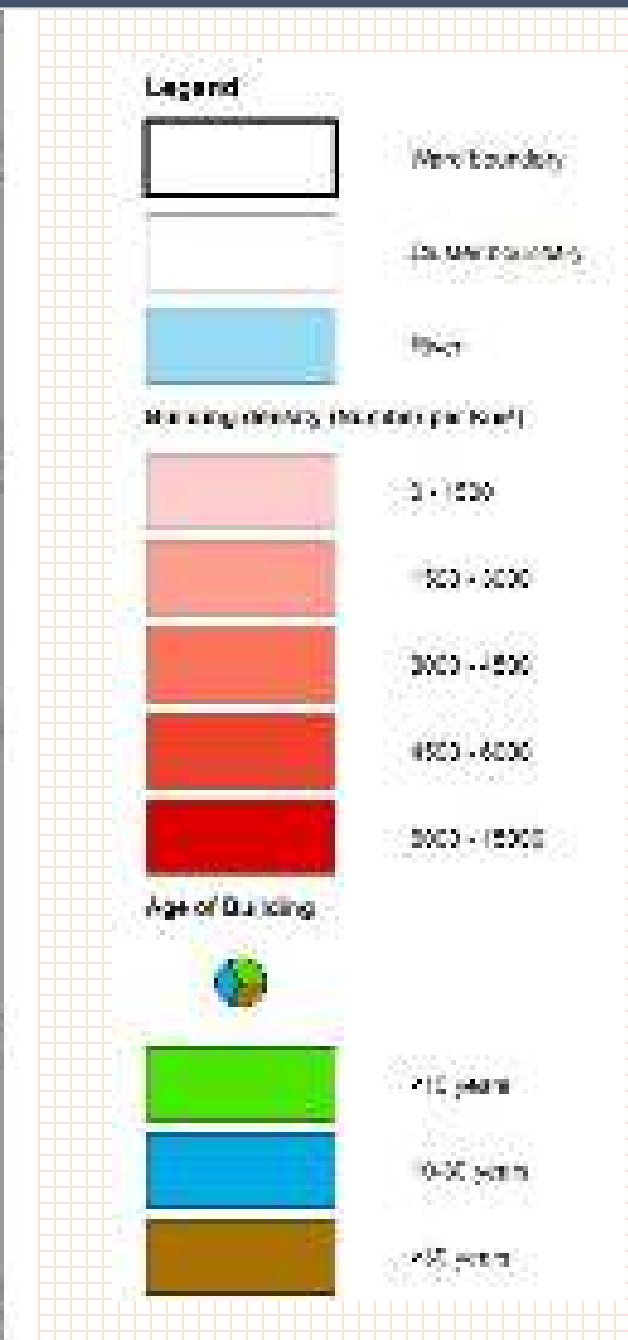
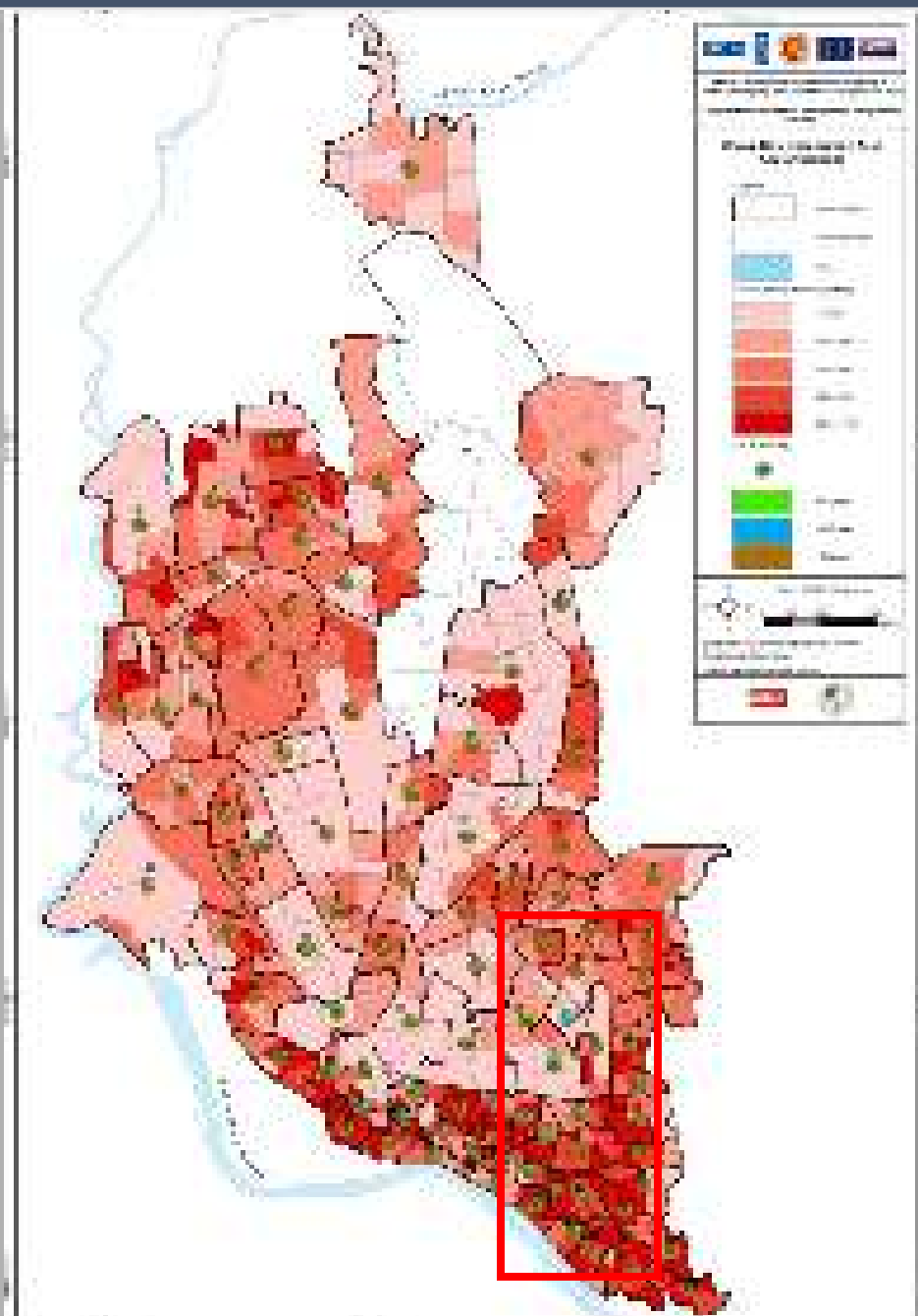
Chittagong : 183000



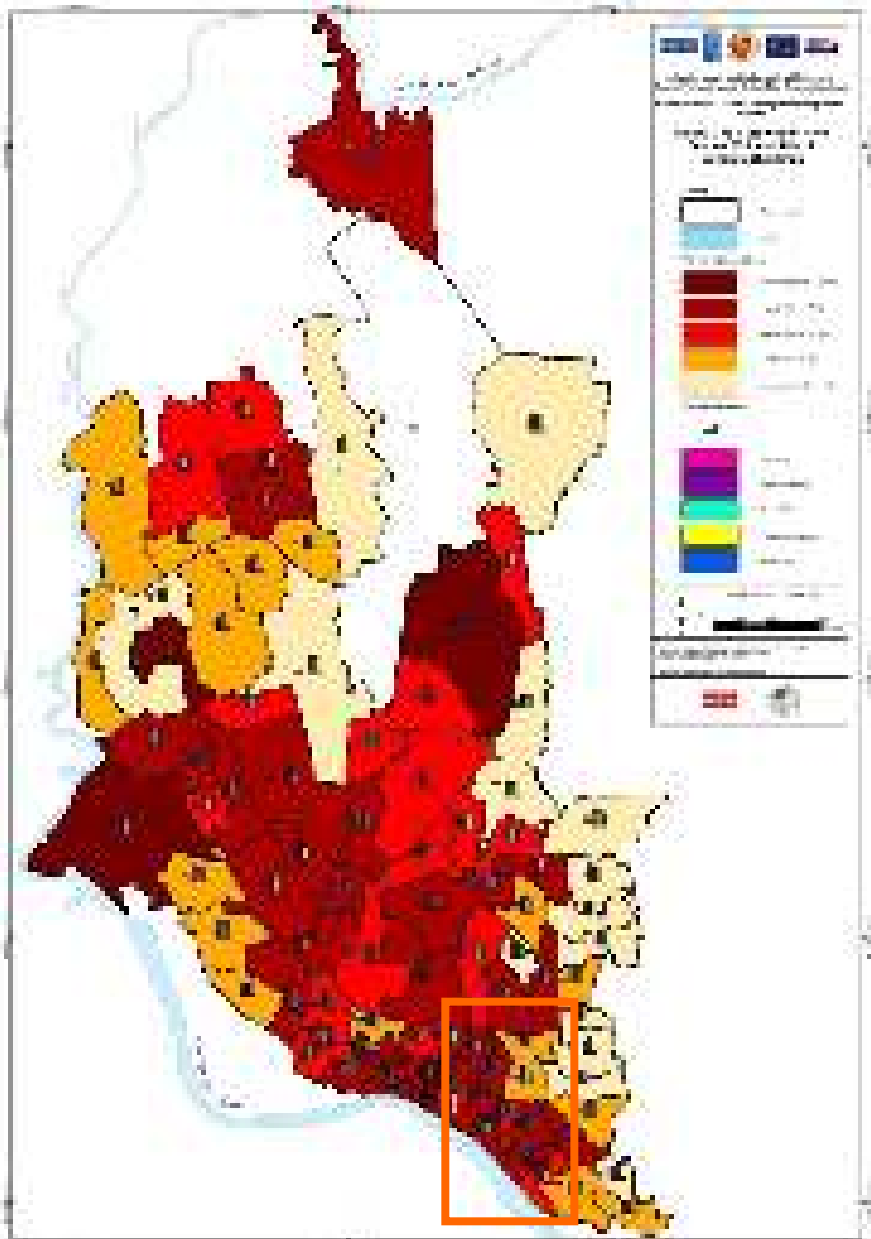
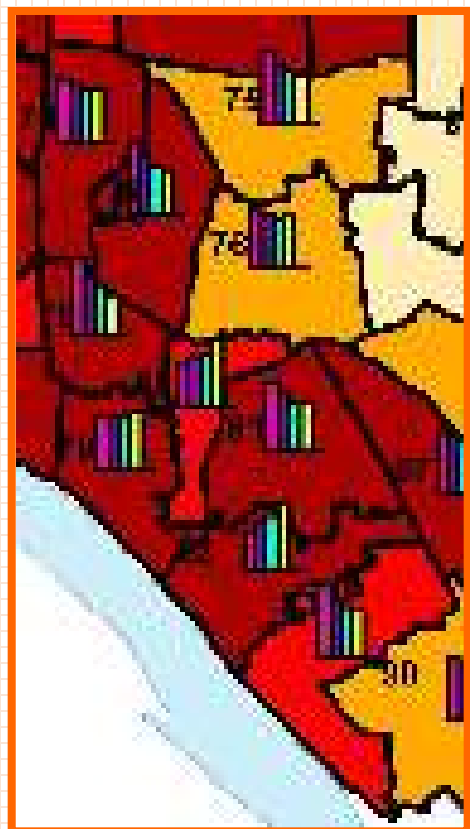
Sylhet : 52, 000



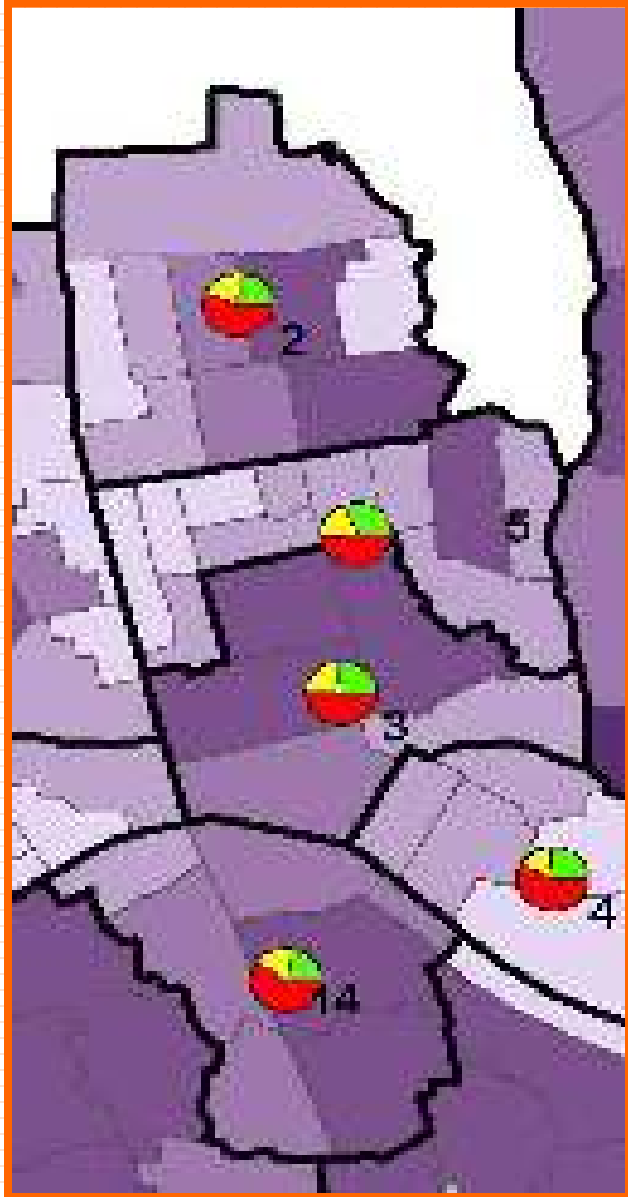
BUILDING AGE AND BUILDING DENSITY OF DHAKA



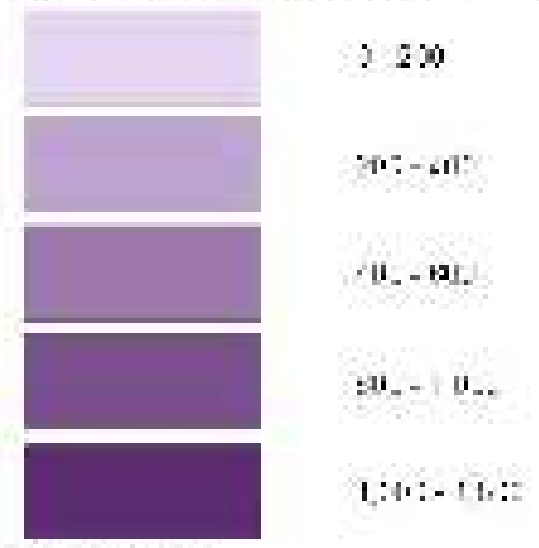
BUILDING VULNERABILITY



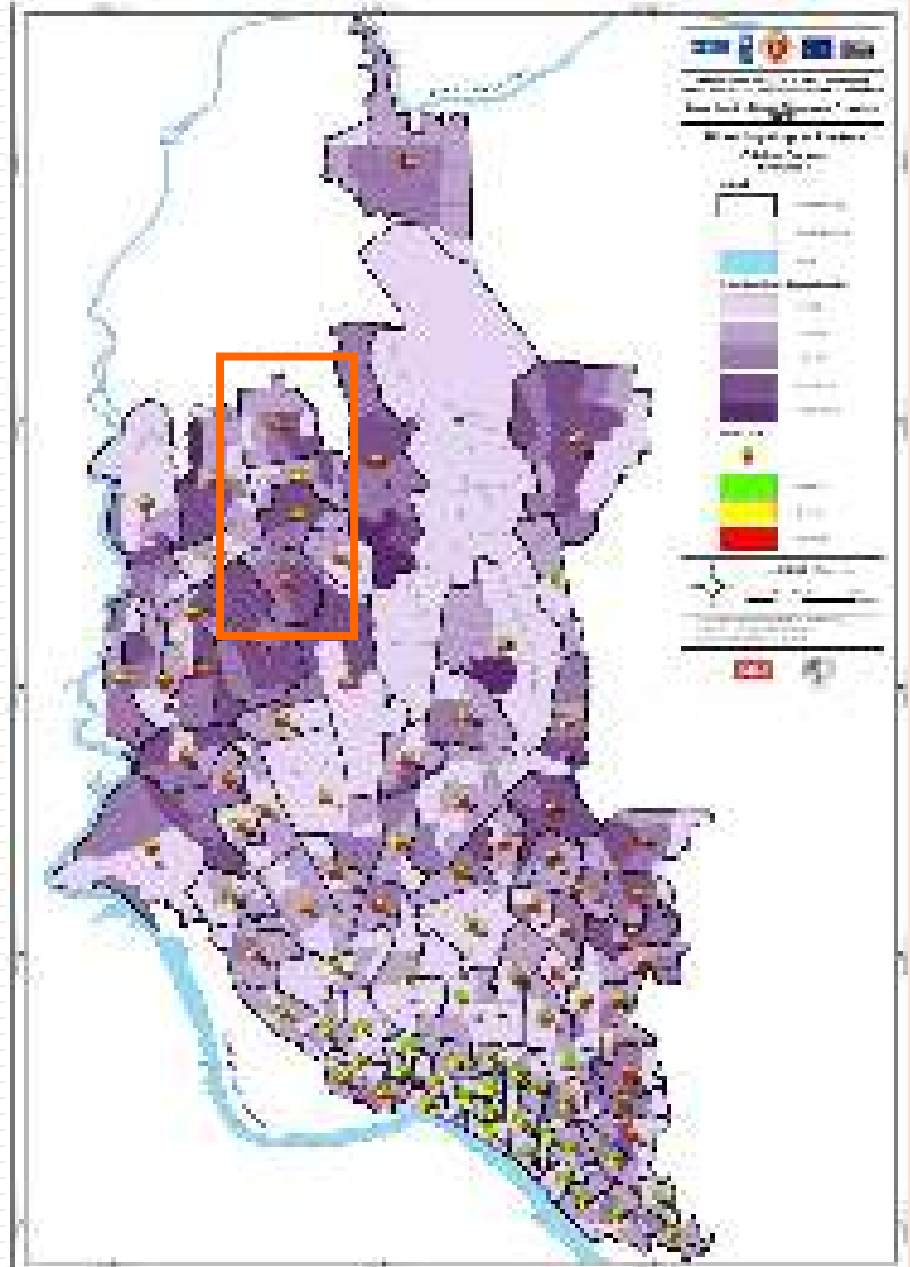
BUILDING DAMAGE MAP



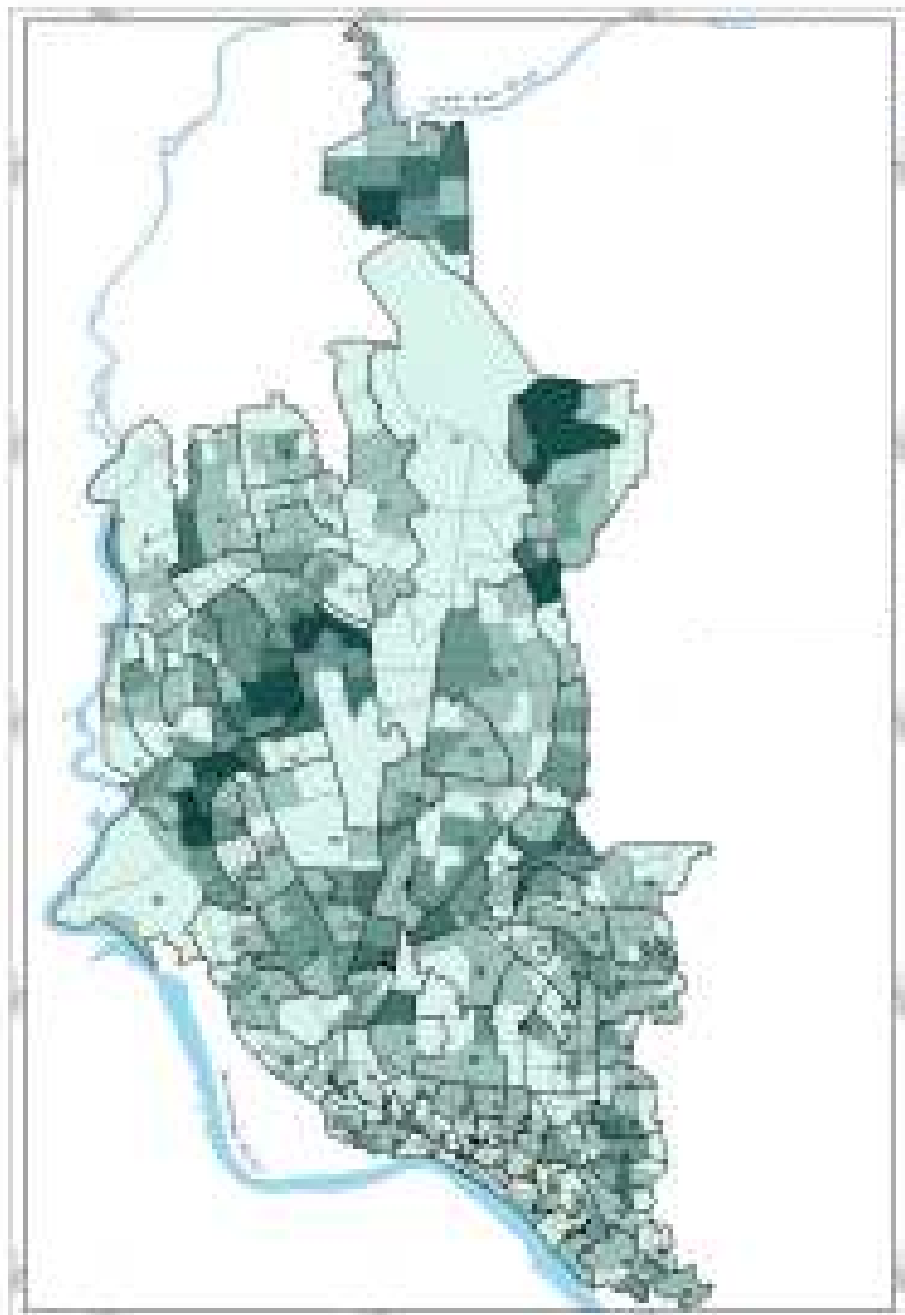
At Least moderate Damage (Number)



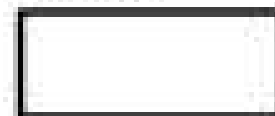
Damage Level



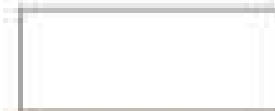
Debris Generation Scenario



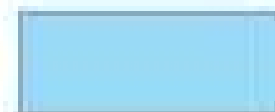
Legend



Ward boundary



Cluster boundary



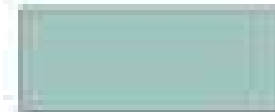
River

Debris Expected

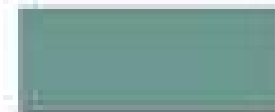
(in thousands of tons)



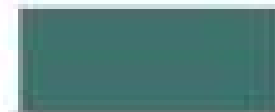
0 - 100



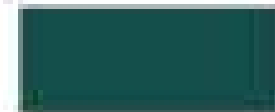
100 - 200



200 - 300

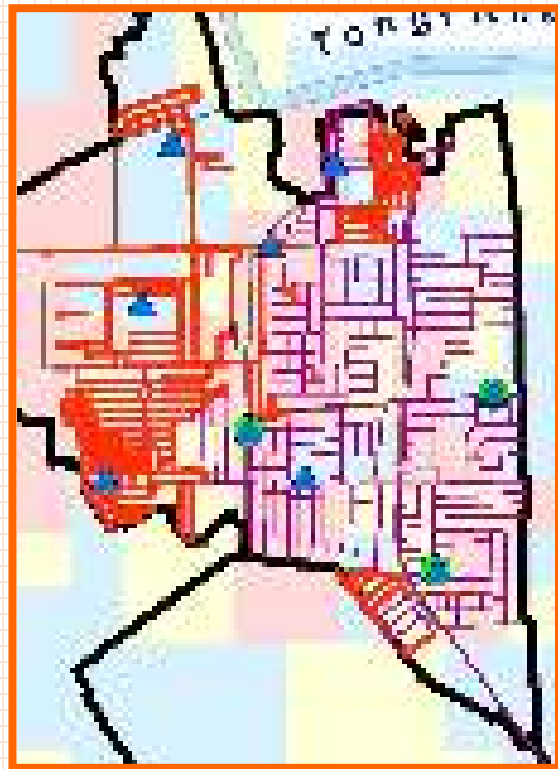


300 - 400



400 - 600

LIFELINE VULNERABILITY



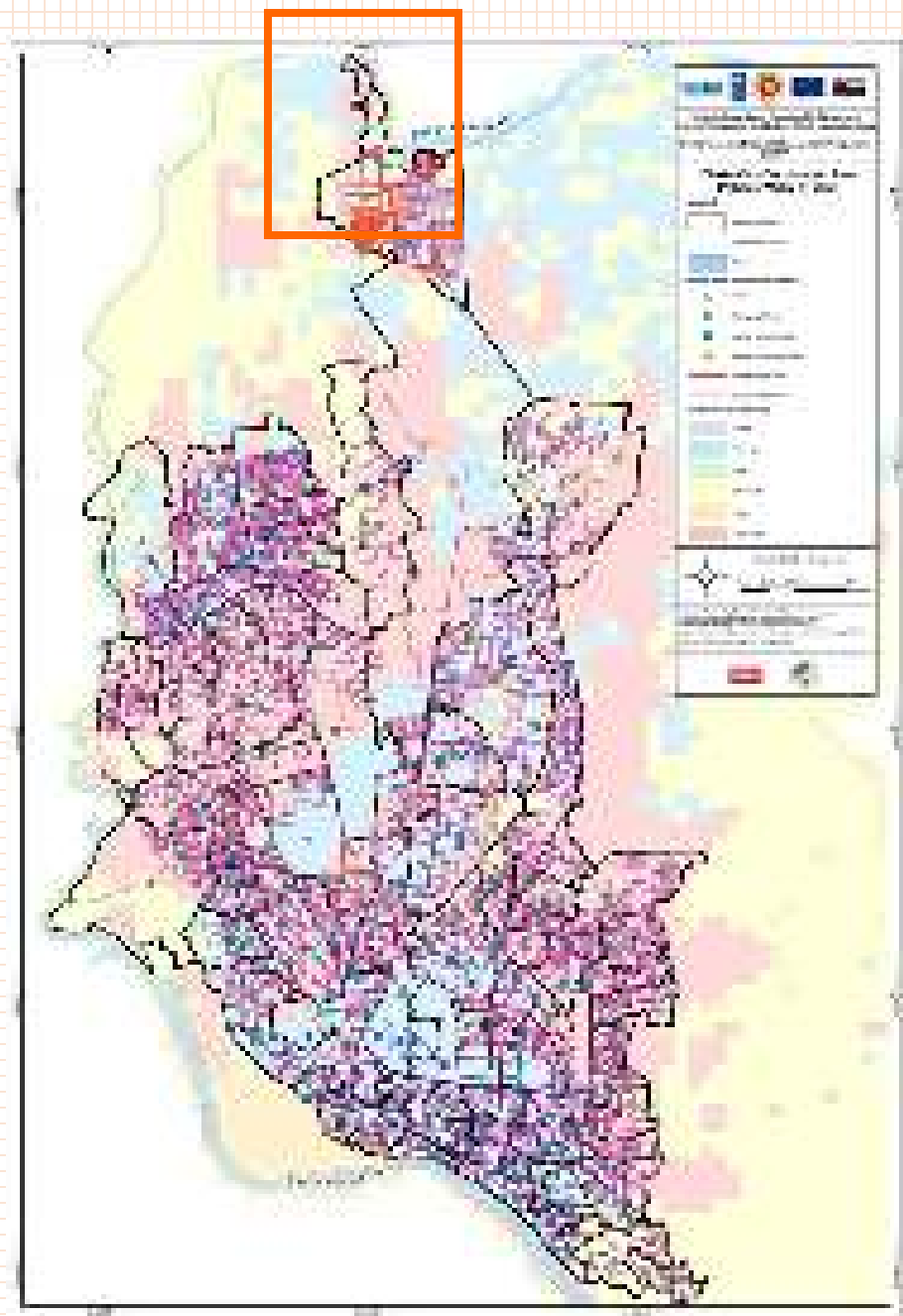
Public Water System Components

- Well
- Pumping Plant
- Above Ground Tank
- Water Treatment Plant

- Effluent Water Flow
- Mains Water Pipe

Liquefaction Susceptibility

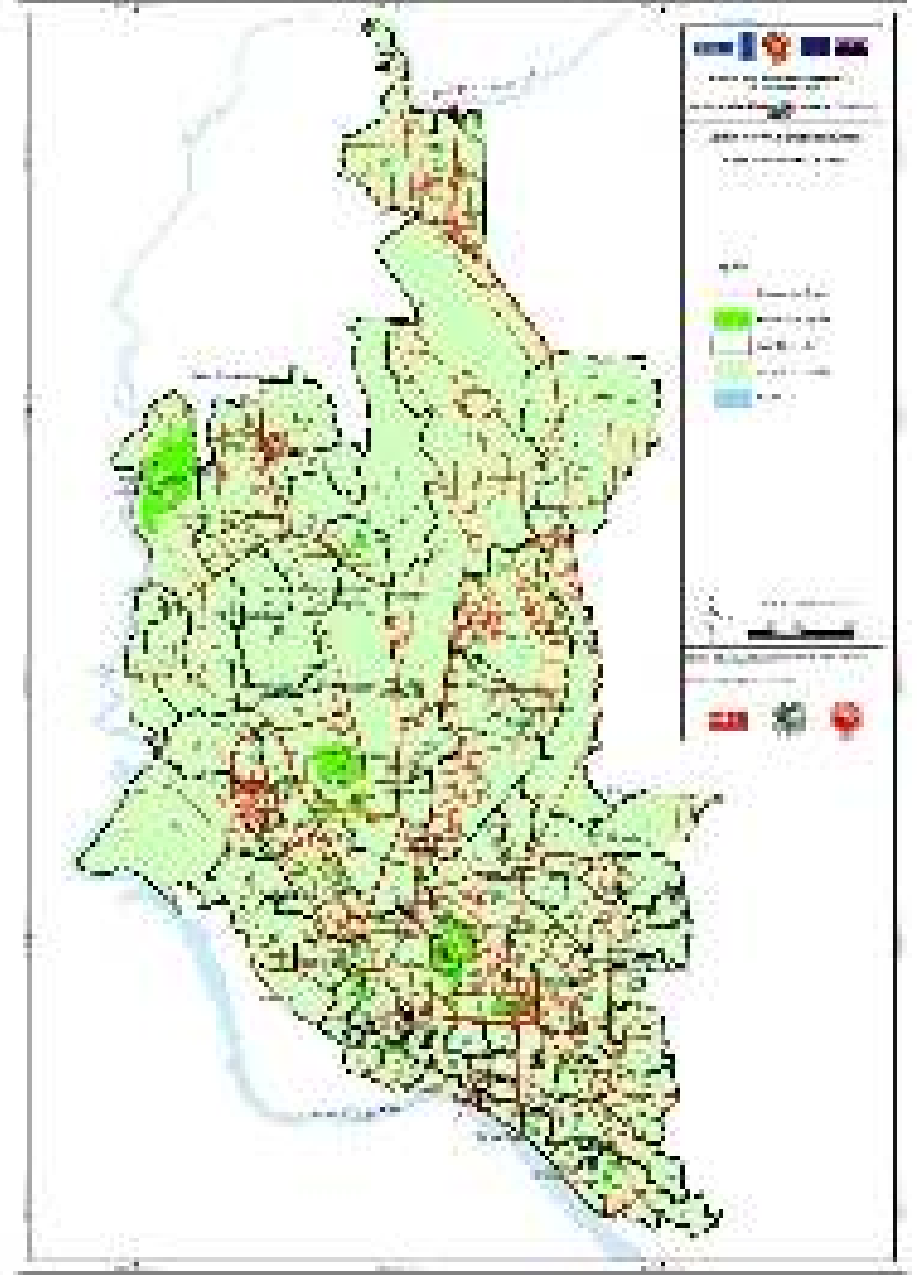
- None
- Very Low
- Low
- Moderate
- High
- Very High



LOCATION OF TEMPORARY SHELTERS

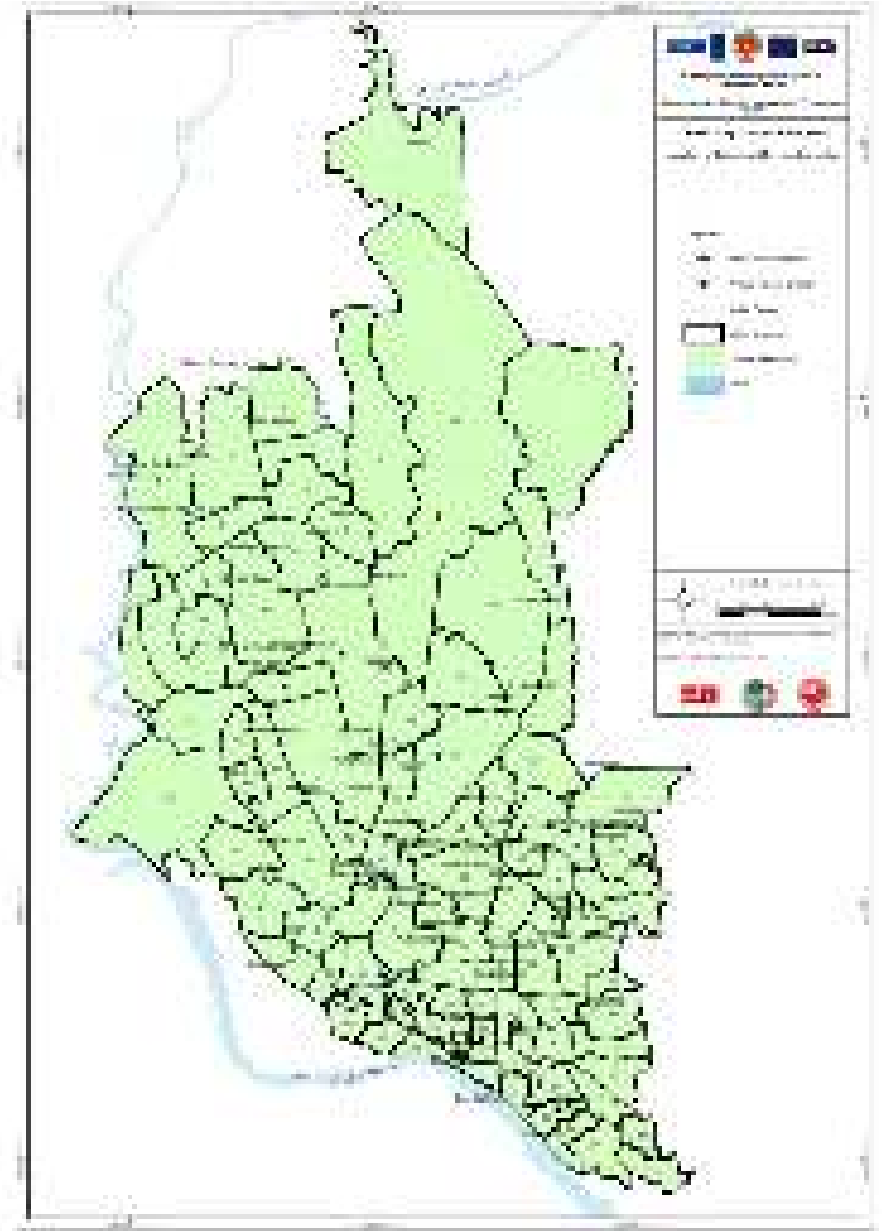
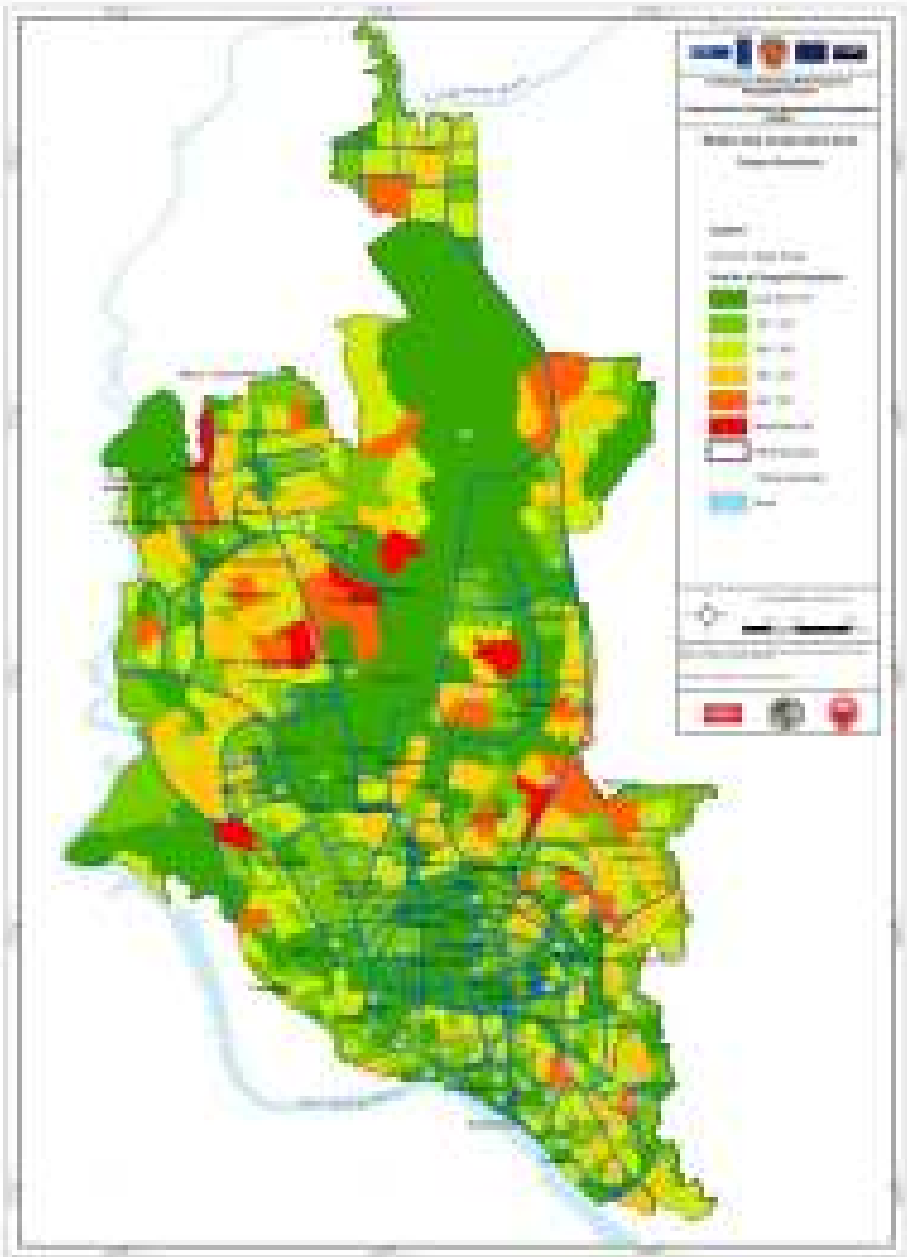


POSSIBLE EVACUATION ROUTE



TRAPPED POPULATION IN DHAKA CITY

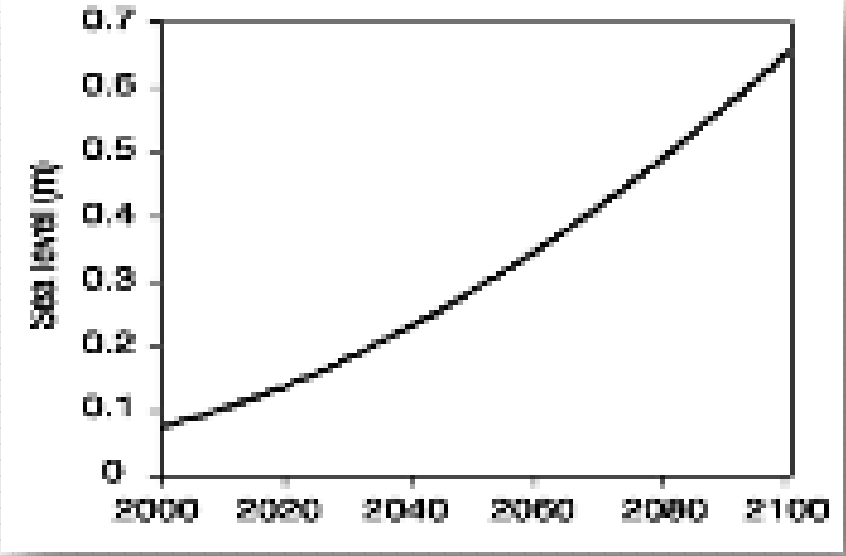
LOCATION OF SEARCH AND RESCUE CAMP



**Sub-sub-district level Flood, Sub-district
Storm Surge and Salinity Intrusion
Mapping to facilitate Community Risk
Assessment (CRA) having climate
sensitive decision**

SEA LEVEL RISE PROJECTION

Projection from AR4



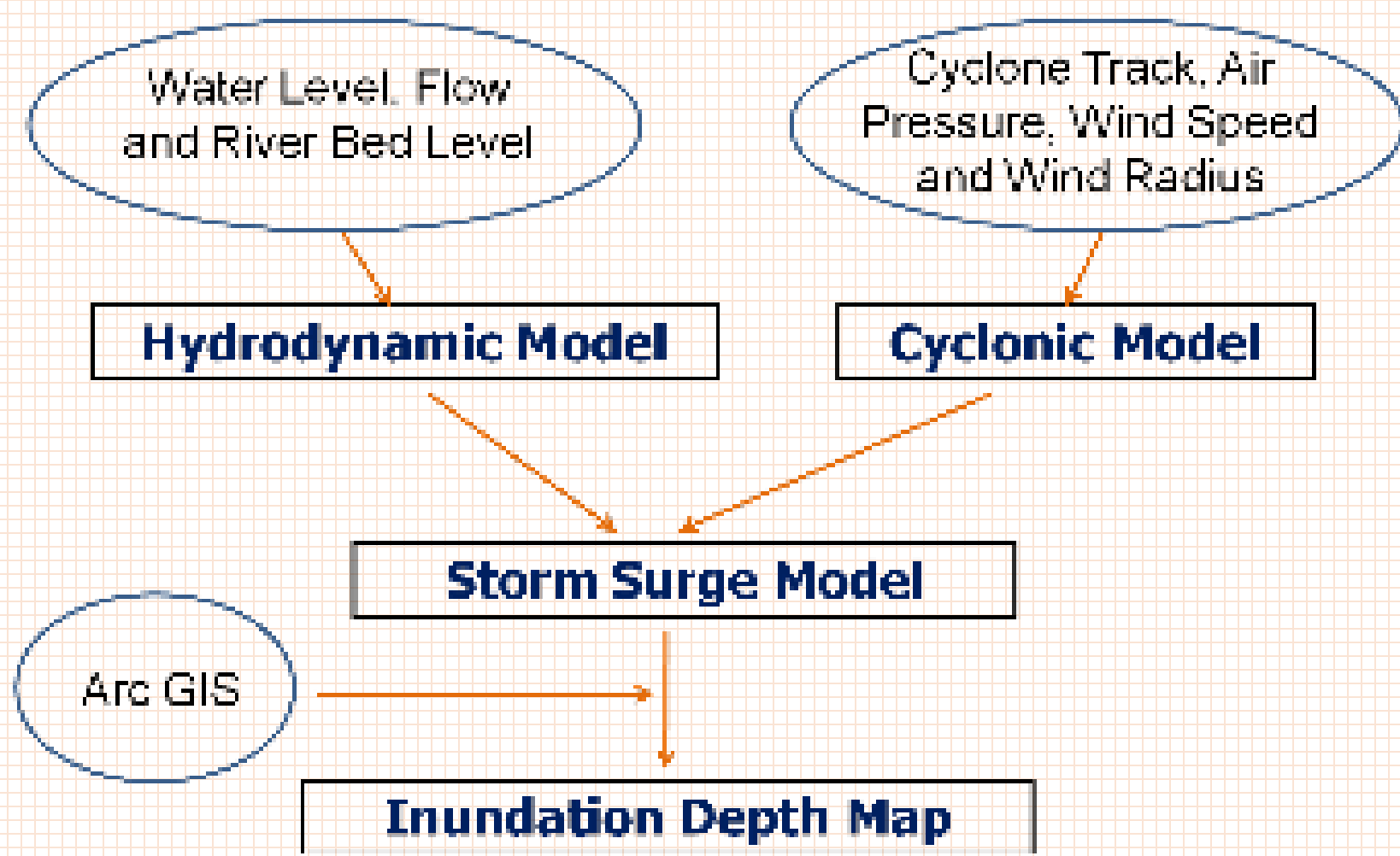
Year	Sea Level Rise (cm) above year 2000 level
2020	8
2030	12
2040	17
2050	23
2060	29
2070	36
2080	43
2090	51
2100	59

IPCC Synthesis Report 2009

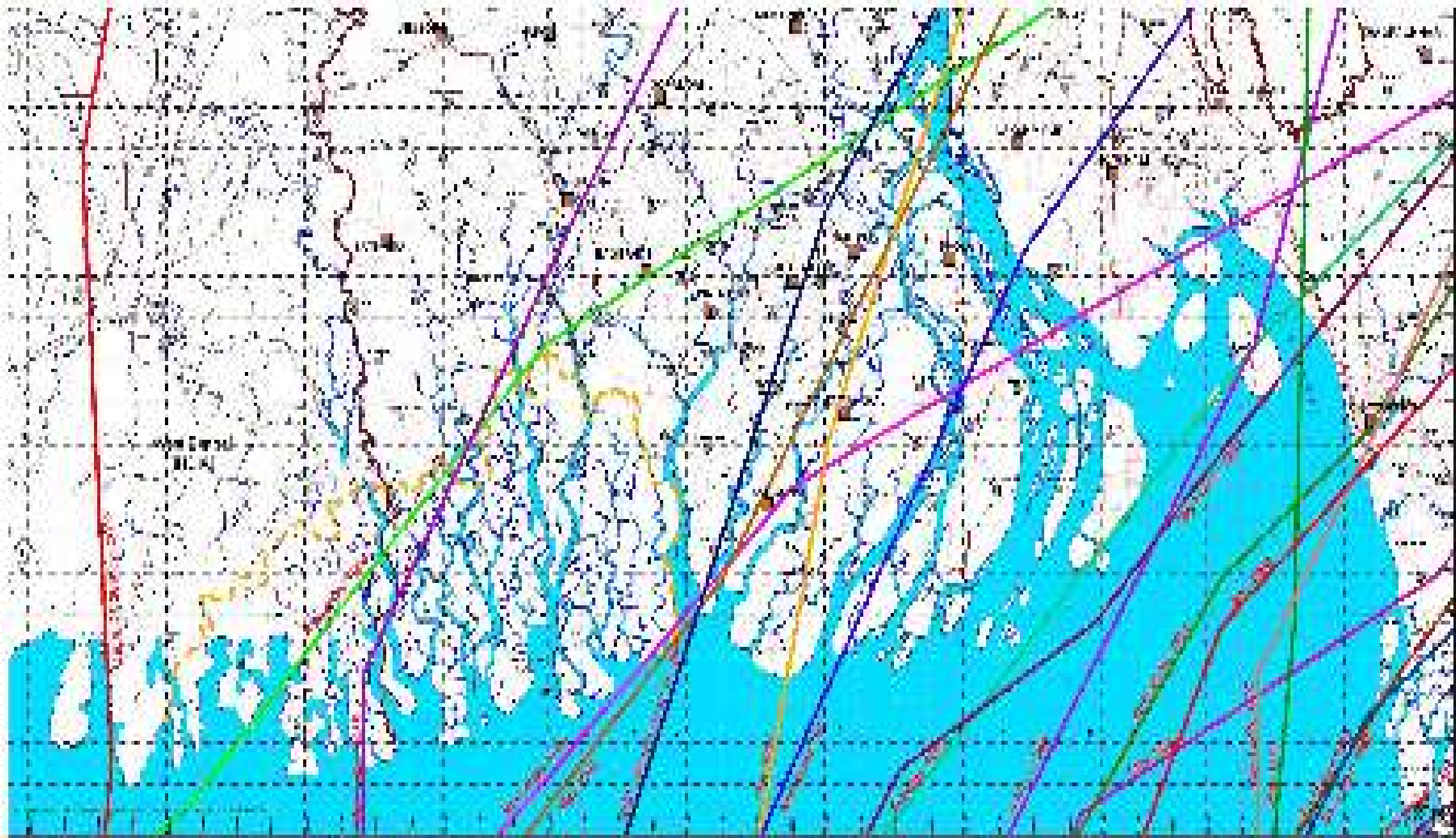


SLR 50 cm was selected for the year 2050

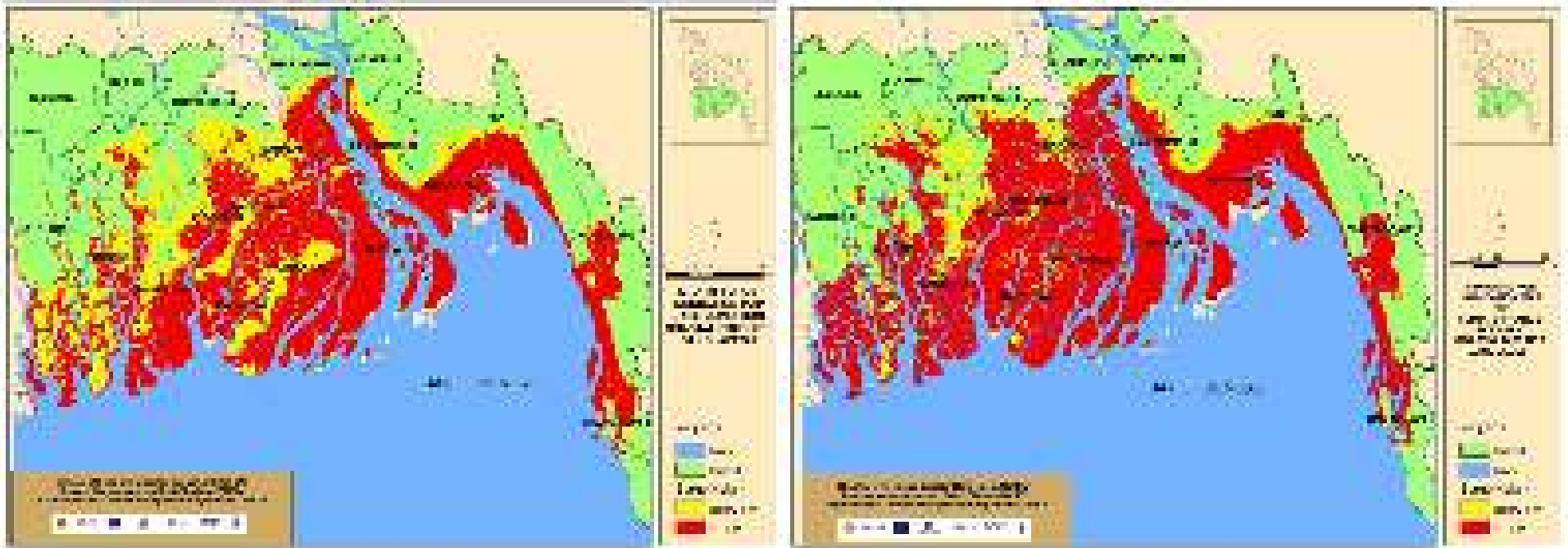
STEPS FOR STORM SURGE INUNDATION MAP



PAST 19 CYCLONES WITH 3 SYNTHETIC TRACK



INUNDATION DEPTH MAPS

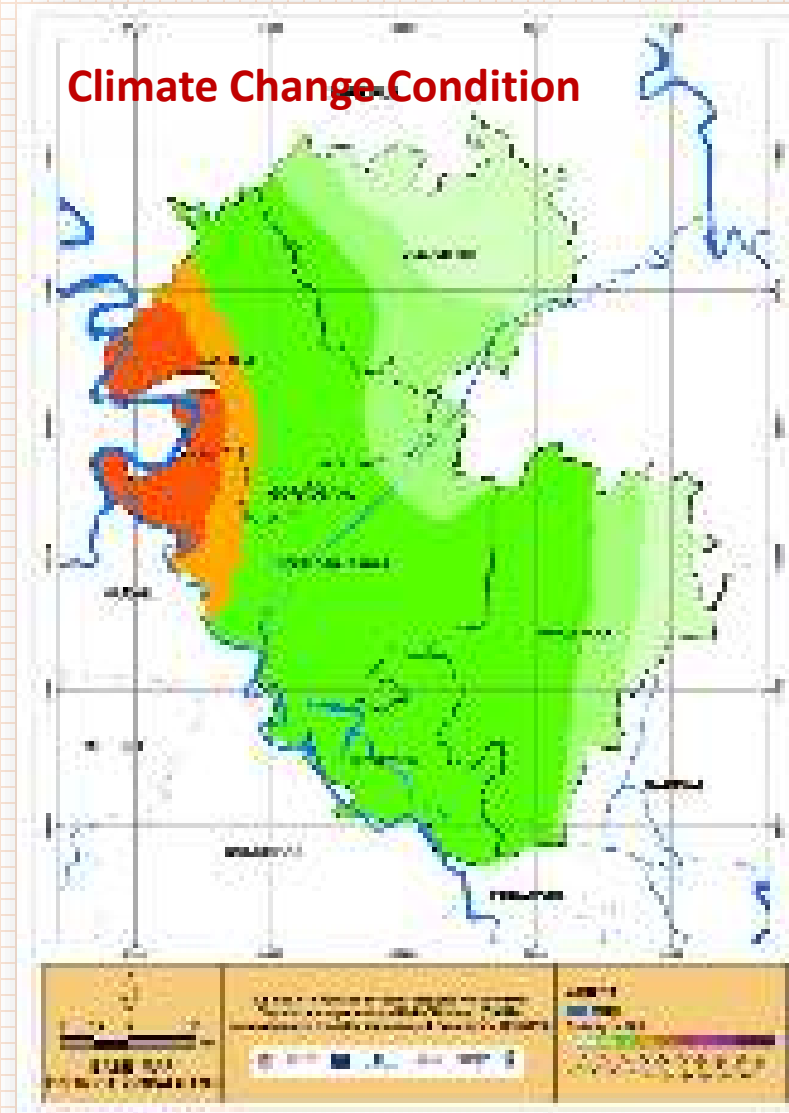
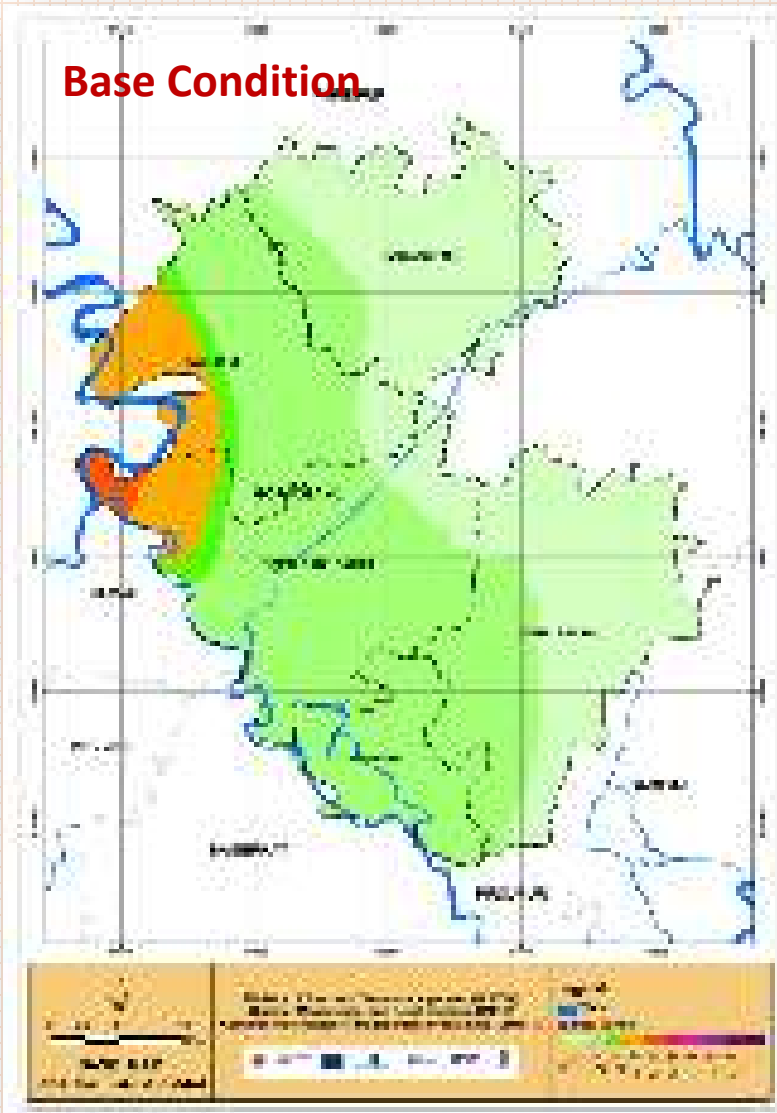


Base Condition

Climate Change Condition

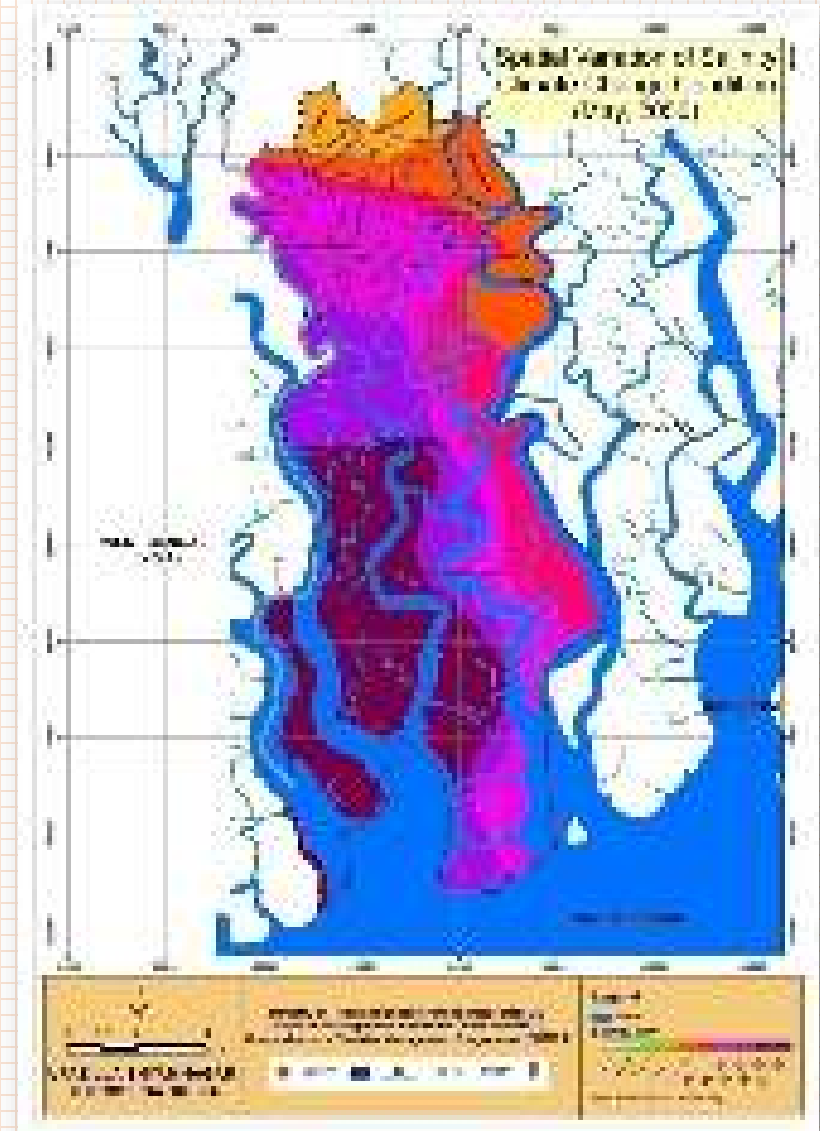
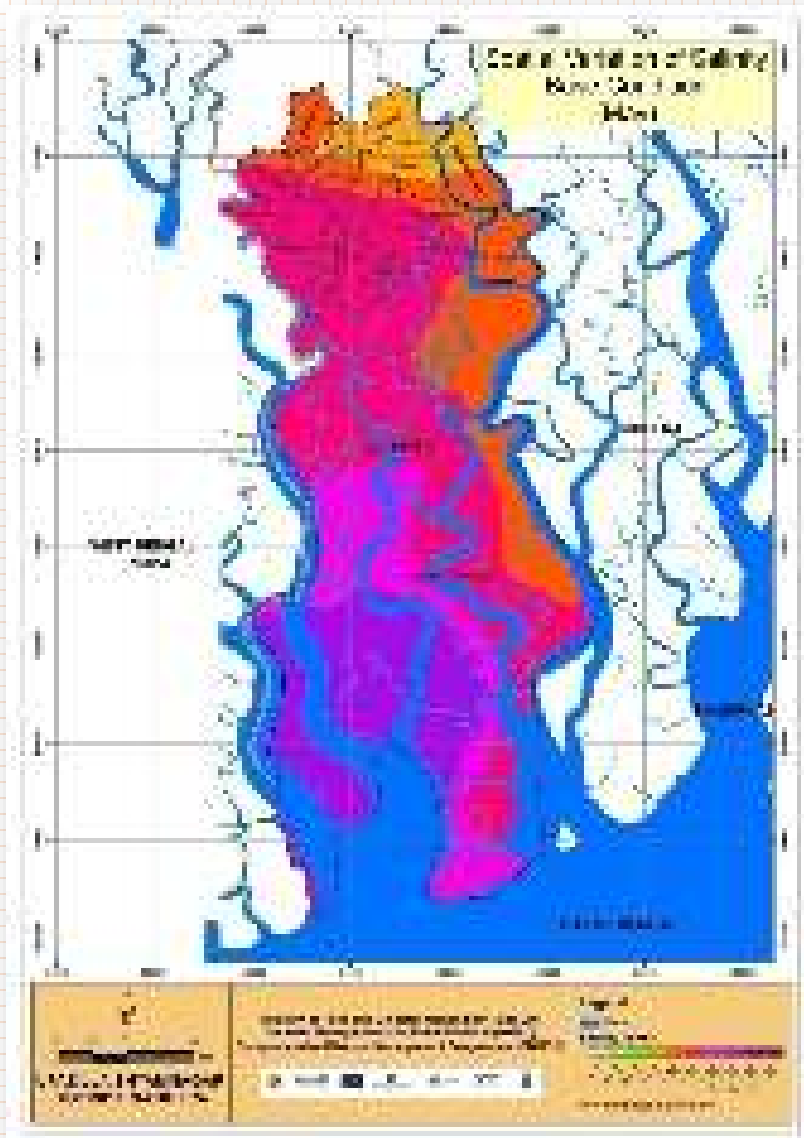
An area of 20,745 km² will be inundated by more than 1m water depth in the changing climate

SALINITY DISTRIBUTION



District: Gopalganj

SALINITY DISTRIBUTION



Sub-district: Shyamnagar; District: Satkhira

BENEFIT OF SALINITY DISTRIBUTION MAPS

The salinity distribution maps are useful for

- to find the water availability in different months for agriculture, drinking purpose, industrial and other household requirement
- Adaptation in fisheries sector and crop planning can also be benefitted from salinity zoning maps
- to find the effect of climate change on the coastal ecosystem as well as on bio-diversity

DISTRICTS FOR THE FLOOD EVENT IN 1988 AND 2007

Sl. No.	Districts	Sl. No.	Districts	Sl. No.	Districts
1	Barhmanbaria	11	Tangail	21	Sylhet
2	Dhaka	12	Manikganj	22	Habiganj
3	Gopalganj	13	Rajbari	23	Moulovibazar
4	Shariatpur	14	Gaibandha	24	Chandpur
5	Madaripur	15	Kurigram	25	Rajshahi
6	Faridpur	16	Sunamganj	26	Pabna
7	Jamalpur	17	Sirajganj		
8	Kishorganj	18	Rangpur		
9	Netrokona	19	Nilphamari		
10	Munshiganj	20	Lalmonirhat		

DISTRICTS CONSIDERING CC

Sl. No.	Districts	Sl. No.	Districts	Sl. No.	Districts
1	Barhmanbaria	13	Rajbari	25	Moulovibazar
2	Dhaka	14	Gaibandha	26	Chandpur
3	Gopalganj	15	Kurigram	27	Pirojpur
4	Shariatpur	16	Sunamganj	28	Barisal
5	Madaripur	17	Sirajganj	29	Bhola
6	Faridpur	18	Khulna	30	Jessore
7	Jamalpur	19	Sathkhira	31	Bagerhat
8	Kishorganj	20	Rangpur	32	Laxmipur
9	Netrokona	21	Nilphamari	33	Pabna
10	Munshiganj	22	Lalmonirhat	34	Rajshahi
11	Tangail	23	Sylhet		
12	Manikganj	24	Habiganj		

FLOOD INUNDATION DEPTH MAPS

The flood depths are classified in accordance with the NWMP guidelines.

$F_0 = 0-30$ cm

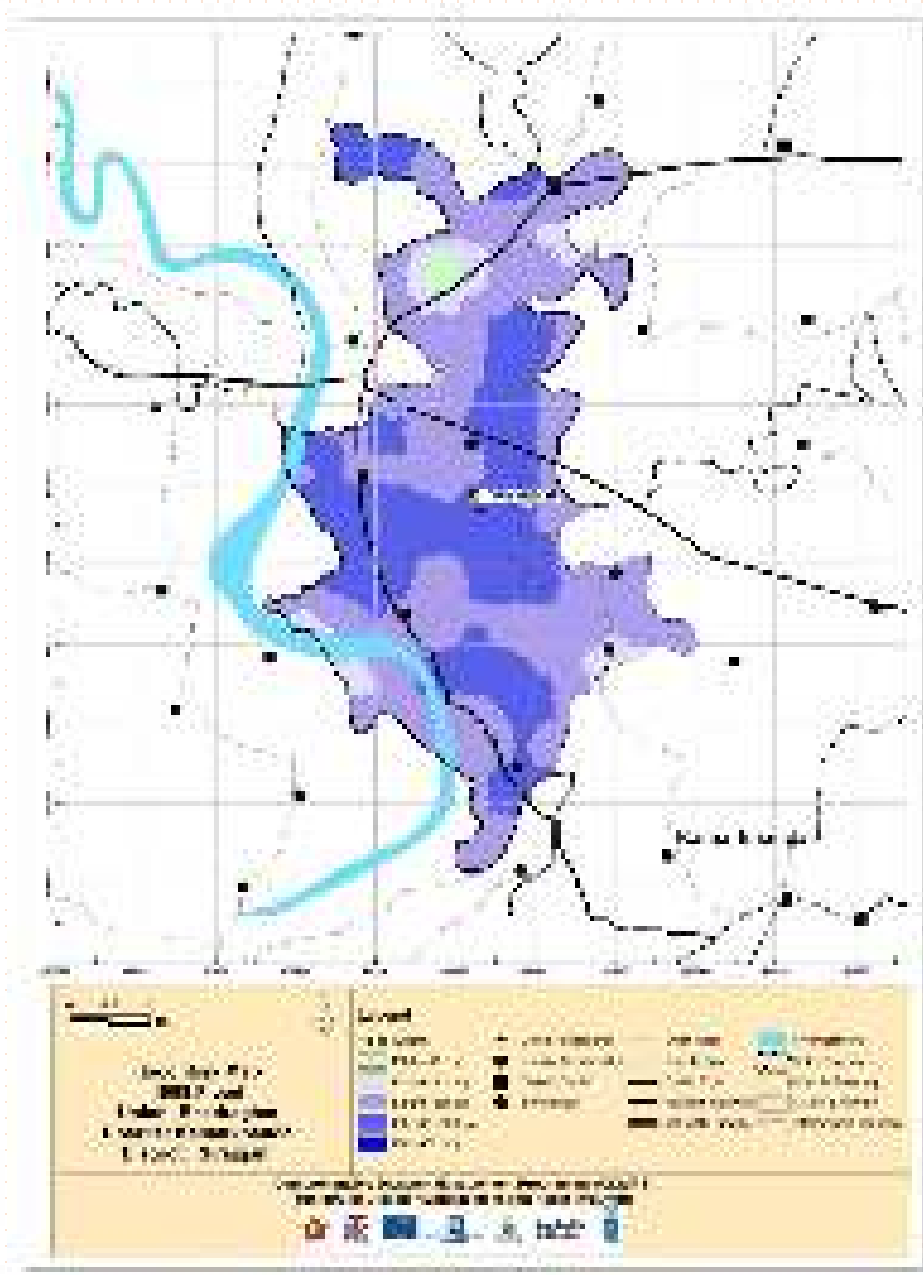
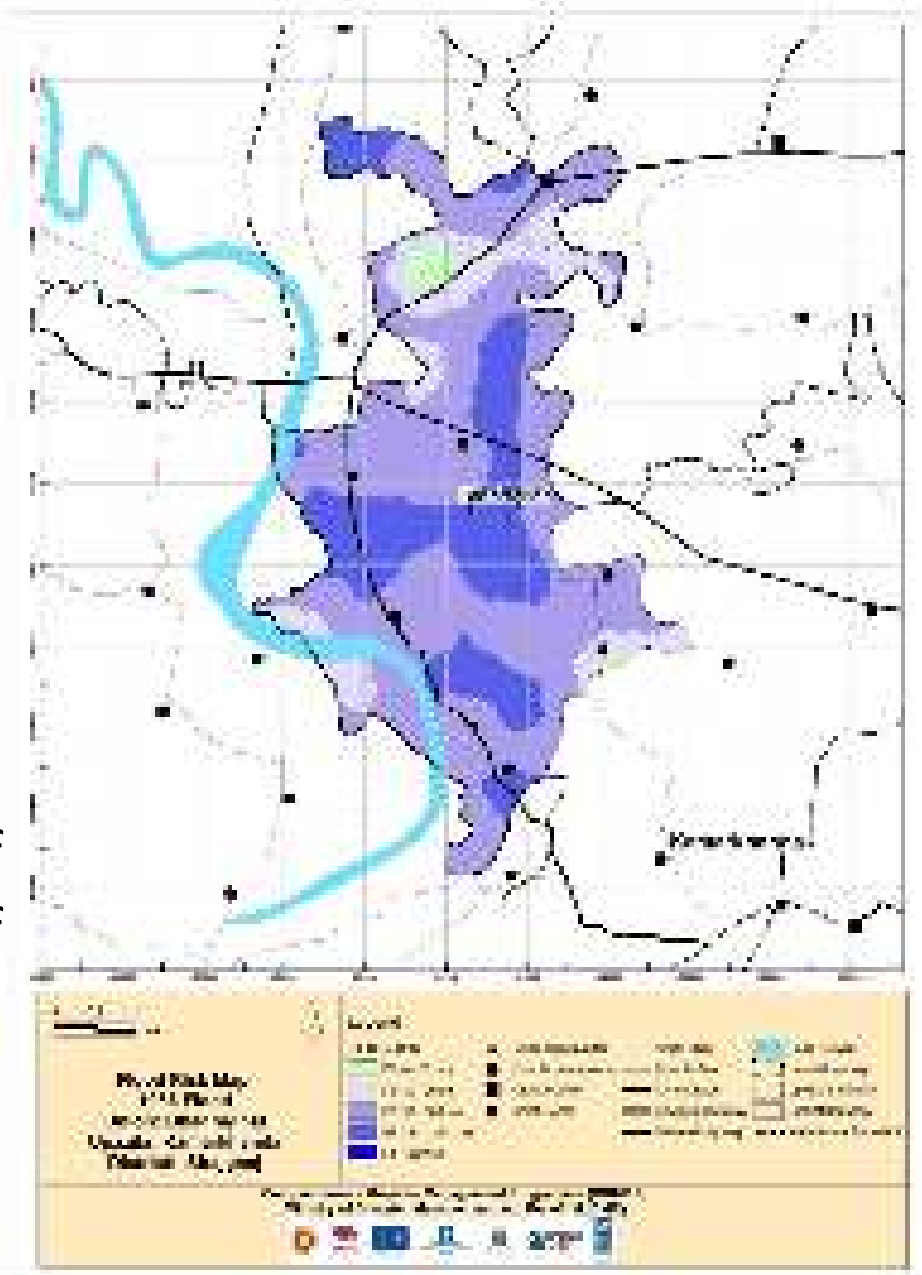
$F_1 = 30-90$ cm

$F_2 = 90-180$ cm

$F_3 = 180-360$ cm

$F_4 > 360$ cm

The flood levels are the result of interpolation of monsoon water level of model grids surrounded with the rivers and channels in the locations of interest.



BENEFIT OF FLOOD INUNDATION DEPTH MAPS

The flood risk maps are useful for

- assessing community risk
- examine the potential physical impacts of climate change
- assess the associated damages and losses in key economic sectors, on vulnerable populations, and in the overall economy
- it can be instrumental for awareness building of local communities and assessment of associated risks
- enable to planner to find different elements at risk like road, homestead and crop fields

Location based Service

- GPS enabled Smart Phone to identify on the spot Flood Inundation Depth.
- System Requirement (Open Source Software/Technology)
- Smart Phone with GPS Module

Flood Inundation Depth

Spot Coordinates

Latitude (N): 22.4525691

Longitude (E): 81.2493553

Get Coordinates



Flood Inundation Depth

Depth (cm): 43

Get Depth



Flood Inundation Depth

Spot Coordinates

Latitude (N): 22.4525691

Longitude (E): 81.2493553

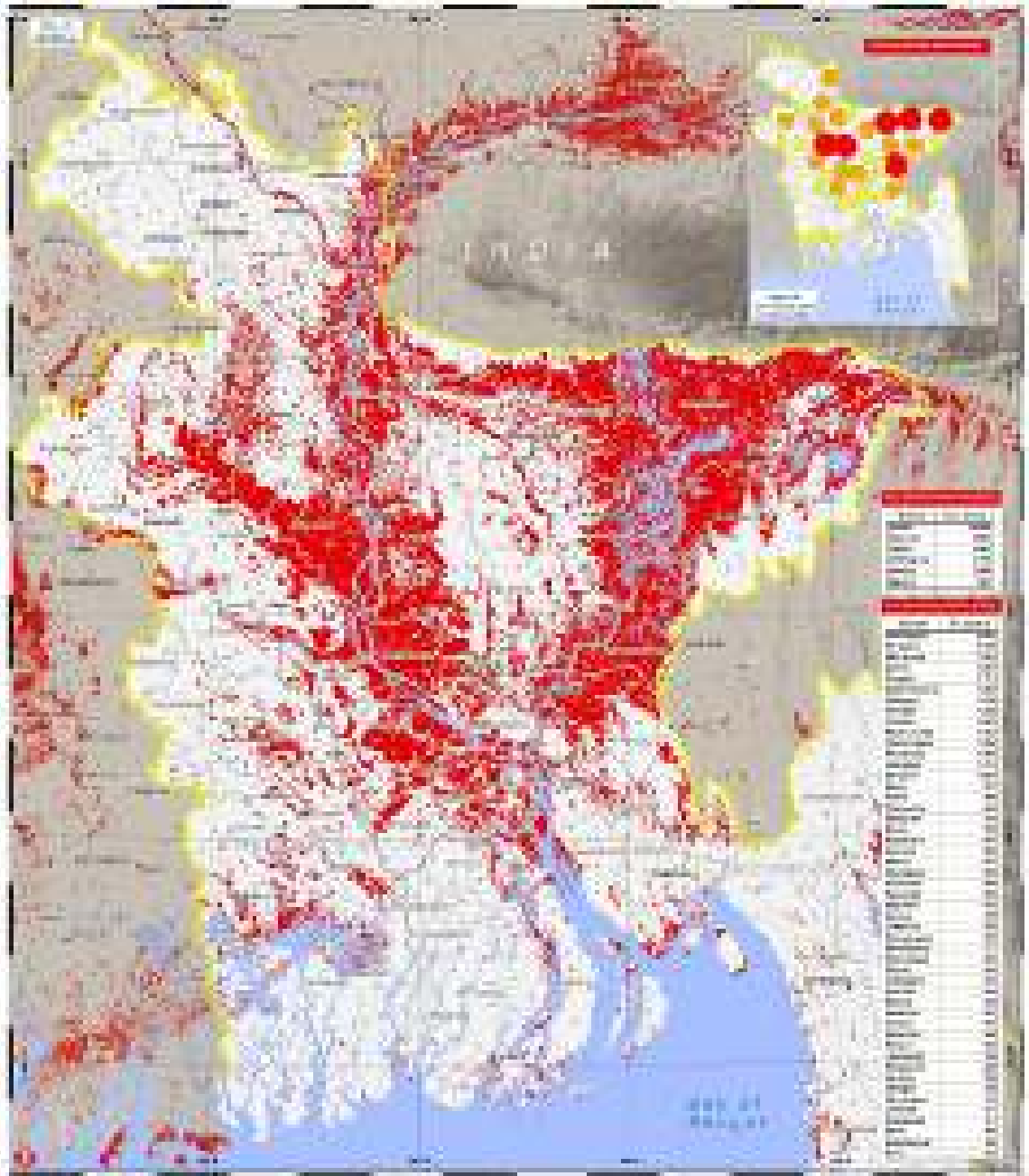
Get Coordinates

Flood Inundation Depth

Depth (cm): 59

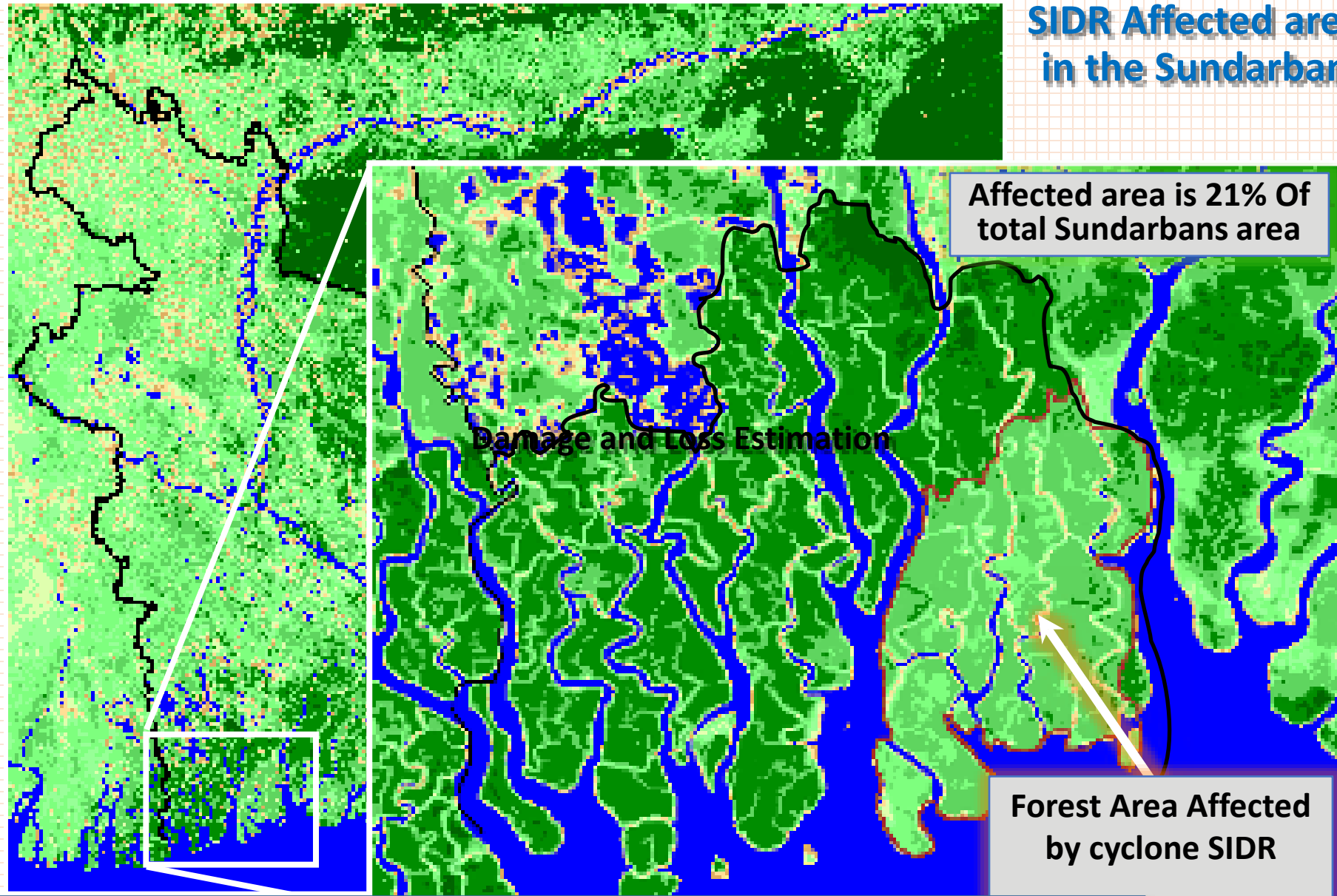
Get Depth

Flood Extent Map from Satellite Image (Flood 2007)



Damage and Loss Estimation

SIDR Affected areas in the Sundarbans



Affected area is 21% Of total Sundarbans area

Forest Area Affected by cyclone SIDR

Damage and Loss Estimation

Disaster Incidence Database (DIDB)

Disaster Incidence Database - Mozilla Firefox

Disaster Incidence Database

Disaster Incidence Database



Show Disaster Info

Search Criteria:

Date From: 2007-01-01

Date To: 2010-04-08

Disaster: Tropical Cyclone

Show Results Clear Selections

Show Map	Event ID	Date	Time	Duration	Disaster	Country	Damage Info	Remarks	OSM Code	More Info
Show Map	10-1000-0001	2007-10-16	22:00:00	8 hours	Tropical Cyclone	INDIA	System SAGUN (Dwarka) - Strongly affected 8204 families with 22822 people	44 houses of 21 families of the affected districts	10-1000-0001-000	
Show Map	10-1001-0001	2007-11-15	22:00:00	8 hours	Tropical Cyclone	INDIA	Cyclone South (Dwarka) - Strongly affected 20048 families with 62000 people - Damaged 450000	100 houses of 200 families of 20 affected districts	10-1001-0001-000	10-1001-0001-000
Show Map	10-1002-0001	2008-04-17	22:00:00	7 hrs	Tropical Cyclone	INDIA	24 people, 10 women, 5000 family with 20000 people of Orissa group. Govt's buses, hospitals and schools are affected. Total of 8 (five) people reported death.		10-1002-0001-000	
							No. of affected people-76, No. of affected women-40, No. of affected family-10000, No. of affected people-200000, Damaged crops (Paddy) 10000 Acres, Damaged houses (Shed) 10000 (Acres), Damaged households 10000000			

11:00 PM

Disaster Incidence Database (DIDB)

The screenshot displays the Disaster Incidence Database (DIDB) web application. The browser window title is "Disaster Incidence Database - Florida Region". The address bar shows the URL "http://www.dsd.org/didb/didb.asp". The page header includes the text "DISASTER INCIDENCE DATABASE" and "2007-2008".

The main interface features a map of Florida on the right side, with several counties highlighted in yellow. These highlighted counties include: Alachua, Baker, Bay, Bradford, Brevard, Calhoun, Columbia, Duval, Escambia, Franklin, Gadsden, Gilchrist, Hamilton, Hardee, Hendry, Hernando, Hillsborough, Indian River, Jackson, Jefferson, Lafayette, Lake, Leon, Levy, Manatee, Marion, Nassau, Oklawaha, Orange, Osceola, Palm Beach, Polk, Putnam, Santa Fe, Seminole, Suwannee, Taylor, Volusia, and Washington.


On the left side, there is a search panel titled "Search Criteria:" with the following fields and controls:

- Date From: 1/1/2007
- Date To: 12/31/08
- County: ALL
- Buttons: Show Report, Show Details

At the bottom right, there is a scale bar labeled "Miles" with markings for 0, 10, 20, and 30.

Disaster Management Committee Contact Information

admin.org.bd/commcpr/



Disaster Management Committee Contact Information

Select Committee Location

Select Level: District

Location: Dhaka


District: Bogra

Upazila: []

Union: []

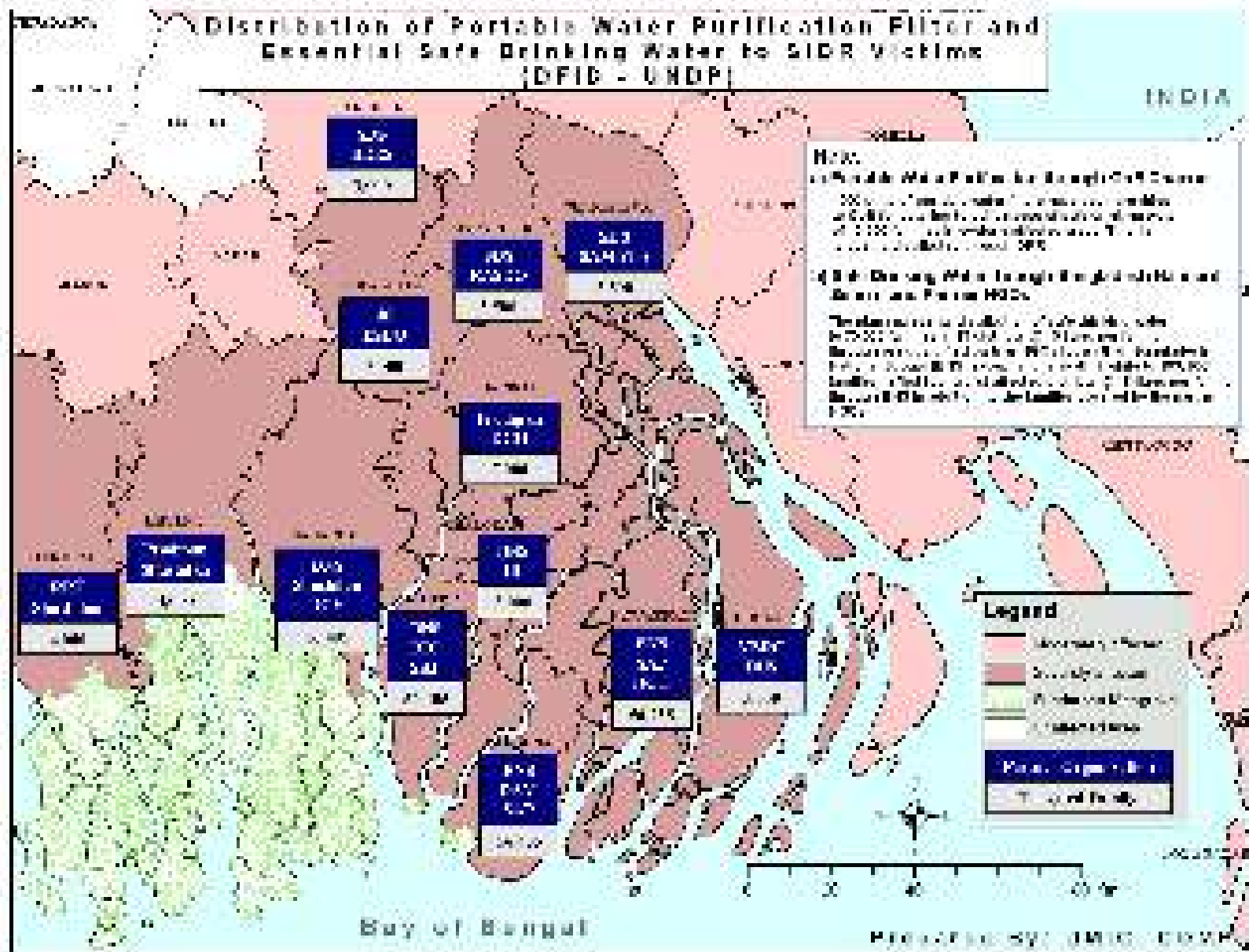
[Report](#) [@ Comment](#) [Print](#) [Print Hardly](#)

Download Base Map



Download

District: Bograhat		
Chairman's Name & Mobile No.	Mr. Alam Hossain	01731920300
Member Secretary's Name & Mobile No.	Mr. Agharal Islam	01739211240
Upazila: Bograhat Sadar		
Advisor's Name & Mobile No.	Mr. Rajul Haque	01713903418
Chairman's Name & Mobile No.	Mr. Mujibur Rahman	01739211240
Member Secretary's Name & Mobile No.	Mr. Saikat Islam	01731920300
District: Barisal para		
Chairman's Name & Mobile No.	Liaqat Ali Dohra	01721092906
Member Secretary's Name & Mobile No.	Abul Jalim Safer	01721023012
District: Hanama		
Chairman's Name & Mobile No.	S. W. Enayatul Haque	01713986250
Member Secretary's Name & Mobile No.	Riphat Dosh	01733253423
District: Dinajpur		
Chairman's Name & Mobile No.	Abdul Aziz Hossain	01717251181
Member Secretary's Name & Mobile No.	Mahmud Hasan	01730922310
Union: Doma		



Thanks