Country Report:

National activities of Bangladesh

on

GEOSS

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2nd GEOSS Asia-Pacific Symposium on the role of Earth observations in tackling climate change
Tokyo, Japan, 14-16 April 2008

Maps of Bangladesh, world and Asia

Position of Bangladesh is shown in this world MAP and ASIA map.


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ASIA
EUROPE
AFRICA
AUSTRALIA
OCEANIA
NORTH AMERICA
Russian Federation
European Russia
Kazakhstan
Mongolia
China
India
Japan
North Korea
South Korea
Pacific Ocean
Arctic Ocean
Indian Ocean
Barents Sea
Norwegian Sea
Kara Sea
Laptev Sea
Bering Sea
Alaska
Sea of Okhotsk
Sea of Japan (East Sea)
Yellow Sea
East China Sea
South China Sea
Philippine Sea
Lake Baykal
Aral Sea
Caspian Sea
Black Sea
Red Sea
Persian Gulf
Gulf of Oman
Gulf of Aden
Arabian Sea
Laccadive Sea
Andaman Sea
Bay of Bengal
Gulf of Tonkin
Gulf of Thailand
Sulu Sea
Cellebes Sea
Banda Sea
Arafura Sea
Java Sea
Coral Sea
Timor Sea
Flores Sea
Savu Sea
Ural Mts
ARCTIC CIRCLE
TROPIC OF CANCER
EQUATOR
INTERNATIONAL --DATE LINE--
MONDAY
SUNDAY
Novaya Zemlya (Russia)
Ostrova Anzhu (Russia)
Ostrov Sakhalin (Russia)
Kamchatka Peninsula
Aleutian Islands
Kuril Islands (Russia)
Bonin Islands (Japan)
Ryukyu Islands (Japan)
Volcano Islands (Japan)
Okinawa (Japan)
Taiwan
Hong Kong (China)
Macau (China)
Hainan (China)
Philippines
Vietnam
Thailand
Laos
Burma
Bangladesh
Bhutan
Nepal
Pakistan
Afghanistan
Turkmenistan
Uzbekistan
Kyrgyzstan
Tajikistan
Turkey
Lebanon
Syria
Israel
Iraq
Iran
Jordon
Kuwait
Qatar
Bahrain
Saudi Arabia
U.A.E
Oman
Yemen
Socotra (Yemen)
Lakshadweep Islands (India)
Andaman and Nicobar Islands (India)
Sri Lanka
Maldives
Phuket (Thailand)
Cambodia
Malaysia
Brunei
Singapore
Sumatra (Indo.)
Java (Indo.)
Bali (Indo.)
Borneo (Indo.)
Indonesia
East Timor
New Guinea (Indonesia)
British Indian Ocean Territory (UK)
MIDDLE EAST
1000 mi
1000 km
0°
15° S
30° N
45° N
60° N
15° N
90° E
120° E
150° E
180°
60° E
WIN $100.00 HERE
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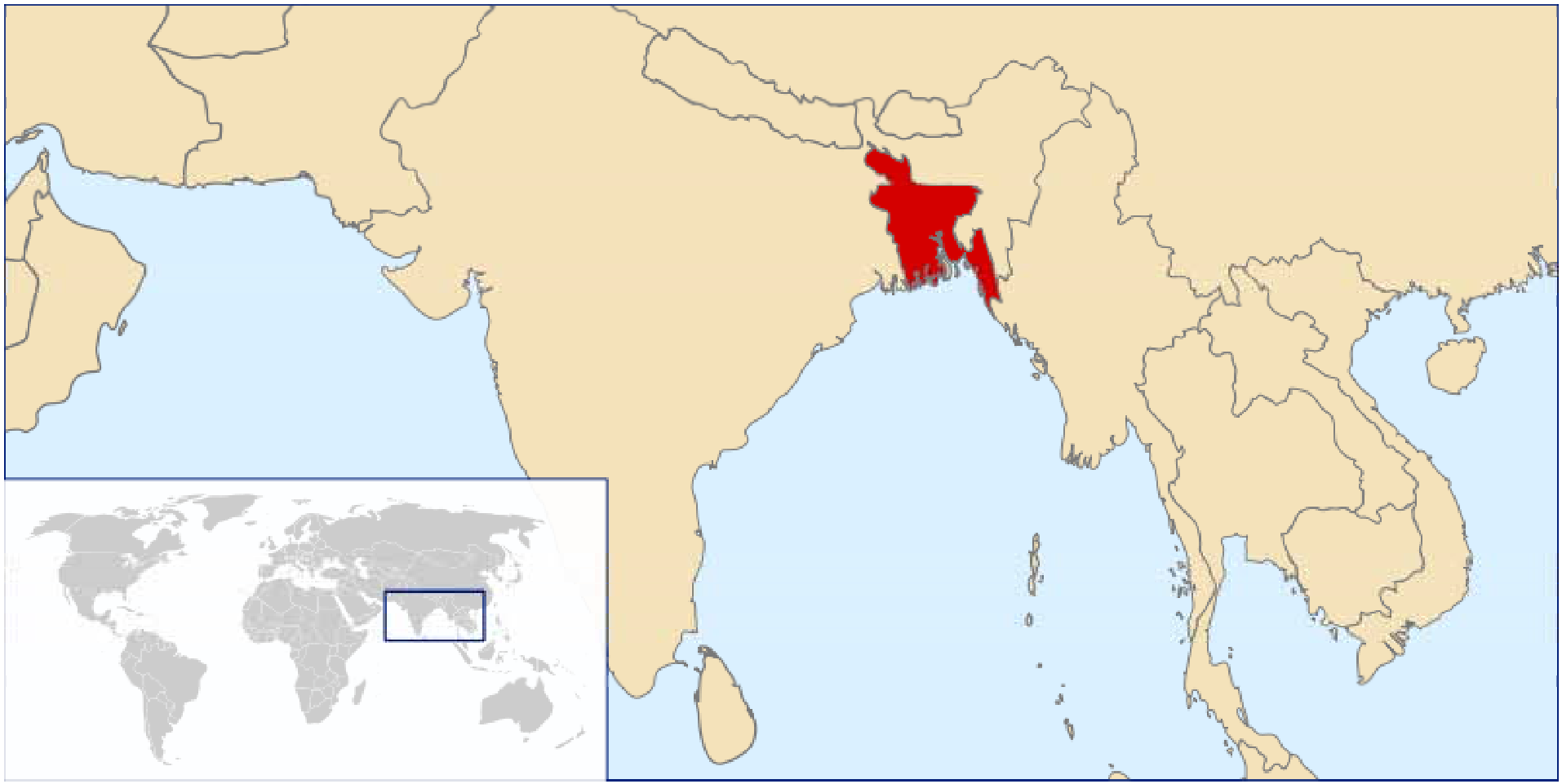
Location of Bangladesh

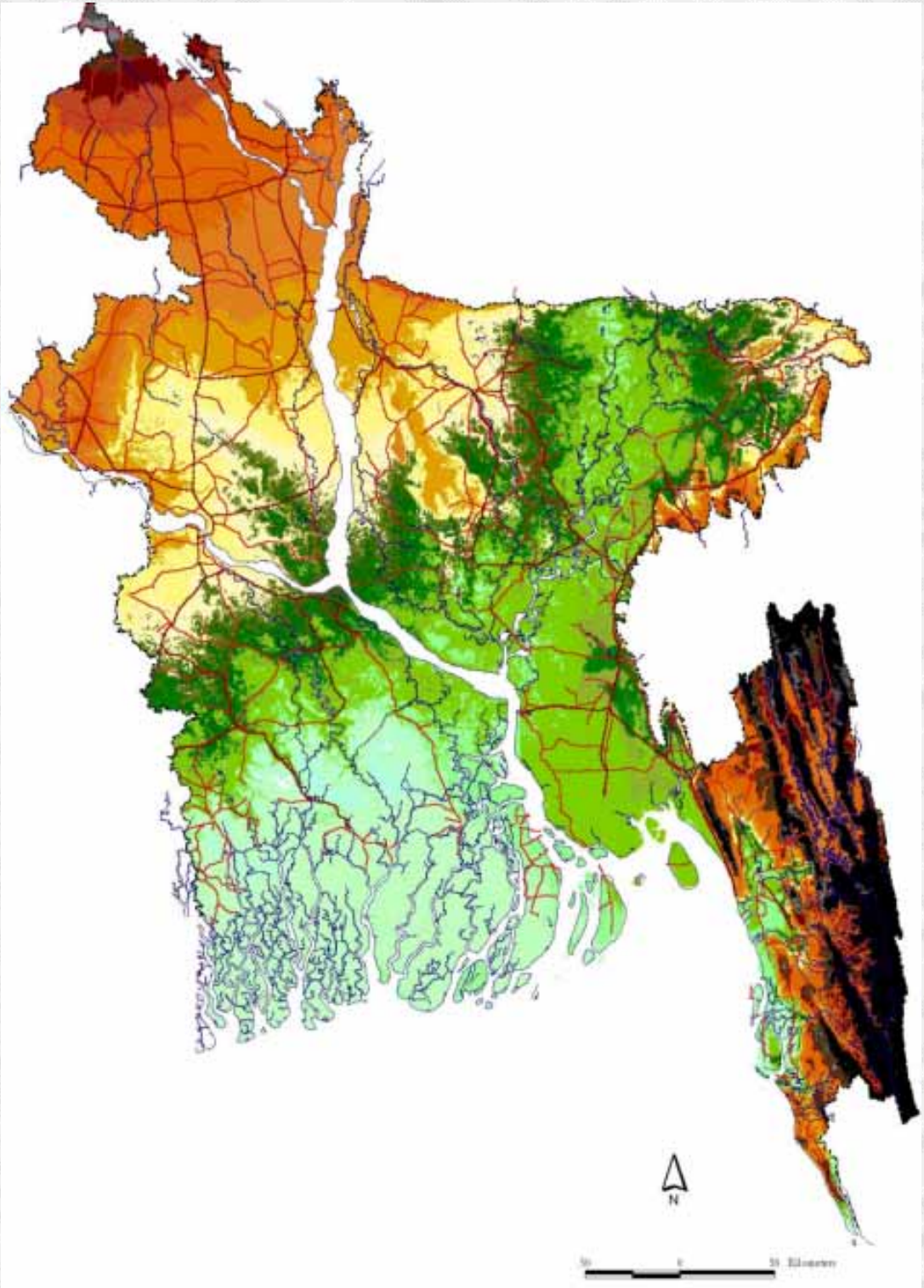


GEOGRAPHY OF BANGLADESH

Bangladesh is a Southeast Asian country of area

- **about 148,875 sq. Km.**
- **Lat: 20^0 45' to 26^0 40'N**
- **Long: 88^0 05' to 92^0 40**
- **Most part of it is a plain low land, with the hills in the SE and NE parts.**
- **The vast Bay of Bengal lies to the south and**
- **great Himalayas in the north of the country.**

- Land of about 230 rivers
- But 57 rivers originate from outside.
- The major rivers- Meghna, Padma and Brahmaputra.
- Trans boundary rivers affects the Climatic conditions.
- Among the natural disasters-
  - Drought
  - Flood
  - Cyclones & Storm Surges
  - Nor'westers/Tornadoes
  - River-erosion
  - Heavy Rainfall
  - Salinity
  - Arsenic Contamination
  - Water Scarcity & Pollution



Topography of Bangladesh

- Land elevation of 50% of the country is within 5 m of MSL

- About 68% of the country is vulnerable to flood

- 20-25% of the area is inundated during normal flood

Strategic Plan for Bangladesh Reference to GEOSS

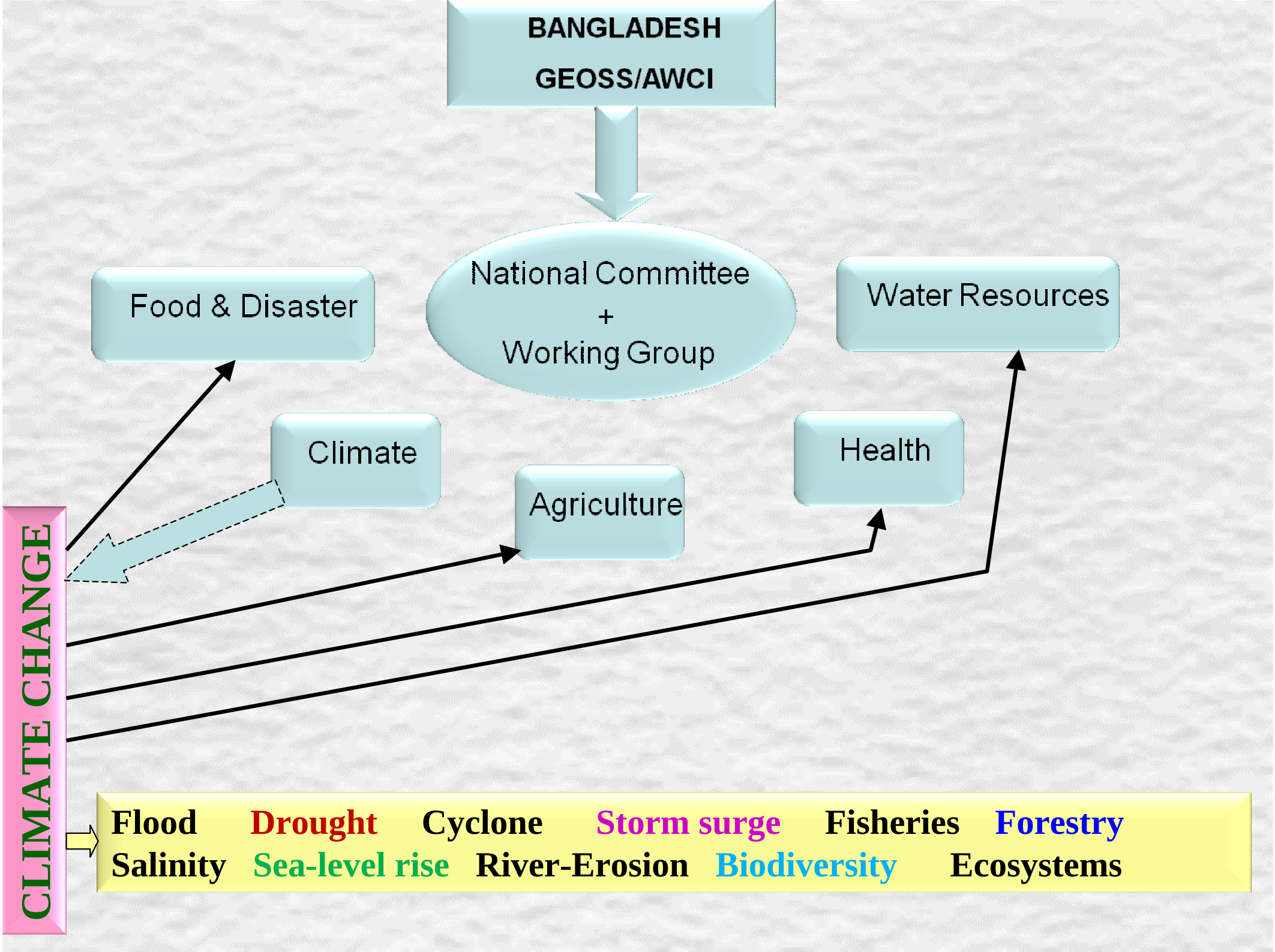
- To communicate with GEO, local government, make plan, prepare funding, communicate with international organizations, and nominate representative for GEOSS meetings a strategic plan is required.

- BANGLADESH-GEOSS is expected for the involvement of different disciplines like Climate sector, Agriculture sector, Food & Disaster sector, Health sector and Water resources sector.

Top priority sectors in the country for GEOSS project in Bangladesh.

- All the top priority sectors in the country are inter-related and in getting benefit from all of them a common national committee is formed.

- The national committee will ask the member in the respective sector to prepare work plan and working group including the specialist in their branches.


BANGLADESH
GEOSS/AWCI
National Committee
+
Working Group
Food & Disaster
Water Resources
Climate
Agriculture
Health
CLIMATE CHANGE
Flood
Drought
Cyclone
Storm surge
Fisheries
Forestry
Salinity
Sea-level rise
River-Erosion
Biodiversity
Ecosystems

The national committee for GEOSS/AWCI

1	Mr. Kamrul Hasan, Secretary, Ministry of Defence (MOD), Government of the People's Republic of Bangladesh, Dhaka	Chairman
2	Brigadier General Shah Md. Sultan Uddin Iqbal, BIRPROTIK, Joint Secretary, Ministry of Defence, Government of the People's Republic of Bangladesh, Dhaka (Md. Abdul Quadir, Representative)	Co-Chairman
3	Mr. Md. Nazmul Huda Khan, ndc., Chairman, SPARRSO, Government of the People's Republic of Bangladesh, Dhaka	Member
4	Dr. Md. Shahjahan Biswas, Director General, Health Services, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh, Dhaka	Member
5	Dr. Samarendra Karmakar, Director (Current Charge), Bangladesh Meteorological Department, Government of the People's Republic of Bangladesh, Dhaka	Member-Secretary
6	Dr. Md. Nazrul Islam, Associate Professor, Department of Physics, Bangladesh University of Engineering and Technology (BUET)	Member

7	Dr. Md. Mafizur Rahman, Professor, Department of Civil Engineering, Bangladesh University of Engineering and Technology (BUET)	Member
8	Dr. Bilqis Amin Hoque, Executive Director & Head of Research, Environment & Population Research Centre (EPRC)	Member
9	Dr. Wais Kabir, Director, SAARC Agricultural Centre (SAC), Bangladesh, Dhaka	Member
10	Mr. Md. Sazedul Karim Chowdhury, Superintendent Engineer/Director, Processing and Flood Forecasting Circle, Bangladesh Water Development Board (BWDB), Ministry of Water Resources, Government of the People's Republic of Bangladesh, Dhaka	Member
11	Mr. Md. Abu Sadeque, PEg., Director (Admin), Bangladesh Disaster Management Bureau (DMB), Ministry of Food and Disaster Management, Government of the People's Republic of Bangladesh, Dhaka	Member
12	Mr. Sardar M. Shah-Newaz, Principal Specialist, Irrigation Management Division, Institute of Water Modeling (IWM), New DOHS, Mohakhali, Dhaka.	Member

MISSION AND VISION of GEOSS in Bangladesh

- To facilitate hydro-meteorological aspect in Bangladesh both in observational and research activities for sectors of social benefit like Agriculture, Climate, Food and Disaster Management, Health and Water resources.

- To Work with international community like GEOSS/AWCI project is the better way in solving the climate and water related issues for Bangladesh.

- The GEOSS/AWCI will provide benefit for the peoples around the world by improving our ability to monitor, understand, and predict changes to the Earth.

- The international cooperation along with the national development of new monitoring, assessing, and predicting environmental changes, will enable development of capabilities to predict drought and flood, prepare for weather emergencies and other natural hazards, plan and protect crops, manage coastal areas and fisheries, and monitor air and water quality and other socio-economic aspects of the country.

LINKS TO INTERNATIONAL ACTIVITIES:

- **Hydro-meteorological phenomena are not confined to the local geography. Sometimes there are long-term and large-scale events occurred.**
- **Only local information may not enough to solve the hydro-meteorological problems. In examples, flood is a very common natural disaster in Bangladesh and we know that about 93% of flood water comes from outside the country.**
- **We need information from the upper catchment which is out of Bangladesh.**
- **Cooperation with international community through this project will help in getting information from neighboring countries.**
- **Link-up with international community is one of the top priorities of the nation.**

WORKING SECTORS IN BANGLADESH

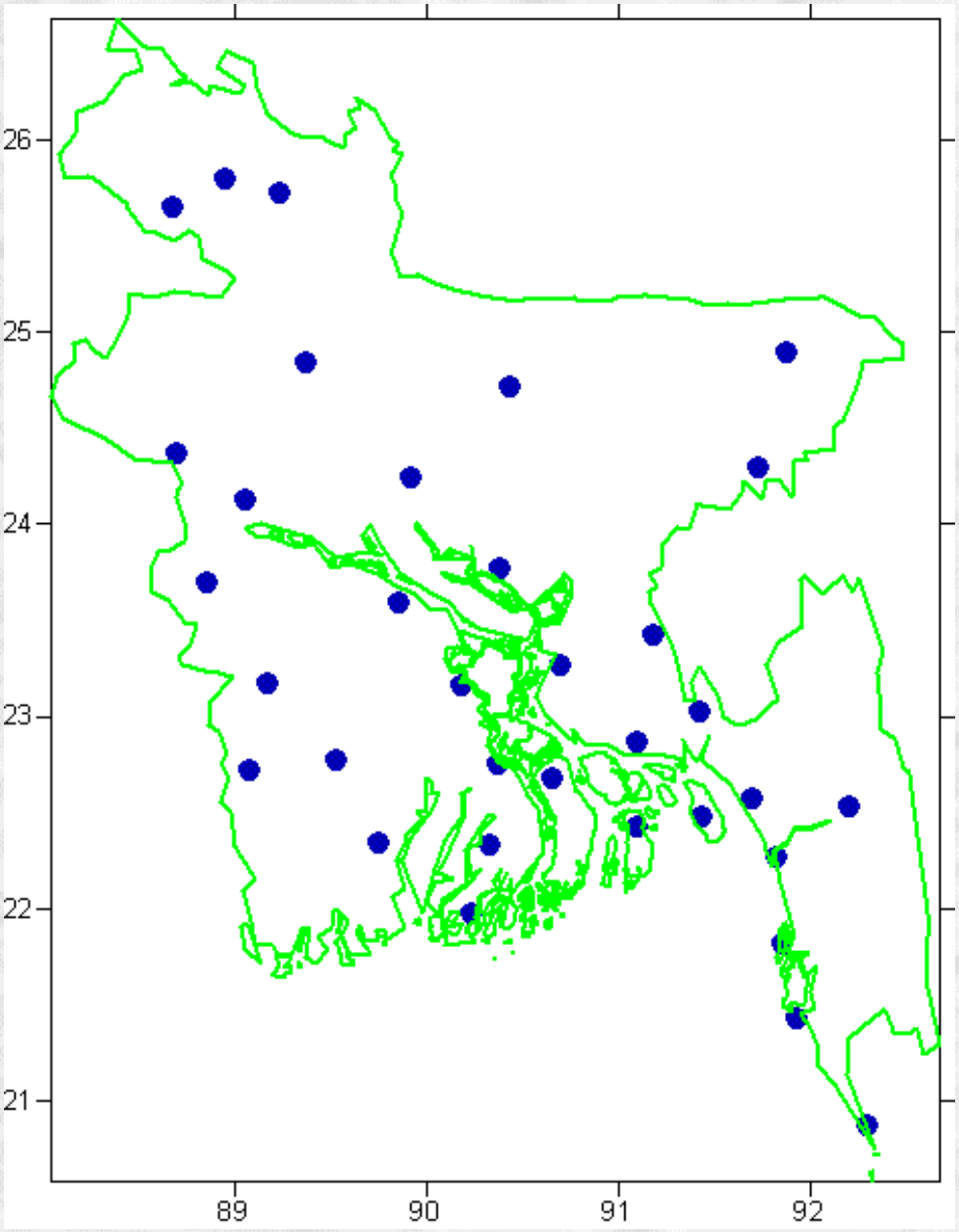
- Climate sector
- Agriculture sector
- Water resources sector
- Food and Disaster Management sector
- Public Health sector

DATA COLLECTION

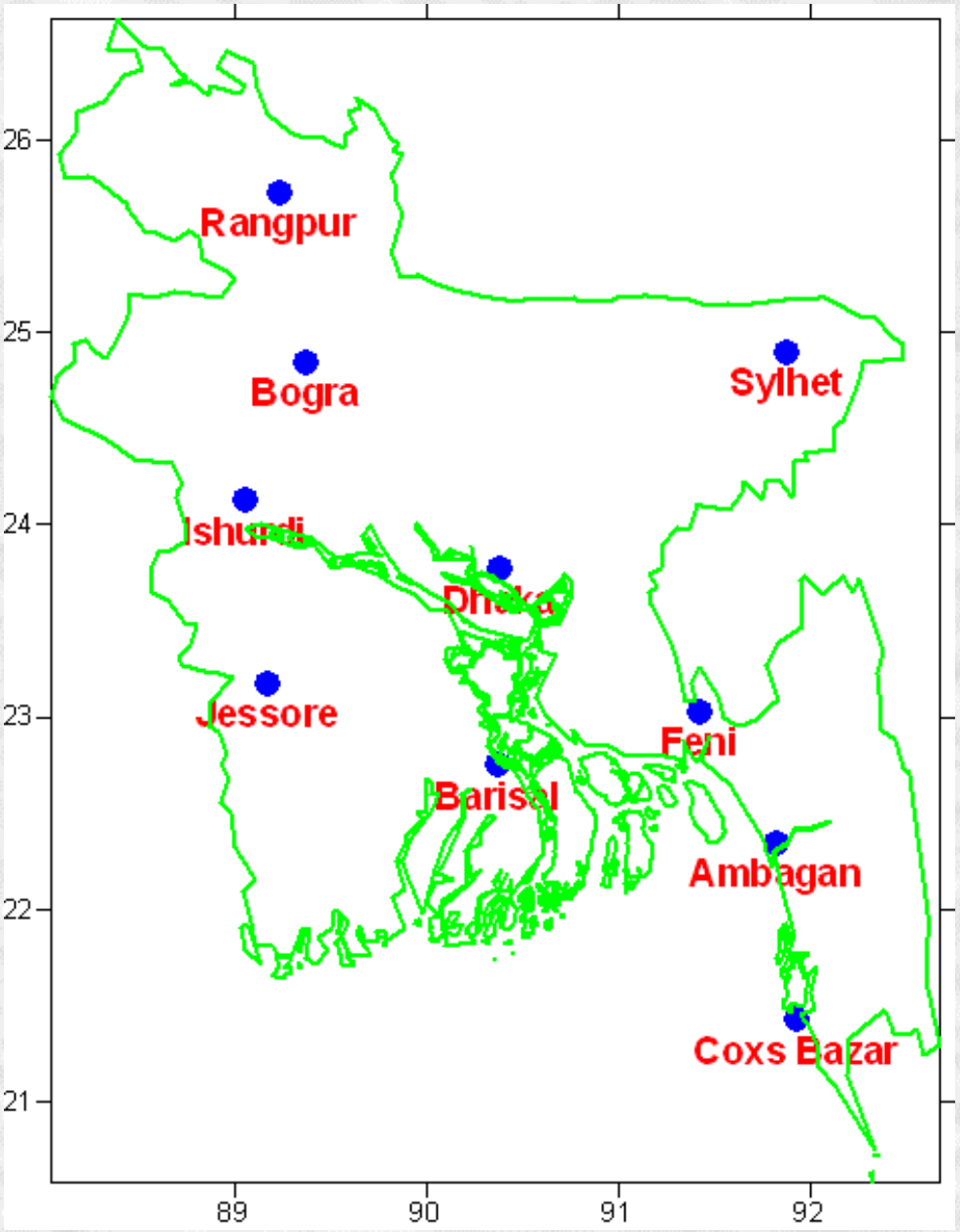
Data collection is the pre-requisite for the research in any field of interest. The metadata will be collected in each sector and derived data will be the key resources for other sectors, especially in the application purposes. Details of the data collection are to be cited in the work plan of each sector.

Available Infrastructure

- 35 First Class Surface Observatories
- 10 Pilot Balloon Observatories
- 3 Rawinsonde Observatories
- 12 Agromet Observatories
- 4 Radar Stations at Dhaka, Rangpur, Cox's Bazar and Khepupara
- Satellite Ground Receiving Station of MTSAT, NOAA and INSAT
- World Area Forecasts Charts (WAFS) from the World Area Forecasting Center, Braknell London.
- Receiving System of Satellite Distribution (SADIS)
- Two high-gust anemometers in operation over the country
- PCVSAT and MICAPS
- NWP products from ECMRWF, NCMRWF, ARL



Location of operational 35 First Class Observatories of BMD



Location of operational 10 Pilot Balloon Observatories of BMD

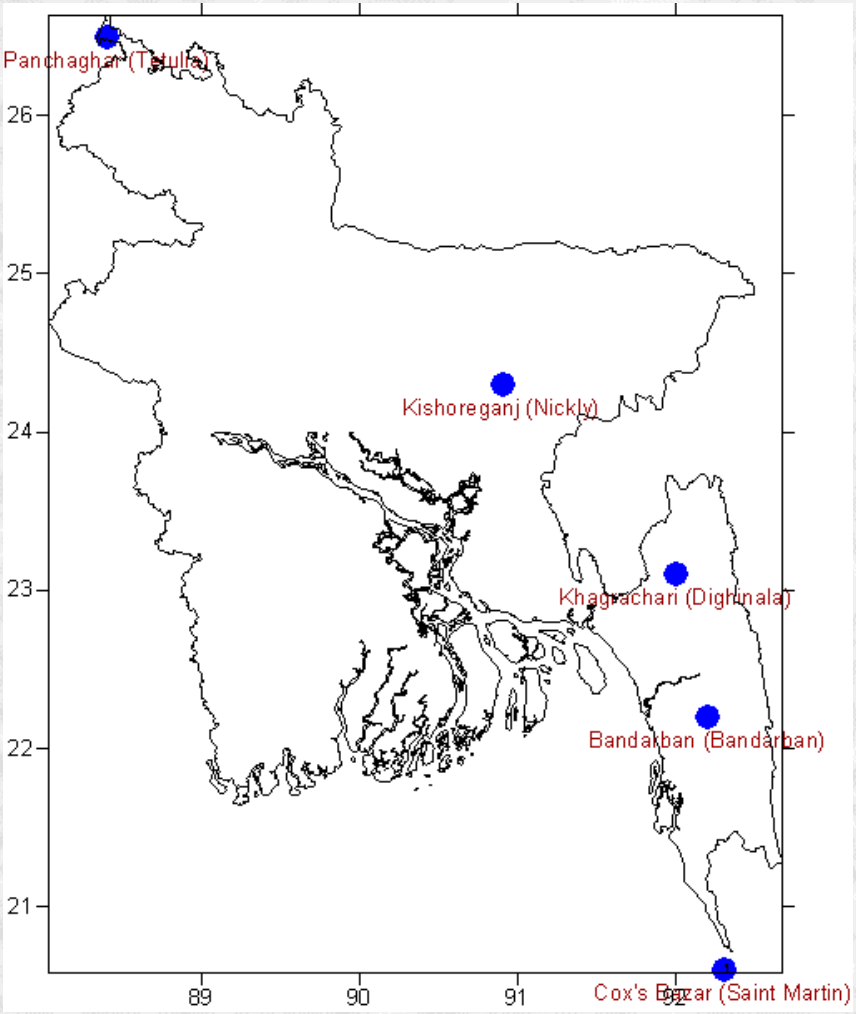


Figure: Proposed First Class Observatories of BMD

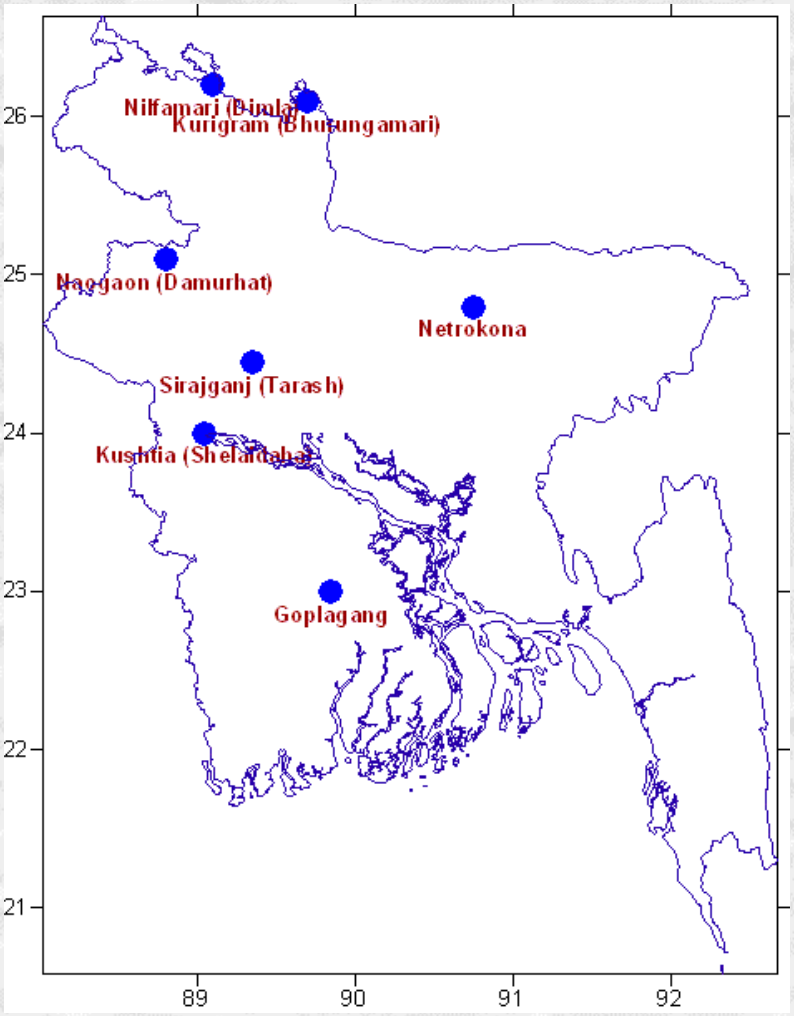
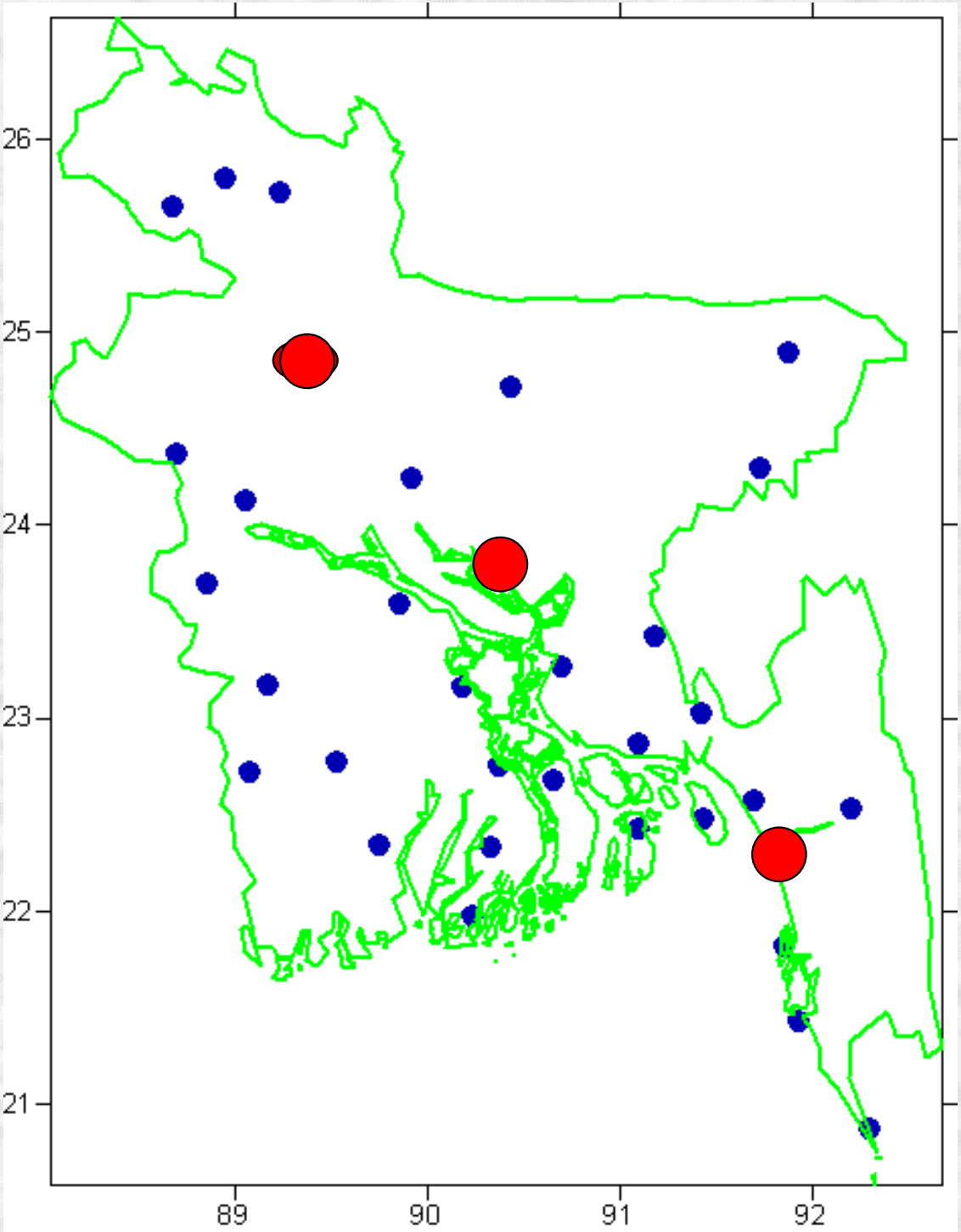
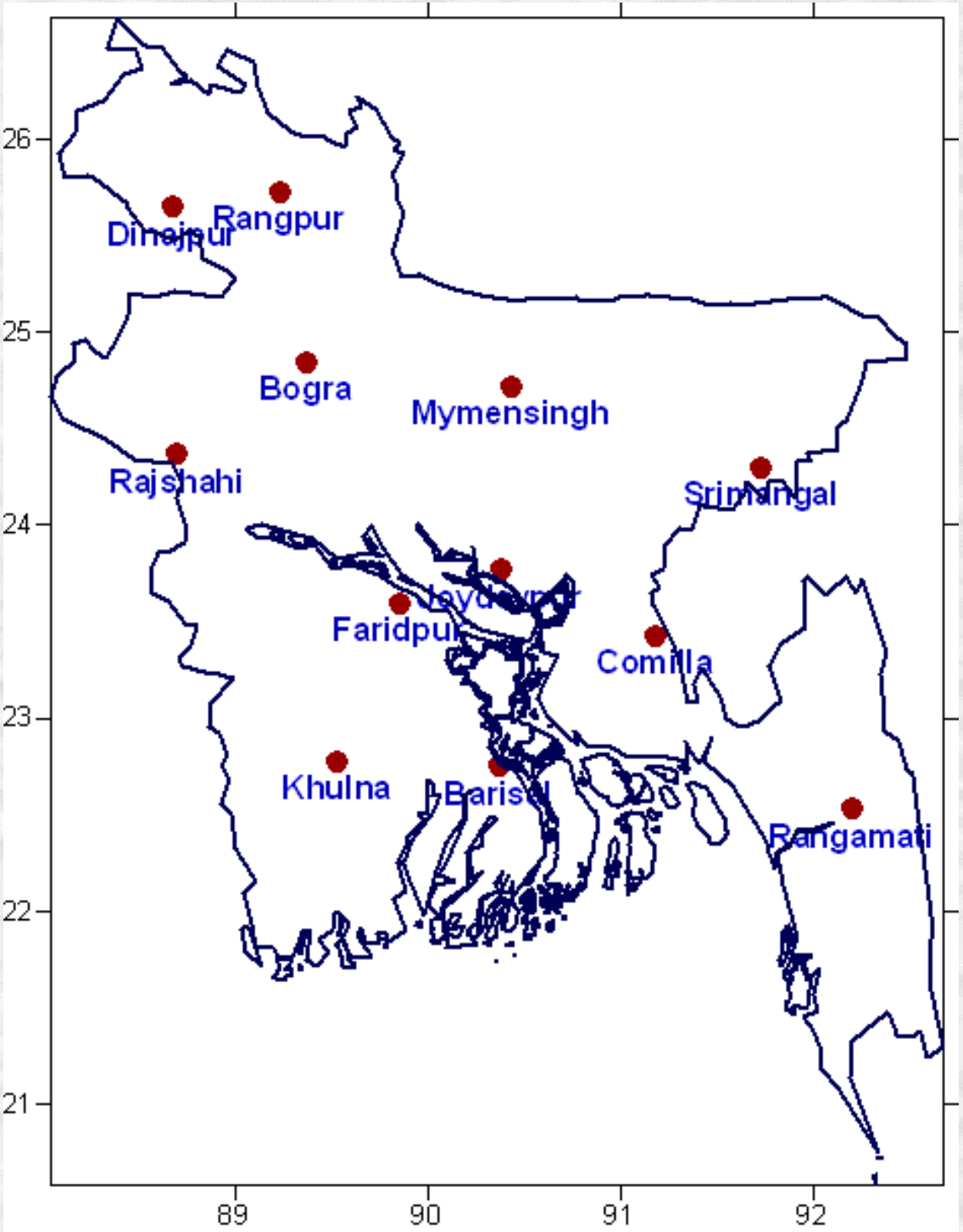


Fig: Proposed Agro-meteorological Observatories of BMD

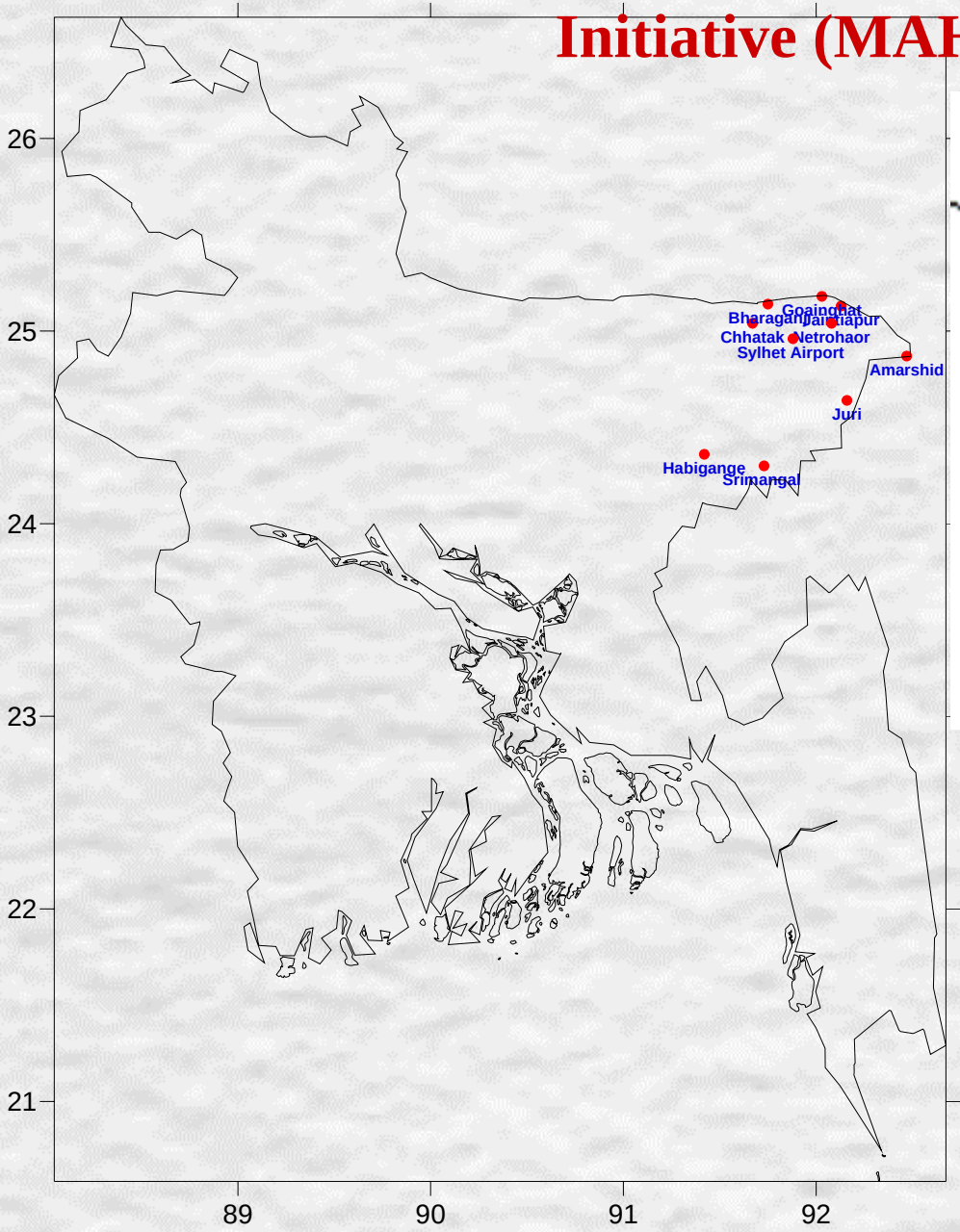
Location of Rawin Sonde (Upper air) Observatories of BMD

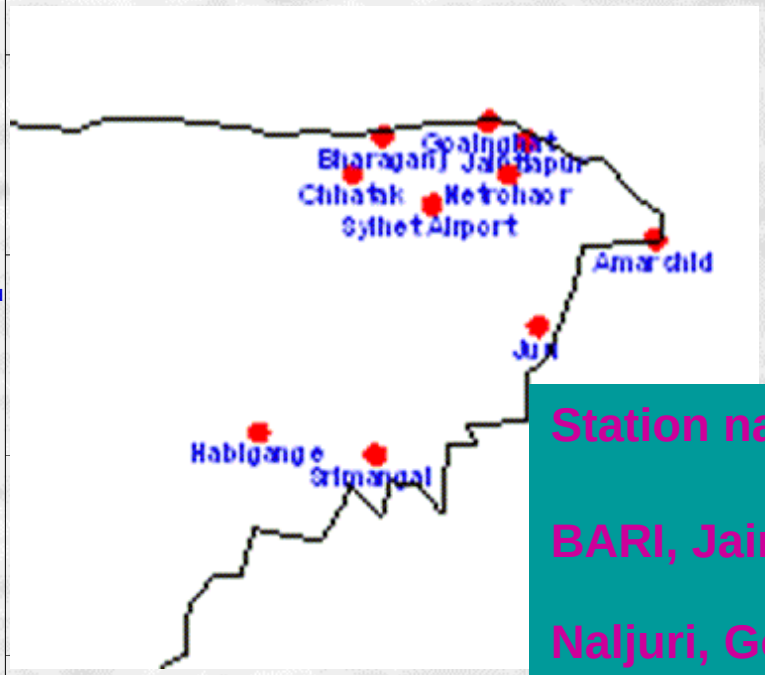


Location of 12 Agromet Observatories of BMD



Automatic rain-gauge Stations over Northeastern Bangladesh under Monsoon Asian Hydro-Atmosphere Scientific Research and Prediction Initiative (MAHASRI) project





Station name

BARI, Jaintiapur

Naljuri, Goainghat

Amarshid

Netrohaor

Chhatak

Juri

Habigange

Srimangal BMD

Sylhet Airport BMD

BDR, Bharaganj

Location of RADAR Stations of BMD

Legend

Operational

Under process of Installation

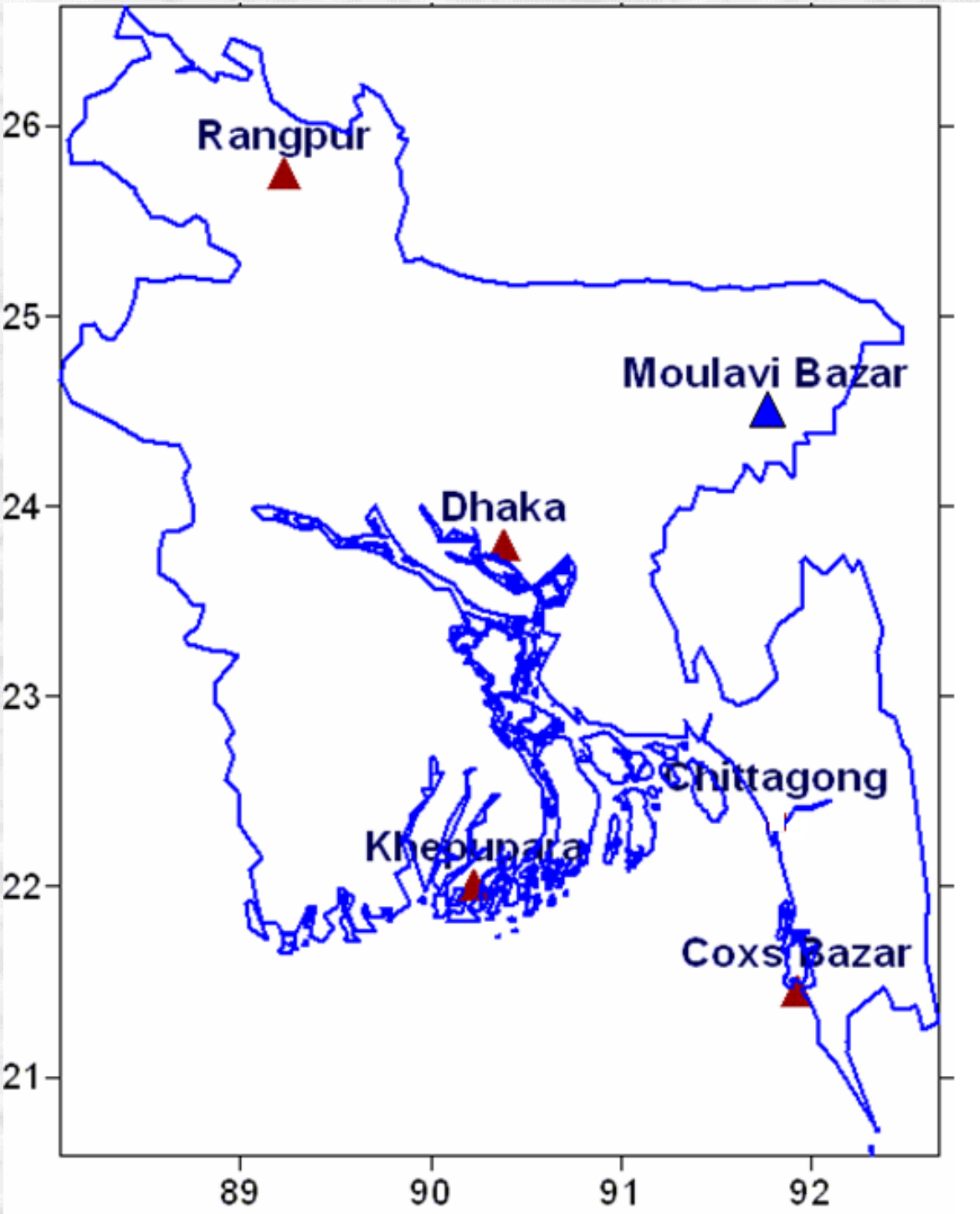
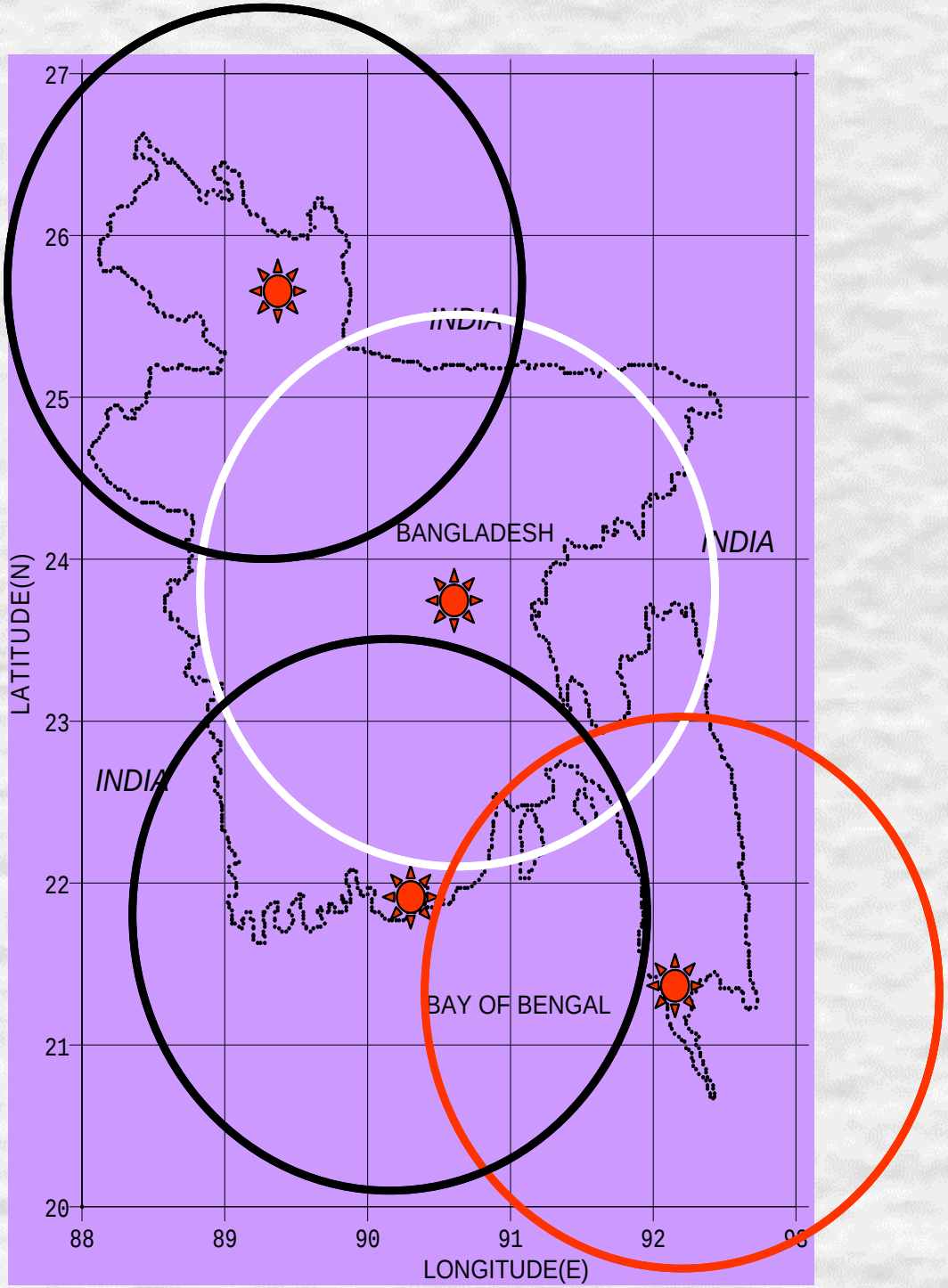
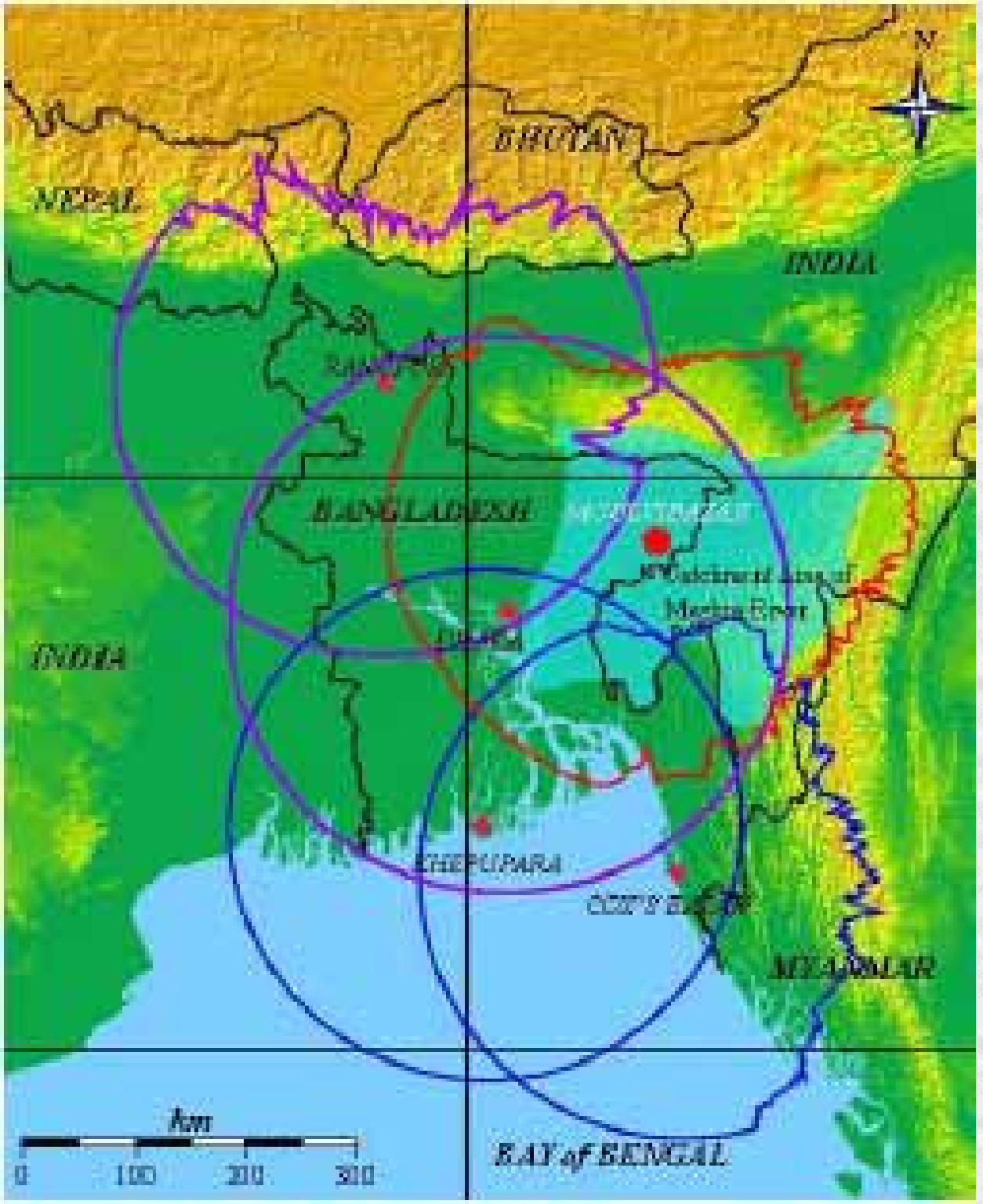


Fig. 3. Coverage of BMD radar systems.



Detection Range of the Radar System including the Proposed one



DATA MANAGEMENT

Data management is one of the important parts in the research and application community.

- Data is achieving and storing in digital format as well as metadata (data of data) format.
- Data is collecting from local observations.
- These data will be within the browsing facilities with some terms and condition for the users defined the purposes where to be used
- The archive will be maintained in data category, data quality check, data disciplinary and data gallery. This will enable the users to effectively locate data and information relevant to their needs.
- A data archiving group is working to collect and maintained the archive system properly.

Data management group:

1.	Dr. Md. Mafizur Rahman, Professor, Bangladesh University of Engineering and Technology (BUET)	Team leader
2.	Dr. A. K. M. Saiful Islam, Assistant Professor, IWFM, Bangladesh University of Engineering and Technology (BUET)	Member
3.	Md. Abdul Mannan, Meteorologist, Bangladesh Meteorological Department (BMD)	Member
4.	Mr. Zakir Hossain, Institute of Water Management (IWM), New DOHS, Mohakhali, Dhaka	Member

CAPACITY BUILDING:

- Capacity building is essential to the nation, which includes ensuring full utilization of the datasets for the end users.
- The importance of capacity building is critical for all nations, especially for developing nations like Bangladesh.
- In the coming years, growing country population with expanding economies will require access to Earth observations for a wide range of societal, scientific, and economic needs.
- International contributions are essential for completing the data sets needed to address important national issues of the country.

Capacity Building Committee

1	Brigadier General Shah Md. Sultan Uddin Iqbal, BIRPROTIK, Joint Secretary, Ministry of Defence, Government of the People's Republic of Bangladesh	Chairman
2	Dr. Samarendra Karmakar, Director, Bangladesh Meteorological Department, Government of the People's Republic of Bangladesh	Member
3	Mr. Md. Sazedul Karim Chowdhury, Superintendent Engineer/Director, Processing and Flood Forecasting Circle, Bangladesh Water Development Board (BWDB), Ministry of Water Resources, Government of the People's Republic of Bangladesh	Member
4	Mr. Md. Abu Sadeque, PEg., Director (Admin), Bangladesh Disaster Management Bureau (DMB), Ministry of Food and Disaster Management, Government of the People's Republic of Bangladesh	Member
5	Dr. Md. Nazrul Islam, Chief Scientist, Synoptic Division, SAARC Meteorological Research Centre (SMRC), Dhaka	Member
6	Dr. Md. Mafizur Rahman, Professor, Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh	Member
7	Dr. Bilqis Amin Hoque, Executive Director & Head of Research, Environment & Population Research Centre (EPRC)	Member

Data Policy Committee

1	Brigadier General Shah Md. Sultan Uddin Iqbal, BIRPROTIK, Joint Secretary, Ministry of Defence, Government of the People's Republic of Bangladesh	Chairman
2	Dr. Md. Nazrul Islam, Chief Scientist, Synoptic Division, SAARC Meteorological Research Centre (SMRC), Dhaka	Member
3	Dr. Samarendra Karmakar, Director, Bangladesh Meteorological Department, Government of the People's Republic of Bangladesh	Member
4	Dr. Wais Kabir, Director, SAARC Agricultural Centre (SAC), Bangladesh, Dhaka	Member
5	Dr. Md. Mafizur Rahman, Professor, Bangladesh University of Engineering and Technology (BUET)	Member

BANGLADESH – GEOSS Member

- In 2005, initiative taken by Prof. Koike, head of the Department of Civil Engineering of The University of Tokyo
- Bangladesh government became a member of the GEOSS on 2006.
- In this venture Bangladesh selected MEGHNA RIVER BASIN as model basin for Bangladesh.
- Agencies involved in Bangladesh are Bangladesh Meteorological Department (BMD), Bangladesh University of Engineering and Technology (BUET) and other NGOs.

Group Photo with the Secretary, Ministry of Defence, Government of Bangladesh

Title: "*To develop a hydro-meteorological prediction system for flood monitoring and forecasting in the Meghna river basin in Bangladesh*".

Component Project: GEOSS/AWCI in Bangladesh (GEOSS/AWCI-BD)

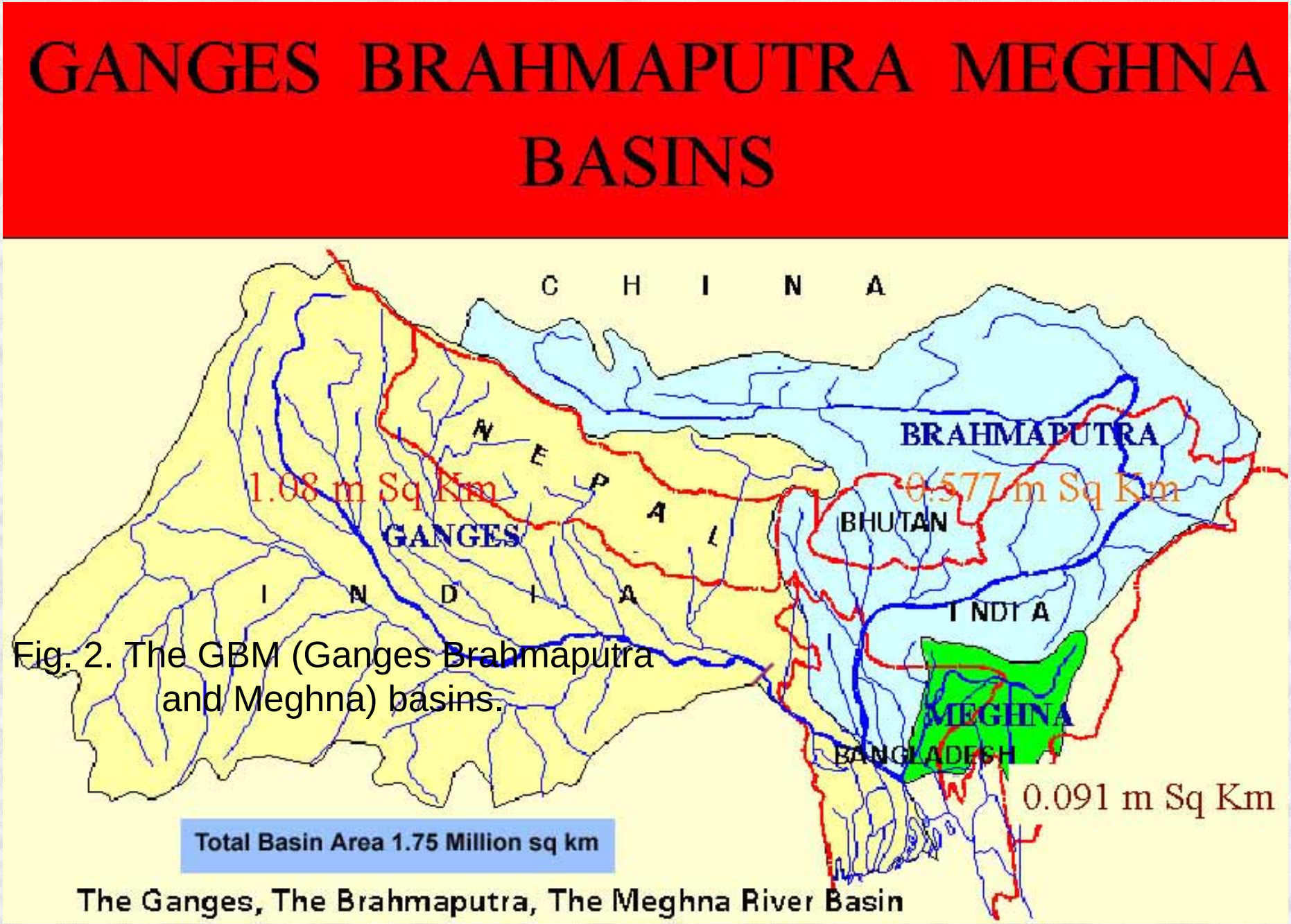


Fig. 2. The GBM (Ganges Brahmaputra and Meghna) basins.

Schedule

2008:

- Collection of GMS data
- Modification of CST for new datasets
- Collection of DEM (data)
- Collection of Digital soil map
- Collection of digital land use data
- Field inspection
- Collection of rainfall data
- Rain gauge data

Schedule (Continue)

2009:

- Calibration of the model parameters

2010:

- Run Hydrological model
- Data analysis and preparation of inundation map

2008, 2009 & 2010:

- Capacity building

Projects of Bangladesh (On going and Planned)

- Establishment of Numerical Weather Prediction (NWP) system
- Replacement of Cox's Bazar and Khepupara Radars with Doppler Meteorological and Hydrological Radars
- Establishment of Doppler Meteorological and Hydrological Radar at Moulavi Bazar and likely to be completed by 2008.
- Establishment of 14 new observatories in the riverine area for reducing river capsize during nor'wester period
- Upgradation of GTS link from 2.4 Kbps to 64 Kbps for Tsunami message reception and dissemination.
- Strengthening of Agro-meteorological Services in Bangladesh including Establishment of 7 (Seven) agromet pilot stations.
- Establishment of 5 (Five) First Class Meteorological Observatories in BMD.
- Strengthening of Meteorological Training Institute And R&D cell in BMD
- Procurement of Remote Sensing Data

Activities of GEOSS – Bangladesh

Establishing scientific basis of predicting hydro-climate system in Bangladesh

Working activities

a. Surface data collection

b. Radar data collection

c. Water level data collection

d. Remote sensing data

e. Flood monitoring & forecasting

f. Feasibility study for flood and other natural hazards

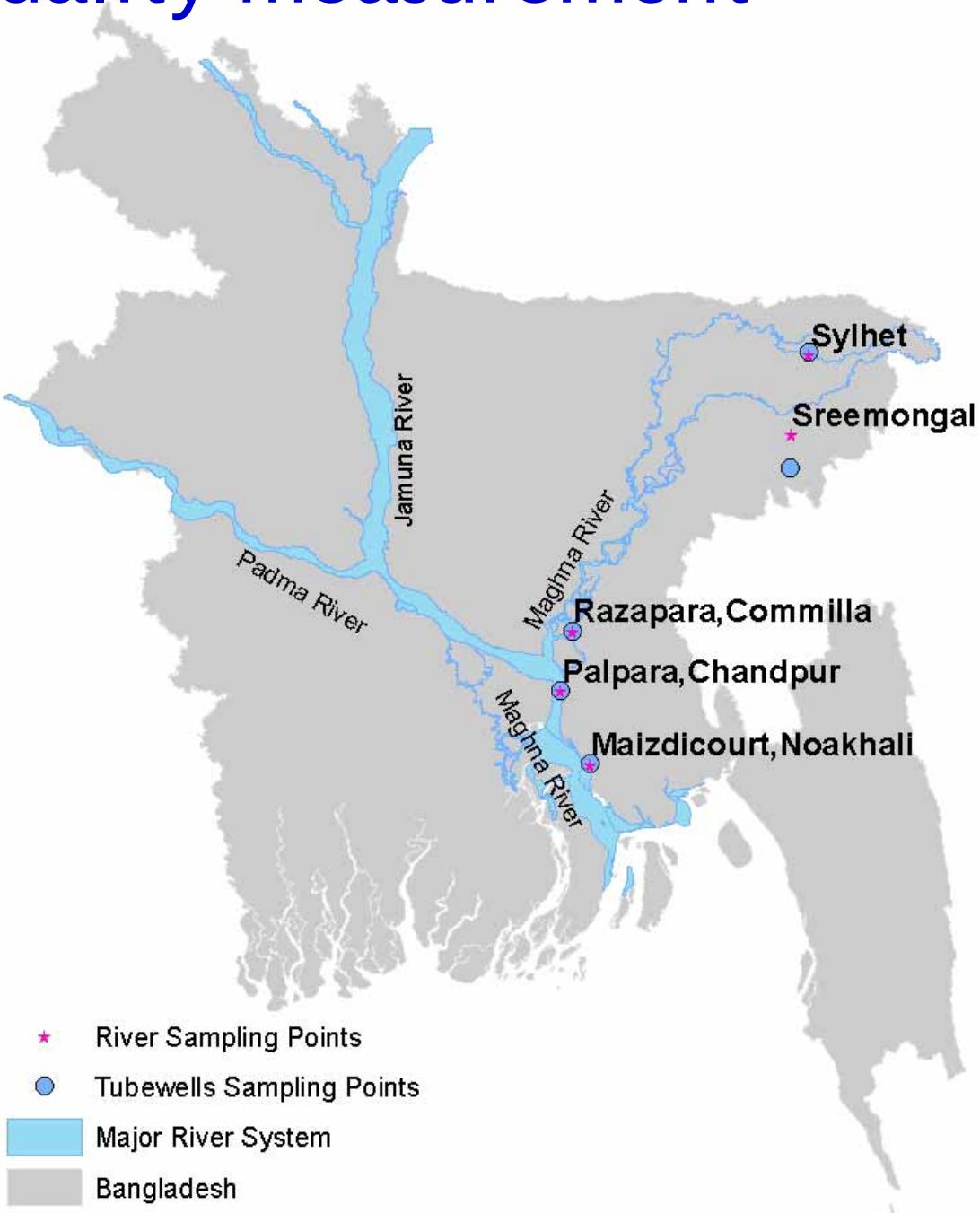
g. Damage assessment for different hazards

h. Vulnerability study and adaptation

Water quality measurement

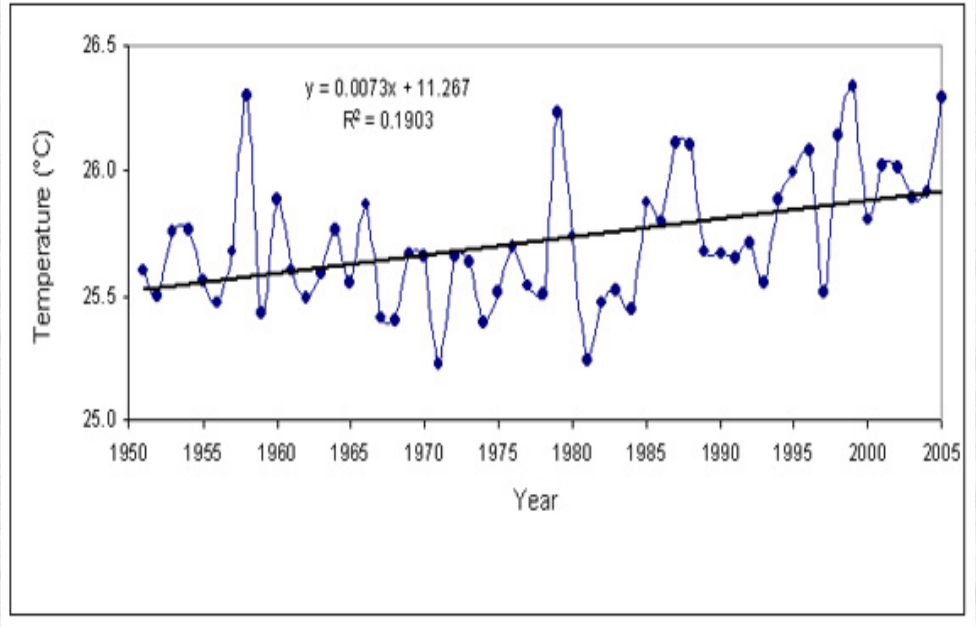
The following parameters were tested of river and tube wells water samples near the BMD stations in January 2008:

- **pH, temperature, electrical conductivity, turbidity, fecal coliform bacteria, sechi depth, arsenic and chloride**

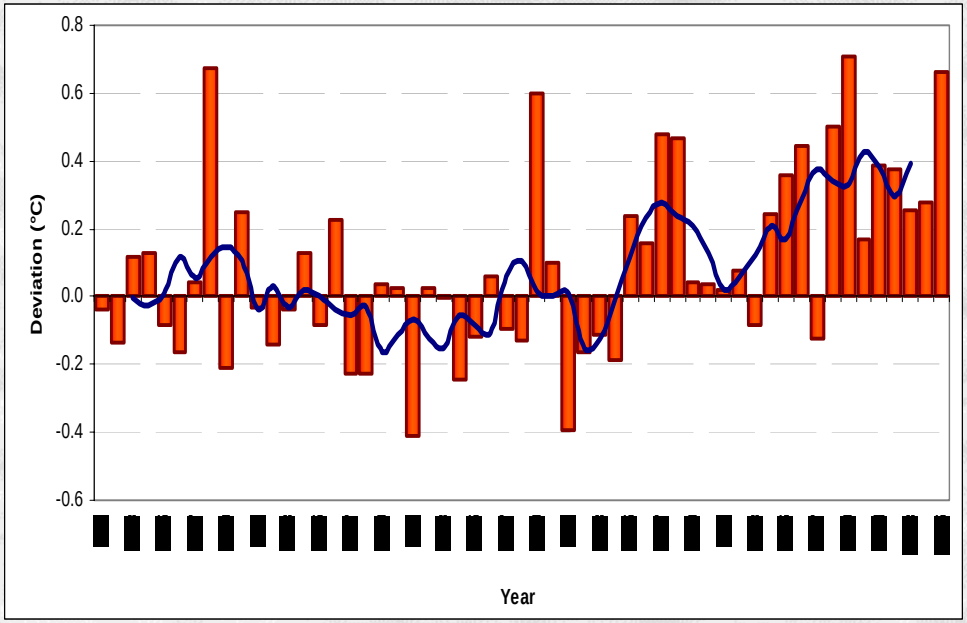


Climate Change and Adaptation in Bangladesh

Trend of annual mean temperature over Bangladesh



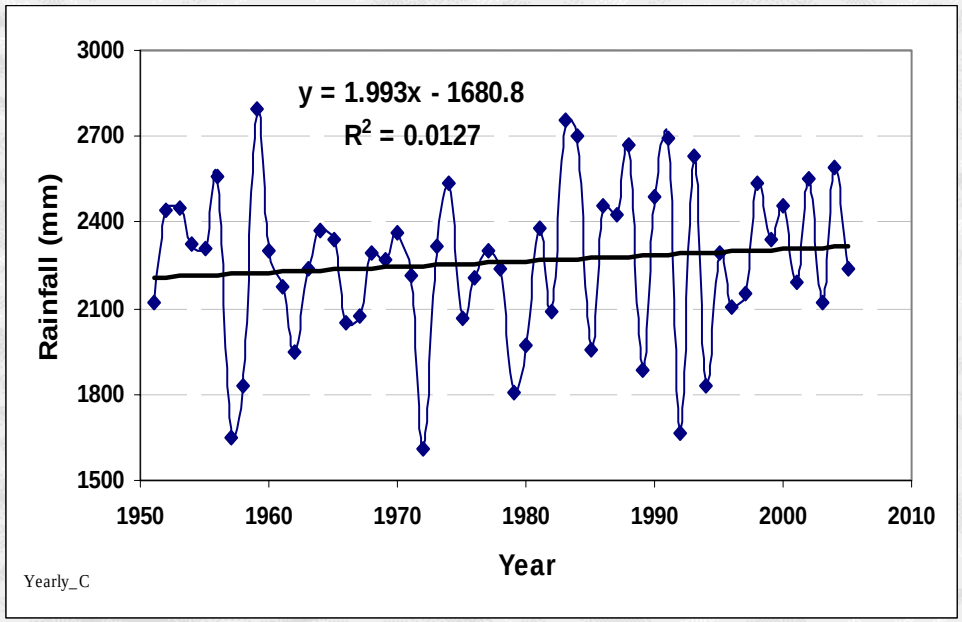
Variation of Yearly Mean Temperature



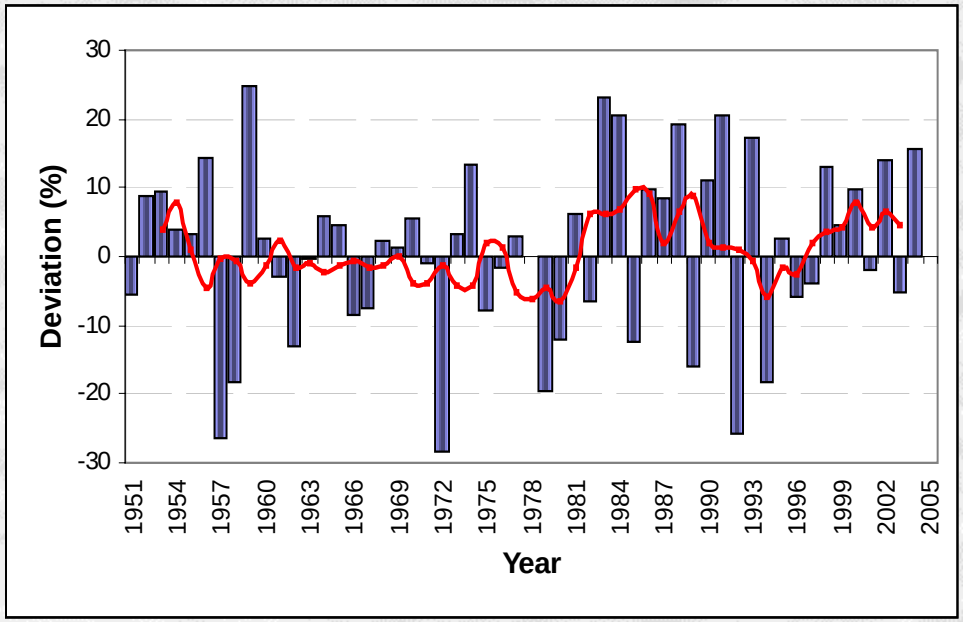
Deviation of Yearly Mean Temperature from Normal

The annual mean temperature has an increasing trend over Bangladesh

Trend of Yearly Rainfall Over Bangladesh



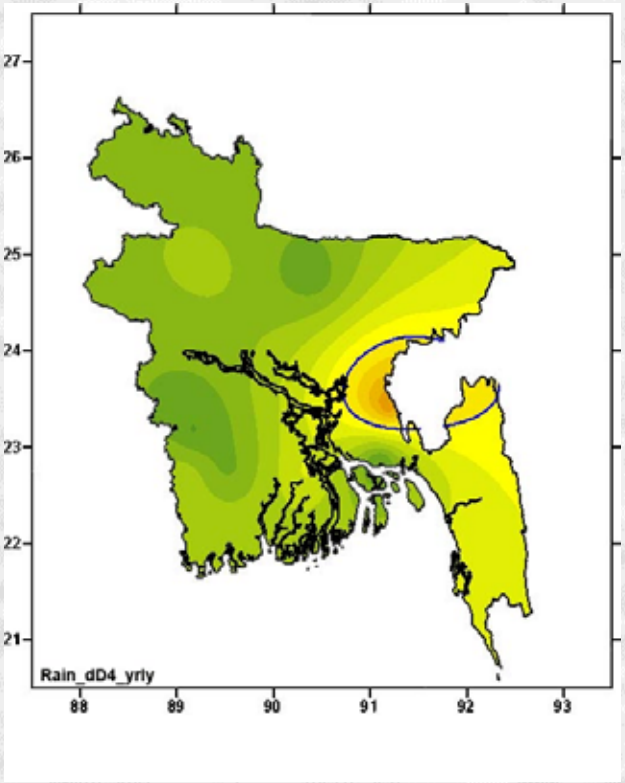
Variation of Yearly Rainfall



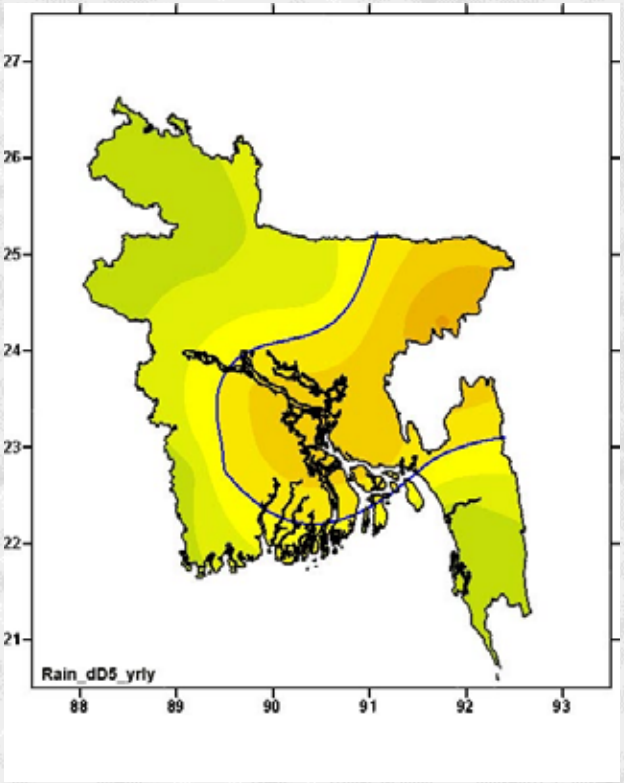
Deviation of Yearly Rainfall from Normal

No significant yearly trends of rainfall were found

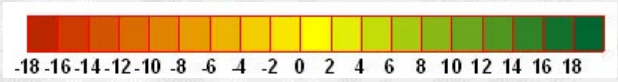
Deviation (%) of Yearly Rainfall from Normal over Bangladesh in different Decades



1981-1990



1991-2000



From the spatial distribution of deviation of Yearly Rainfall from LPA over Bangladesh, inter-decadal change were observed during the period 1951-2005

Vulnerability of Bangladesh to climate stimuli

- Low economic strength,
- Inadequate infrastructure,
- Low level of social development,
- Lack of institutional capacity,
- Higher dependency on the natural resource base

Climate change induced challenges are

- scarcity of fresh water due to less rain and higher evapo-transpiration in the dry season,
- drainage congestion due to higher water levels in the confluence with the rise of sea level,
- river bank erosion,
- frequent floods and prolonged and widespread drought,
- wider salinity in the surface, ground and soil in the coastal zone

Existing Knowledge on Coping Strategies

- Cyclone Shelters
- Flood Shelters
- Coastal Embankment
- Digging of drainage channel
- Creation of green belt through Coastal Afforestation
- Rain Water Harvesting
- Floating Agriculture
- Saline Tolerant Species
- Shallow Tube-well for irrigation
- Supplementary Irrigation
- Drainage Control
- Short duration Crop variety based on situation (Depth and Duration of Flood, Timing of flood, recession of flood, etc.)
- Artificial Management of Temperature for Poultry and Livestock (Use of Wet Jute bags, Use of Exhaust fan, electricity bulbs for heating rooms)

Future Coping Strategies and Mechanisms

- Development of Techniques for Transferring Knowledge and experiences from one area/ecosystem to another.
- Communication of adaptation measures to community Level
- Monitoring of actual impacts of climate change (Then, we can target the problems for solution)
- Research to study problems and to find coping strategies.
- Strengthening of insurance mechanism for crop failures, losses due to cyclones, storm surges and natural hazards.
- An integrated system approach (Integration among Production system, Human System and Physical System) to deal with SLR

Priority Sectors

- Agriculture and Food Security
- Terrestrial and Freshwater Ecosystem
- Coastal Zone and Marine Ecosystem
- Disaster Control (floods and drought)
- Human Health, and
- Human Settlement and Infrastructure (as result of urbanization).

Important National Projects related to Climate Change and adaptation

Forest Department, Department of Public Health Engineering, Water Resource Planning Organization (WARPO), Ministry of Environment and Forest (MoEF), Disaster Management Bureau (DMB) and Local Government Engineering Department (LGED), Department of Environment (DOE), Board of Education and NGO consortium are taken some projects related to Climate Change.

Q & A

?

Concluding Remark

- The BANGLADESH GEOSS/AWCI will provide the nation with a unique platform to identify and solve the climate and water related problems.
- This Strategic Plan defines the purpose and vision of the priority sectors of the country.
- It outlines a practical approach with a societal benefits focus, identifying key issues in integration and governance.
- This plan highlights specific opportunities developed for near-term action by the participating organizations.
- An evolving system, taking into account emerging technologies and scientific advances in and around the country, is necessary to meet the changing needs of society.
- The strategic goals and objectives of future coping mechanisms are to reduce adverse effects of climate change including variability and extreme events and promote sustainable development
- Implementing the BANGLADESH GEOSS/AWCI offers an exciting opportunity to make permanent improvements in local capacity to deliver specific benefits to our people and our economy.

Conclusion

- We have planned elaborate programme out of which limited success has been achieved as budget from the government is limited.
- It we get external technical and financial support we would be able to contribute to meet the target of GEOSS/AWCI.

Thank You