Br. Gen. Shah Md. Sultan Uddin Iqbal, BIR PROTIK
Joint Secretary
Ministry of Defence
Government of the People’s Republic of Bangladesh
Position of Bangladesh in the World Map and in the Asia Map
GEO membership of Bangladesh

- In middle of 2005, Dr Koike, Head of the Department of Civil Engineering of Tokyo University, invited Mr. Shah Sultan Uddin Iqbal, Joint Secretary of Ministry of Defense to attend a seminar on GEOSS (AWCI- Asian water cycle symposium.)
- Bangladesh representative having learned from the symposium, the utility of GEOSS (to countries of the world) through this seminar immediately notified the government.
- As a consequence of this, the Bangladesh government became a member of the GEOSS on 2007.
- Later a number of teleconferences and meetings (total three) were held to identify the project for model river basin in various countries.
- In this venture Bangladesh selected MEGHNA RIVER BASIN as model basin for Bangladesh.
- The other departments working with this venture are Bangladesh Meteorological Department (BMD), Bangladesh University Of Engineering and Technology (BUET), Bangladesh Water Development Board (BWDB) and other NGO.
- Now participating organizations in GEOSS (Bangladesh) are more than 20.
GEOSS Asian Water Cycle Initiative (AWCI)

18 River Basins in 18 Countries

Selected MEGHNA RIVER BASIN as model basin for Bangladesh
<table>
<thead>
<tr>
<th>Organizations Participated in the GEOS/AWCI in Bangladesh</th>
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</thead>
<tbody>
<tr>
<td>• Ministry of Defence (MOD)</td>
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<tr>
<td>• Ministry of Health and Family Welfare</td>
</tr>
<tr>
<td>• Space Research and Remote Sensing Organization (SPARRSO)</td>
</tr>
<tr>
<td>• Bangladesh Meteorological Department (BMD)</td>
</tr>
<tr>
<td>• Bangladesh University of Engineering and Technology (BUET)</td>
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<tr>
<td>• Environment &amp; Population Research Centre (EPRC)</td>
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<tr>
<td>• SAARC Agricultural Centre (SAC)</td>
</tr>
<tr>
<td>• Bangladesh Water Development Board (BWDB)</td>
</tr>
<tr>
<td>• Disaster Management Bureau (DMB)</td>
</tr>
<tr>
<td>• Institute of Water Modeling (IWM)</td>
</tr>
</tbody>
</table>
Cape Town Declaration

The participants assembled at the Group on Earth Observations Ministerial Summit in Cape Town, South Africa, on 30 November 2007. They confirm their common view that:

a. The sustained operation of terrestrial, oceanic, air-borne and space-based observations networks is critical for informed decision making;

b. Data interoperability is critical for improvement and expansion of observational, modelling, data assimilation and prediction capabilities;

c. Continued research and development activities and coherent planning are essential for future observations systems;

d. Continued cooperation and dialogue will establish GEOSS as a powerful means to support informed decision making;

e. Coordination at national, regional and global levels, continued investments, scientific and technological advances and innovative approaches to financing will be vital for upgrading and expanding Earth Observations and building the capacity of individuals, institutions and systems, particularly in developing countries.
G8 Tokyo Hokkaido Summit  
7-9 July 2008

Declaration

• To respond to the growing demand for Earth observation data, we will **accelerate efforts** within the **Global Earth Observation System of Systems (GEOSS)**, which builds on the work of UN specialized agencies and programs, in priority areas, **climate change** and **water resources management**, by **strengthening observation, prediction and data sharing**.

• We also support **capacity building** for developing countries in earth observations and promote interoperability and linkage with other partners.
Application on Meghna River
Land use in Meghna River
Approach Overview

- DEM
- River network
- Flow direction
- Flow accumulation
- Digital National Drainage

Comparison:
- Yes
- No

Set-up DHM

Evaluation of DHM

Usable information for Disaster countermeasures Using weather forecast

GIS, Surface hydrologic analysis

Flood inundation
Rainfall Data: Gauge & TRMM
Summary of Meghna River

- The DHM model was set-up using Global Data set (By Tokyo University)
- River routing model needs to be improved
- In-situ data is required for validation:
  - Actual river network
  - Cross sections along the streams
  - Water level, discharge
  - Ground validation of TRMM using Rain gauge for 10 years 98-08
Integral approach of Capacity Building Modules at AWCI Demonstration basins
## Capacity Building Needs vs. Resources Matrix

<table>
<thead>
<tr>
<th>Country</th>
<th>Bangladesh</th>
<th>Bhutan</th>
<th>Cambodia</th>
<th>China</th>
<th>Indonesia</th>
<th>Laos PDR</th>
<th>Mongolia</th>
<th>Myanmar</th>
<th>Philippines</th>
<th>Sri Lanka</th>
<th>Thailand</th>
<th>CEOP Data Integration Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legend</strong></td>
<td>3: being applied</td>
<td>2: applicable</td>
<td>1: potentially applicable</td>
<td>0: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td>GEOSS/AWCJ AP Symposium, Jan 2007, AWCJ ICG meeting, Sep 2007</td>
<td></td>
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</tbody>
</table>
Capacity Building Programs

1) Country level capacity building targeting local audience
2) Specific Training Modules provided by Agencies/Institutions to experts/scientists
3) Integrated capacity at each AWCI demonstration basin targeting international participants
Integrated Capacity Building

Objective: To show the applicability of available data/information/models/algorithms/systems at AWCI demonstration basins in order to overcome water issues.

Modules from resource organizations:

- Data Integration, quality control (CEOP, Tokyo U.)
- Global flood alert system, hazard mapping (ICHARM)
- Satellite Data, Mini-projects, Sentinel Asia (JAXA)
- Flood hazard mapping, emergency manage (MRC)
- Floods inundation modeling, rainfall downscaling (UNU)
- Flood simulation, dam operation (University of Tokyo)
- Radar rainfall, real-time forecast (Senjong University)
Impacts of Climate Change

- Drought
- Flood

1/3 land is used for Food Products

Water Pollution
Erosion
Mangrove Forest
Animals
Drought
Flood
Extreme Weather Events

- Thunderstorm
- Cyclone
- Cold wave
- Heat wave
Manmade problems
Environmental Degradation Due to Climate Change

Mangrove forest under threat

Drainage congestion

Typical erosion in small and medium rivers
Cyclone SIDR Storm
surge flooding

Out of 30 affected districts 15 were worst affected
Storm surge

Small shops, businesses, market areas, damaged along the road side.

School children foreground, a flattened school building in the backdrop.

Small boat near the shore.
### Causalities in Cyclone SIDR in Bangladesh

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<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Death</td>
<td>3,363</td>
</tr>
<tr>
<td>2</td>
<td>People missed</td>
<td>871</td>
</tr>
<tr>
<td>3</td>
<td>Family affected</td>
<td>1,928,265</td>
</tr>
<tr>
<td>4</td>
<td>People affected</td>
<td>8,545,470</td>
</tr>
<tr>
<td>5</td>
<td>Houses damaged</td>
<td>1,449,157</td>
</tr>
<tr>
<td>6</td>
<td>Crop damaged</td>
<td>2,077,226</td>
</tr>
<tr>
<td>7</td>
<td>Trees destroyed</td>
<td>4,065,316</td>
</tr>
</tbody>
</table>

**Total Damage Cost in USD: 450 million**
Impact of SLR: Intrusion of 5ppt Salinity line
Dry Season

This additional water level and resultant drainage and sedimentation problem has to be considered in the design of infrastructure.
The climate in Bangladesh is changing and it is becoming more unpredictable every year.

Uncertainty of rainfall and uneven temporal and spatial distribution

- Flooding
- Longer dry spells → droughts
- Cyclones
- Salinity intrusion → extra bearing on the agriculture and on the potable water

We require prediction of - more floods, untimely floods, more droughts, salinity intrusion, and more cyclones with higher intensities.
Adaptation strategy has to take on the sectors:

- Energy
- Climate Change
- Human Health
- Water Resources
- Ecosystems and Wildlife
- Agriculture and Forestry
- Coastal Areas and Sea Level Rise
Examples of good adaptation practices

- **Mini Ponds for rain water harvesting**

- **Homestead gardening**
Capacity Building Activity

Capacity building for the following organizations are going on:

- Bangladesh Meteorological Department (BMD)
- Bangladesh Space Research and Remote Sensing Organization (SPARRSO)
- Survey of Bangladesh (SOB)
- Capacity building other participating organizations are in process.
Projects of BMD (Ongoing)- GOB

Project Name:

a. Up-gradation of Agro-meteorological Service in Bangladesh Meteorological Department (BMD) .(7 new stations will be est.)

b. Establishment of Five 1ST Class Meteorological Observatory at Places [ Panchagar (Tetulia), Kishoregonj (Nikli), Khagrachari (Dighinala), Cox’s Bazar (Saint Martin) and Bandarban]

c. Up-gradation of 17 Existing Meteorological Observatories and Establishment of 01 New Observatory along the Coastal Belt for Cyclone Monitoring.

d. Establishment of Inland River Port Weather Forecasting and Warning Centre for Reducing Accident of River Going Vessels (1ST Revised). (14 new stations will be est.)

e. Establishment of Numerical Weather Prediction System
Projects of BMD (ongoing)- JICA AID

Project Name:

a. Improvement of Meteorological Radar System at Cox’s Bazar and Khepupara

b. Establishment of Meteorological Radar System (S-band) at Moulvibazar, Bangladesh

Aim of the Project: To reduce devastation caused by cyclones, floods and other natural disasters in Bangladesh

Scope of the Project:

• To collect Radar data
• To monitor cyclones formed in the Bay of Bengal
• To monitor monsoon related disasters and other natural disasters in coastal areas of Bangladesh
• Prediction of time and place of the landfall of Tropical Cyclones and storm Surge with sufficient lead time
• Providing quantitative storm surge forecasts
Future Projects of BMD

- Human Capacity building in BMD
- Climate Change studies in Bangladesh
- Improvement of Meteorological Training Institute
Gaps and Needs for Societal Benefit of Bangladesh

- Need more observational facilities
- Need more coordinated research
- Need more research projects

** GEOSS Can help in these regards**
Projects of SoB (ongoing)

Project Name: Improvement of Digital Mapping System of Survey of Bangladesh

Aim of the Project: To provide digital topographic maps with accurate and updated detail information and digital data to government and non-government organizations to undertake development works.

Scope of the Project:

• To establish Digital Mapping Centre of SoB at Mirpur, Dhaka
• To produce 1:5000 scale digital topographic maps and data base
• To produce 1:25,000 scale digital topographic maps and data base
• To strengthen the capability of production of digital topographic maps of SoB.
Projects of SPARRSO (ongoing)

Project Name: Environment, Disaster and Resources monitoring System (EDREMOS)

Aim of the Project: To Strengthen the analytical and qualitative research and development capabilities of SPARRSO

Scope of the Project:

- Enhancement of the application of remote sensing and GIS technology in Forestry, Agriculture, Fisheries, Water Resources, Oceanography, Meteorology and Environment.
- Extension of infrastructure for processing, analysis and archival of satellite data.
- Conduct Research on the related fields
GEOSS Seminar in Bangladesh
“Capacity Building on Climate Change and Adaptation in Bangladesh”

Date: 07 August 2008
Organized By: Bangladesh Meteorological Department (BMD)
Guided By: Ministry of Defence (MOD)

Recommendations:

• Capacity building on detail study on Climate Change to submit in IPCC report.
• Research on the Impact on Future Climate Change and adaptation procedure.
• Capacity building on the use of local data for different models
• Capacity building on the use of High Resolution GCM output of Japanese Earth Simulator.
• Project is need for capacity building in Rainfall Downscaling and Forecast, Flood Inundation Modeling, DEM Generation for water modeling, Flood Alert System and Management,
THANK YOU
Explanation:

• GIS and surface hydraulic analysis data, river network data, river discharge data will be used as an input of Digital Elevation Model (DEM).

• DEM- DEM model will calculate flow pattern, flow direction and flow accumulation of a particular point of the river according to input data.

• The calculated value will then be compared with the actual or observed flow of that point mentioned earlier.

• Then model will verify the result. If the model calculated flow differs from the observed flow then model will take in consideration and will account it as a systematic error and correct the bias.

• After bias correction the model will be set up for that point and respective river.

• In similar way model will run for different cases of discharge in different year as training period for validation.

• After validation the model will be used for inundation map generation and information will be sent to the users.