PRESENTATION ON
Role of Survey of Bangladesh in Producing and Providing Geospatial data

Md Abul Kalam
Bangladesh
Survey of Bangladesh (SOB) is the National Mapping organization of Bangladesh

SOB is carrying out all Geodetic activities of Bangladesh

SOB is responsible for taking Aerial photographs in Bangladesh

SOB Produces and Issues Maps & Map Data to the Users for various development activities
Commitments

- Preparation of Topographic Base Map of scale 1:25,000
- Topographic Map of scale 1:5,000 (City area)
- Thematic Maps of various types and scales
- Horizontal and Vertical Control Points
- Establishment and Maintenance of GNSS CORS
- Determination of Mean Sea Level (MSL)
- GIS Database of scale 1:50,000, 1:25,000 and 1:5,000
- Aerial Photographs
- Orthophotos
- Digital Terrain Model (DTM)
- Demarcation of International Boundary
GEODETTIC ACTIVITIES

ESTABLISHMENT OF NATIONAL HORIZONTAL DATUM

Wettzell (Germany) 
Dhaka 
Tsukuba (Japan) 
Hartebeesthoek (South Africa) 
Yaragadee (Australia)
NATIONAL DATUM

NATIONAL DATUM YARD

Established: 1994

Gulshan, Dhaka

Horizontal Datum

Vertical Datum
DETERMINATION OF MEAN SEA LEVEL (MSL) AND FIXATION OF VERTICAL DATUM

Location: Chittagong
Established: 1993
Data Records: Every 6 Sec

The station is used by University of Hawaii Sea level centre as Global Sea level observing station (GLOSS) since 2007 for Tsunami Warning of Indian Ocean
Horizontal Control Points

- 1st Order Horizontal GCP - 260
- 2nd Order Horizontal GCP - 817

Vertical Control Points

- 1st Order Vertical GCP - 662
- 2nd Order Vertical GCP - 1485

3D Control Points(X,Y,Z) - 765
Six Permanent GNSS Stations Established at Dhaka, Khulna, Rajshahi, Rangpur, Moulvibazar & Chittagong

Data Collected from Dec 2011 and Supplied to Various Public and private organizations
GNSS STATION

- Receiver: Trimble-Net R9
- Technology: Trimble Pivot Platform
- Data acquisition Interval: 1 Second
SURVEY EQUIPMENTS USED IN SOB

Total Station
Theodolite
GNSS CORS
Digital Level
GNSS Receiver
CHRONOLOGICAL HISTORY OF AERIAL PHOTOGRAPHY AND SATELLITE IMAGERY IN BANGLADESH
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>Scale</th>
<th>Name of Company</th>
<th>Area</th>
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<td>1974-75</td>
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<td>2.5m GSD Stereoscopic</td>
<td>Digital Globe</td>
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FLOW DIAGRAM OF SURVEYING AND MAPPING ACTIVITIES IN

Sources
- Aerial Photographs
- Satellite Images
- Geodetic Control Point

PHOTO
- Aerial Triangulation
- Stereo Plotting
- DTM Generation
- Orthophoto Generation

GIS
- Cartographic Database
- GIS Database

Carto
- Simplification and Smoothing
- Generalization
- Symbolization

Print
- Printing of Hard Copy Map

Field Verification

PROOF
PHOTOGRAMMETRIC ACTIVITIES

- Aerial Triangulation
- Digitization and Compilation
- Digital Surface Model Creation
- Digital Terrain Model Creation
- Orthophoto Generation
- Contour Generation
- Height Creation all over Bangladesh with respect to Mean Sea Level
GIS OUTPUT

- GIS Database with 11 Data sets, 68 Feature Class and 303 Feature Types
- GIS Basic Database for External Users
- Cartographic Database for Topographic Base Map
- Seamless Database for all over Bangladesh
CARTOGRAPHIC OUTPUT

- Topographic Maps of Different Scales
- Thematic Maps According to requirements of stakeholders
- Administrative Maps
- Guide Maps of Important Cities
CHARACTERISTICS OF AERIAL PHOTOGRAPHS FOR 1:25,000 SCALE BASE MAP

- **Spatial Resolution** – 50 cm GSD
- **Radiometric Resolution** – 8 bit
- **Number of Band** – 4 Bands (R,G,B,CIR)
- **Year of Acquisition** – 2010-11
- **Covering Area** – All over Bangladesh
CHARACTERISTICS OF AERIAL PHOTOGRAPHS
FOR 1:5,000 SCALE CITY MAPS

- Spatial Resolution – 25 cm GSD
- Radiometric Resolution – 8 bit
- Number of Band – 4 Bands (R,G,B,CIR)
- Year of Acquisition – 2010-11
- Covering Area – 5 Divisional Cities
- Pixel Size – 6 Micron
We are using satellite image and aerial photo data combined in a map.
Recently we purchased two image processing software to update our Base maps in reverine areas using satellite image.

- ERDAS Imagine Professional 2016
- ENVI version 5.3

Apparently we are using monochromic/Stereoscopic satellite data which were acquisitioned in different years.
In the international border area we prepared Maps by using monchrometic images.

We need to prepare Maps and DEM by using Stereoscopic Satellite Images.

- **Satellite Images** – Spot 5
- **Spatial Resolution** – 2.5 meter GSD
- **Radiometric Resolution** – 8 bit
- **Number of Band** – 4 Bands (R,G,B,CIR)
- **Year of Acquisition** – 2010
- **Covering Area** – Along the International Boundary
- Satellite images – World View
- Spatial Resolution – 0.5 meter GSD
- Radiometric Resolution – 8 bit
- Number of Band – 4 Bands (R,G,B; CIR)
- Year of Acquisition – 2016
- Area covered – Along 6 big river of Bangladesh

- Used to detect the area of river bank erosion
- To Incorporate and update river bank data to the base maps
PHOTOGRAMMETRIC WORKFLOW

Aerial Photograph/ Satellite Images

Aerial Triangulation

DTM Generation

Stereo Plotting

Orthophoto Generation
Relation between image and ground by using minimum GCP to make stereo model
PHOTOGRAMMETRIC SOFTWARE

- Aerial Triangulation - Inpho Match version AT 5.3.1 (03)

- Stereo Plotting - Summit Evolution version 6.1 (40) with Auto CAD Map 3D version 2011 (62)
  Summit Evolution version 7 (23) with Auto CAD Map 3D version 2016 (23)
  Summit Evolution version 7 with Arc GIS 10.3

- DTM & Orthophoto - Application Master includes (20)
  Match T DSM, DTM Edit & Ortho Master
  Ortho Vista includes SEAM Edit (10 no.)
DTM (20m Interval edited DTM)
Working procedure for making GIS and Cartographic Geodatabase from Photogrammetric Data and including Field Surveyed Data
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### Attributes of a Map

Sheet No. 78C/9C

Mr Nasir Uddin Ahmed, Syr, Grade-1

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<td>Kerimpur Sahbalpur Road, Primary School</td>
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</tbody>
</table>
• Arc GIS 10  - 45
• Production Mapping  - 45
STORAGE SERVER

- Model: HP 580 G-7
- Storage Capacity: 65 TB
Publish Map
1:25,000 Scale
printed Map
1:5,000 Scale
Challenges:

- Updating of Existing Topographic Base Maps and GIS Database (using Stereoscopic High Resolution Multispectral Satellite Imagery)
- Extraction of Features using Satellite Imagery by state of the art technology
- Creation of Precise Digital Terrain Model
- Creation of 3D Model using Remote Sensing Technology
- Administrative and logistic frame work
FUTURE PLAN

- Densification of GNSS CORS Network
- Establish National Spatial Data Infrastructure (NSDI)
- Aerial Survey using Unmanned Aerial Vehicle (UAV)
- Light Detection and Ranging (LiDAR) Survey
- Establishment of more tidal stations
- To carry out Gravity survey all over the country for determination of an accurate Geoid Model
THANKS FOR YOUR PATIENCE HEARING