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DEVELOPMENT AND USE OF GEO-INFORMATION IN BANGLADESH

Submitted by Survey of Bangladesh **

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DEVELOPMENT AND USE OF GEO-INFORMATION IN BANGLADESH

Introduction

Geo-Information is a vital component for sustainable development activities for a country. Up-to-date and precise geo-information is indispensable for achieving national successes in a comprehensive way. Demands for geo information are gradually increasing in Bangladesh for implementation of her improvement projects and to mitigate recurring natural calamities. Accurate geo information fulfills the followings:

- Proper utilization of natural resources.
- Land management system.
- Controlling environment management.
- Administrative managements.
- Infrastructural development, etc.

GEO DATA OF BANGLADESH

Political Location of Bangladesh. Surrounded by India in northern, western and most of the eastern part. Myanmar located on southeast and the Bay of Bengal on the south.

Geographic Location. Extent of Latitude from 26° 40 © North to 20° 30 © North and the extent of longitude from 88° 00 © East to 92° 38 © East. Magnetic declination around capital Dhaka is 0° 50 © West measured in 1967.

Area and International Boundary. Area of the country is 1,43,989 Square Kilometers with a coast line of 580 Kilometer. Bangladesh share 4053 kilometer international boundary with India and that of Myanmar is 193 kilometer.

Terrain Information. Commonly flat except $1/5^{th}$ area on southeastern part is hilly. A total of 52% land is cultivable and 13% land is covert by forest. Height pick is 977 Meter above Mean Sea Level. Population of the country is 139 Million (July 2003).

Main Rivers. Bangladesh share Common Rivers with India. Among them Padma, Meghna, Brahmaputra, Testa, Surma and Karnaphuli are prominent.
Agricultural and Natural Resources. Rice, jute, tea, sugarcane and tobacco are main agricultural product of Bangladesh. Natural gas, coal, limestone are available in Bangladesh.

PHASES OF DEVELOPMENT OF GEO INFORMATION IN BANGLADESH

Phase I (1767 to 1916) : During the period between 1767 to 1916 basic components of geo information for our region has been established. They are as follows :

- Determination of local Ellipsoid (Everest -1830)
- Establishment of Geodetic origin at Kalyanpur, Modha Prodesh, India.
- Establishment of horizontal control network.
- Establishment vertical control network.

Determination of local Ellipsoid (Everest -1830).

Semi Major Axis, a = 6377276.345 Meter
Semi Minor Axis, b = 6356075.413 Meter
Flattening, 1/f = 300.8017
Lambert Conformal Conical Projection with two standard parallels was selected for base map. The whole area of India was divided into several grid zones. Bangladesh (the then Bengal) positioned into the zone named grid IIB, where the geographic coordinate for false origin is latitude 26° and longitude 90°.

Establishment of Geodetic Origin at Kalyanpur, Modha Prodesh, India.

Kalyanpur is the origin of old Indian Triangulation.

Astronomical	Latitude	=	24º 07 © 11.26 © © N.
	Longitude	=	77º 39 © 17.57 © © E. of Greenwich.

Latitude was introduced by Col. Everest in 1841
and Longitude was introduced by Col. Gore in 1900.

Establishment of Horizontal Control Network: First horizontal network adjustment carried out on 1916 covering most of Indian territories including Bengal and Myanmar. Survey of India carried out this geodetic control network adjustment.

Establishment vertical control network. Up to 1858 heights were derived trigonometrically in our region. During 1858-1875 levelling survey were carried out using local MSL and between 1875-1909 vertical control network was formed and adjusted for Indian subcontinent. Nine tidal stations along coast of India were taken into consideration during network adjustment. They are Falls point, Vizagapattam, Madrash, Nagapattam, Coachin, Baypor, Karoar, Bombay and Karachi.

Phase II (1916 to 1990): Following are the activities took place during phase II:

- Triangulation network was extended and readjusted.
- Leveling network was extended and readjusted.
- Magnetic and gravity observation were carried out.
- Extensive mapping activities were carried out.

Triangulation network was extended and readjusted. During this period most of the triangulation network was extended and densified along the country.

Leveling network was extended and readjusted. There was no tidal station in and around Bangladesh. Vizagapattam in India was the nearest tidal station. So, widely extended level line inside Bangladesh could not check properly.

Magnetic and gravity observation. In the year 1966-67 magnetic and gravity observations around the country were performed. It is found 0° 50' W at Dhaka.

Extensive Mapping Activities. Base map of Bangladesh is at scale 1:50,000. It takes 267 sheets (at 15' X15' square size) to cover whole of Bangladesh. This series maps along with other topographical maps were completed and regularly updated during this period. Other topographical maps are as follows :

Scale 1: 1000,000 – one sheet cover whole of Bangladesh.
Scale 1: 500,000 – 6 sheets cover whole of Bangladesh.
Scale 1: 2,50,0000 – 27 sheets cover whole of Bangladesh.
Scale 1: 25,000 – (Part of the country).
Scale 1:10,000 – (Part of the country).
Scale 1: 5,000 – (Part of the country).

Besides that various thematic maps were produced.

Phase III (1990 – till date)

National mapping organization (NMO) was hard pressed to provide up-to-date information of geo data for various users. Due to modern scientific innovation nature of users' requirements also changed. The NMO realize the necessity of updating geo data regarding measuring units (FPS to SI), data acquiracy, compatibility with other ellipsoid and projection system. Following are the major works have been completed:

- Establishment of national horizontal and vertical datum in Bangladesh.
- Establishment of WGS-84 reference station in Bangladesh.
- Determination of transformation parameters between WGS-84 and Everest 1830 ellipsoid.
- Establishment of Tidal observatory in Bangladesh and determination of Mean Sea Level.
- Establishment of horizontal control network using GPS.
- Establishment of vertical control network using Digital level.
- Introduced digital mapping system in Bangladesh.
- Use of remote sensing and image processing in Bangladesh.
- Use of Geographical information system (GIS) in Bangladesh.

Establishment of national horizontal and vertical datum in Bangladesh. In co-operation with Japan International cooperation agency in the year 1995, we established national horizontal and vertical datum at Gulshan, Dhaka, Bangladesh. In this survey works Gulshan, Dhaka point were connected with nearest four IGS station Tsukuba (Japan), Wettgell (Germany), Hartebeesthoek (South Africa), Yaragadee(Australia).

We inherited vertical network which was linked in 1909 with nine tidal observatories around the coast of Indian sub continent. There were no tidal observatories in Bangladesh. These line traveled very long distance as well as old were used for crossing wide rivers and also due to passes time, natural disaster like earth quake significant relative error were found. We established a vertical datum and tidal observatory for both determination and monitoring MSL in Bangladesh.

Determination of transformation parameters between WGS-84 and Everest 1830 ellipsoid. Transformation parameters between WGS84 and Everet1830 ellipsoid (Local ellipsoid) were derived with the help of new GPS net and existing geodetic network. Obtained shift parameters are mentioned below:
The transformation constant from WGS-84 to Everest -1830

? X = - 283.729 m
? Y = - 735.942 m
? Z = - 261.143 m

Introduced digital mapping system in Bangladesh. We have introduced digital mapping technology in our production system in 1998 with the technical cooperation of IGN France. About 75% of data for our base map are already captured. We are planning to change our base map from 1:50,000 to 1:25,000 scale using digital photogrammetric method and remote sensing technology.

Cadastral map of Bangladesh were at scale 16 inch to a mile. New scale is being selected as 80 inch to a mile. Extensive survey works are under way to convert in to new scale cadastral map around the country.

Remote sensing and GIS activities in Bangladesh.

We have Space Research and Remote Sensing Organization (SPARSO) dealing with remotely sensed data for Bangladesh. Meteorological department of the country forecasts weather information using different satellite data. We are using remote sensing data to mitigate natural calamities and disaster management using latest satellite images. In addition, hydrographic, forest, agricultural and educational institutes are using satellite data for implementation and research purposes. Moreover different organizations of the country are producing maps taking active help from satellite images time to time.

In the field of GIS, various organization developed GIS for their own requirements. At the beginning coordination among the users and developers were less. In fact different platforms, codes, formats and primary data acquisition methods were used. As a result data standardizations, sharing problem became difficult.

We are as NMO, organizing to bring all related organizations including government and private bodies to be a common platform.