

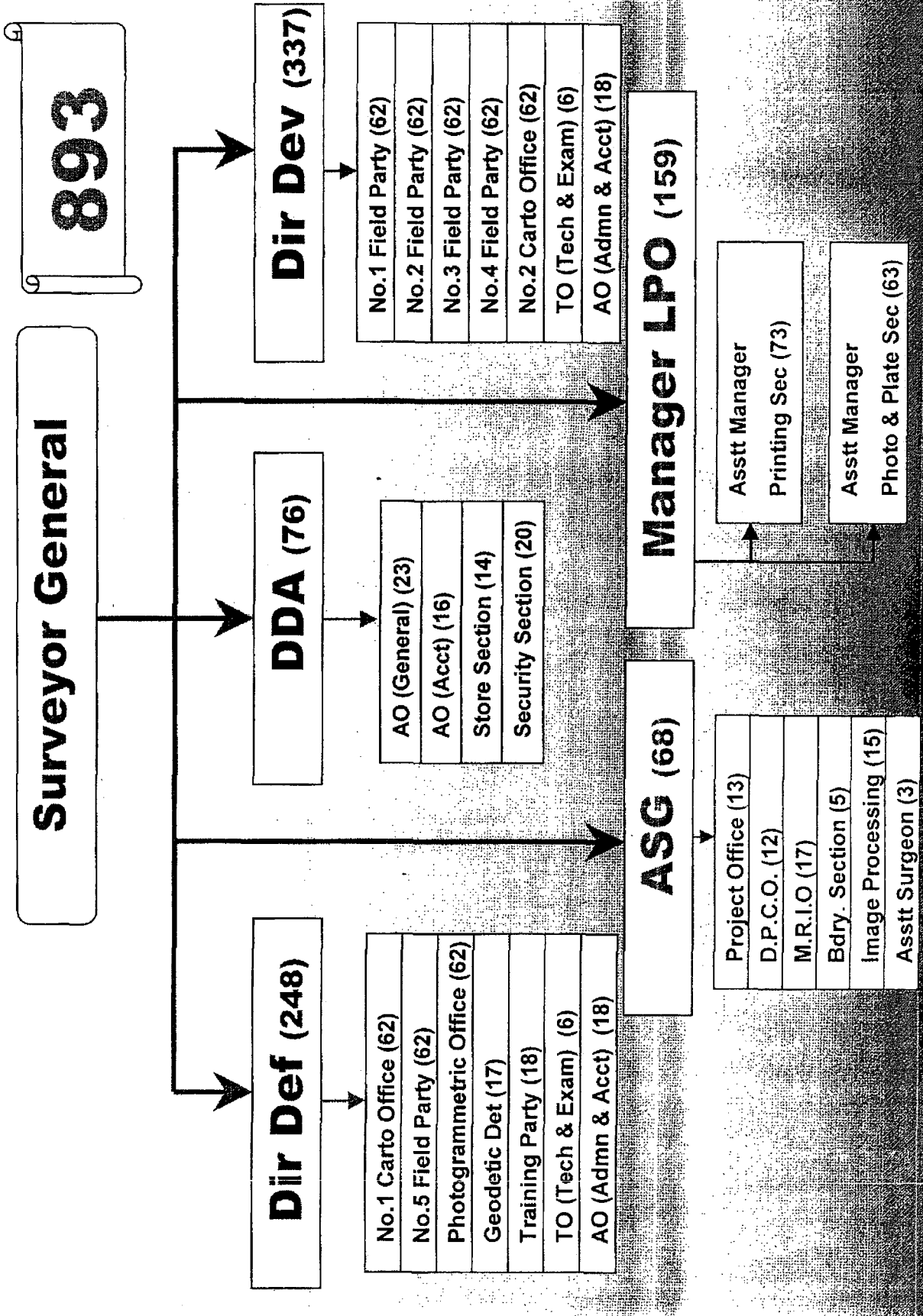
Calendar Aerial Photograph

1. *Survey General* Signature of HOPE: 17 Nov 2008
2. EOI Closing Date: 11 January 2009
3. RFP Collection date: 10 March 2009
4. Pre-Proposal Meeting: 05 May 2009
5. RFP Submission: 13 May 2009
6. Negotiation and Contract with 1st Top Scorer: 14 July 2009
7. Negotiation and Contract with 2nd Top Scorer: 11 August 2009 (If needed)
8. Negotiation and Contract with 3rd Top Scorer: 15 September 2009 (If needed)
9. Commencement of Work: 01 November 2009

Expression of Interest.

Request for Proposal

ORGANIZATION OF SOB



MANPOWER OF SURVEY OF BANGLADESH

<u>Sl No.</u>	<u>Class</u>	<u>Authorization</u>	<u>Held</u>	<u>Deficiency</u>
1.	1 st Class Officer	38	28	10
2.	2 nd Class Officer	11	02	09
3.	3 rd Class Staff	635	438	197
4.	4 th Class Staff	209	136	73
		Total :893	604	289

N.B. Seasonal 4th Class Staff (for field work only): 1205

SEMINAR ON
GEO-INFORMATION AND DIGITAL MAPPING IN BANGLADESH: PRESENT AND FUTURE

Time & Date: 10:00 – 16:30, 18 June 2008

Venue: Ball Room, Pan Pacific Sonargaon Hotel

AGENDA

10:00–10:30	Reception & Registration	
10:30	Arrival of the Chief Guest	
10:30	-----	Inaugural Session
10:30-10:35	Recitation from the Holy Qur'an	Mawlana Mahmudul Haque
10:35-10:50	Welcome address	Brig Gen Mohd Habibur Rahman Khan, psc, Surveyor General of Bangladesh
10:50–11:15	Presentation on Geo-information and Digital mapping in Bangladesh: Present and Future	Lt Col Mohammad Alauddin, psc, Project Coordinator & Director, Defence Survey
11:15–11:40	Presentation on Digital Mapping Process & Product	Mr. Christophe GRATEAU Chief Consultant
11:40-11:50	Presentation	Brig Gen Shah Md Sultan Uddin Iqbal, BP, ndu, psc, Joint Secretary, MOD
11:50-12:05	Address	Mrs. Nobuko Suzuki KAYASHIMA, JICA Resident Representative
12:05-12:20	Address	Mr. Kamrul Hasan, Secretary, Ministry of Defence
12:20–12:30	Address	H.E Mr. Masayuki Inyue, Ambassador, Embassy of Japan
12:30-12:50	Address	Mr. Mohammed Anwarul Iqbal, B.P.M (Bar), P.P.M, Hon'ble Advisor, Ministry of Local Government Rural Development & Co-operatives, Ministry of Labour & Employment and Ministry of Textiles & Jute, Government of the People's Republic of Bangladesh
12:50-13:00	Vote of Thanks	Lt Col Ahmedul Kabir, Director, Development Survey
13:00	-----	
13:00-14:00	Lunch/Prayer	
14:00	-----	Technical Session
14:00-14:40	Presentation on Technical aspect of the Project	Major Khairul Quadir and Mr. Gonesh Chandra Roy
14:40-15:20	Presentation on Surveying and Digital Mapping of the Project	Mr. Christophe GRATEAU Chief Consultant
15:20-16:10	Open Discussion	
16:10-16:20	Presentation	Lt Col Ahmedul Kabir
16:20–16:30	Closing Remark	Lt Col Mohammad Alauddin, psc,

SEMINAR
ON
GEO-INFORMATION AND DIGITAL MAPPING IN
BANGLADESH
PRESENT AND FUTURE

Organized by
SURVEY OF BANGLADESH



JUNE 18, 2008
PAN PACIFIC SONARGAON HOTEL
DHAKA

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By Brigadier General Mohd Habibur Rahman Khan, psc
Surveyor General of Bangladesh and Project Director

2. KEY NOTE PAPER:

GEO-INFORMATION AND DIGITAL MAPPING IN BANGLADESH:
PRESENT AND FUTURE

By Lt Colonel Mohammad Alauddin, psc
Director, Defence Survey and Project Co-ordinator

3. DIGITAL MAPPING PROCESS AND PRODUCTS

By Christophe GRATEAU
Chief Consultant

4. TECHNICAL ASPECTS ON GEO-INFORMATION AND DIGITAL MAPPING IN
BANGLADESH: PRESENT AND FUTURE

By Major Md. Khairul Quadir
Superintendent of Survey

and

Ganesh Chandra Roy
Assistant Superintendent of Survey

WELCOME ADDRESS

BY

BRIGADIER GENERAL MOHD HABIBUR RAHMAN KHAN, psc
SURVEYOR GENERAL OF BANGLADESH

Bismillahir Rahmaner Rahim.

1. Hon'ble Adviser, Mr. Mohammed Anwarul Iqbal, B.P.M. (Bar), P.P.M. Ministry of Local Government Rural Development & Co-operatives, Ministry of Labour & Employment and Ministry of Textiles & Jute, today's chief guest. Special Guest Mr. Masayuki Inyue, Ambassador of Japan, Special Guest Mr. Kamrul Hasan, Secretary, Ministry of Defence, Ms. Nobuko Suzuki Kayashima, Resident Representative, Japan International Cooperation Agency, Brigadier General Shah Md Sultan Uddin Iqbal, BP, ndu, psc, Joint Secretary, Ministry of Defence, representatives from concerned ministries, government departments, faculties from universities and representatives from private geo-information firms/industries, research organizations, present in the seminar, Asslamualikum and very Good Morning.

2. I on behalf of Survey of Bangladesh express our deepest gratitude to the Hon'ble Adviser Mr. Mohammed Anwarul Iqbal, B.P.M. (Bar), P.P.M. Ministry of Local Government Rural Development & Co-operatives, Ministry of Labour & Employment and Ministry of Textiles & Jute for excepting our invitation to be the Chief Guest in the inaugural session of the seminar and grace the occasion.

3. My heartfelt gratitude to our Special Guests Mr. Masayuki Inyue, Ambassador of Japan and Mr. Kamrul Hasan, Secretary Ministry of Defence for remaining present in the inaugural session. We are also very delighted to have Ms Nobuko Suzuki Kayashima, Resident Representative JICA with us this morning.

4. The aim of the seminar is to inform the Government and stakeholders, and the Geographic Information Community about the project "Improvement of Digital Mapping System of Survey of Bangladesh" and also to inform all concern about the products and activities of this project.

5. We have arranged the seminar in two parts; as in the first half we will have the inaugural session, in the second half from 1400 hrs we will have the technical session and in between we will have lunch and prayer time.

6. Ladies and Gentlemen, now I will briefly introduce the Survey of Bangladesh, different projects we carried out with the help of the Government of Japan, objectives of the present Digital Mapping Project, its outcome and its effects on various development projects and our daily life, then I will cover some future visions of Survey of Bangladesh and our limitations.

7. Surveying and Mapping in Bengal Region was started by the Survey of India in 1767 under the British rule. After the independence of Bangladesh a regional office of Survey of East Pakistan was reorganized as Survey of Bangladesh (SOB). Due to the reason of history in Bengal Region this part had many bottlenecks in the field of Surveying and Mapping. Some of them are.

- a. There was no geodetic datum established in Bangladesh.
- b. Geodetic control points were not distributed homogenously.
- c. Levelling Network was divided into two parts due to the Jamuna River.
- d. There were not enough data and information in regional office in Dhaka at the time of independence.
- e. No digital mapping centre was established.

8. Thus SOB decided to solve the above mentioned problems as a most prioritized works and started to establish the Geodetic Control Network which is the basis of Surveying and Mapping in Bangladesh. SOB has completed the First Order GPS Network and Levelling Network in May 2004 by the cooperation of the Japanese Government, more particularly by JICA.

9. SOB established a Tidal Observatory at Rangadia, Chittagong in 1993-94 with the technical assistance from JICA to fix Mean Sea Level (MSL). We record 6-second Sea Level data for 24 hrs and 365 days a year. One Tidal Observatory is good enough for measuring the MSL. However, with one Tidal Observatory it is not possible to assess and fix the MSL for entire coast.

10. As a National Mapping Organization SOB has also executed a Project named "The Study on Urban Information Management for Greater Dhaka City" by the

cooperation of Japanese Government which started in November 2002 to supply fundamental data of Greater Dhaka City by producing 1:5000 scale digital topographic maps and digital data, which is made available to all by 2005. Now the product is on open sale and detail information is in our website.

11. At present Government of Japan under Debt Relief Grant Aid (DRGA) is funding a project for Survey of Bangladesh, which is more than 100 crore Taka to Improve the Digital Mapping system of Bangladesh with following objectives:

- a. To establish Digital Mapping Centre for Survey of Bangladesh at Damalkote, Mirpur, Dhaka.
- b. To produce 1:25000 scale digital topographic maps covering entire country and its database.
- c. To produce 1:5000 scales digital topographic maps covering five Divisional cities (Barishal, Chittagong, Khulna, Rajshahi and Sylhet) and its digital database (approximately 160 sheets).
- d. To strengthen the capability of production of maps of Survey of Bangladesh (SOB).

12. By the implementation of Digital Mapping Project, following outputs are expected:

- a. Establishment of a modern digital mapping centre for Survey of Bangladesh.
- b. Produce hard copy topographic paper maps of 1:25000 scale covering entire country and its digital database.
- c. Production of 1:5000 scale digital topographic maps of major cities of the country and its digital database.
- d. Digital Elevation Model for the entire country.
- e. Densification of Horizontal & Vertical Control Points.
- f. Ortho photo.
- g. Geoid Model.
- h. Tidal Observatory.
- i. Capacity Building for SOB.

13. We also expect that by implementing this project following results will be achieved:

- a. Any organization can use accurate, seamless and latest topographic maps and digital data as basic data for their works.
- b. Planning and implementation of national development works can be executed smoothly.
- c. It is possible to avoid the duplication of budget for topographic mapping for the Government of Bangladesh.
- d. Mutual use of data and information among the Government organizations will be possible.
- e. “National Flood Risk and Damage Reduction Program” can be implemented smoothly by acquiring various information and digital data from this project.
- f. Geo-informatics can assist in disaster management especially by earth quake, cyclone, flood, river erosion etc.

14. In short Digital Map has got versatile use, 1:5000 and 1:25000 maps may be used by various developing agencies like Agriculture, Land, Water Resources, Irrigation, Forest, Environment, Disaster management, City authorities, Security agencies, Communication departments, universities, etc. for their own planning purpose. This will certainly save time and money of those organizations, which will ultimately contribute to the development of the country. Different educational institutes can use digital map for research works. Very importantly this project will also play important roles in order to implement Poverty Reduction Strategy Paper (PRSP).

15. Ladies and Gentlemen we are aware that with the present existing set of rules and regulations it won't be possible for us to have these maps and digital data open for sale. Realizing the difficulties and to make the maps/ aerial photographs easily available to the users, Ministry of Defence has constituted a committee headed by Survey General and members from different concerned Ministries and departments/ agencies. As such, we are revising the existing rules and classification for maps, aerial photograph and digital data keeping pace with the development of technology. However, not compromising with

the security aspects and the military requirements. New policy would help the agencies both Government and private organizations to get digital data easily.

16. Again with directives from the Ministry we have formulated a registration policy for Surveying and Mapping by different institution (private/ semi government). This is to maintain a standard and accuracy of maps and other geo-data. Very soon we will request the different surveying and mapping firm/industries to complete the registration.

17. Some Future visions of SOB:

- a. Densification of Bench Marks to 5 KM from 15 KM.
- a. Densification of Plannimetric Control Points to 10 KM from 30 KM.
- c. Increase 3D Control Points from present 180 to 1000 points: Useful Geoid Model.

18. Few Limitations of SOB are:

- a. No aerial photography capability
- b. No permanent GPS beacons
- c. Non availability of undergraduate or postgraduate diploma or degree curriculum in the universities and colleges on Geo-Informatics or Geo-Information services in Bangladesh.
- d. Limited courses on surveying, remote sensing and GIS,.
- f. No training courses available on photogrammetric engineering, geodesy, geodetic surveying, hydrographic and oceanographic survey.

19. Potential Future Capacity for Advancement of SOB:

- a. Establishment of additional Tidal Observatories to have networked solutions to fix MSL and observe the Sea Level rise and fall.
- b. Establishment of GPS Beacon.
- c. Aerial Photography Capability by having Digital Camera and trained manpower and using our existing aircraft from Army Aviation/ Air Force.
- d. Capacity Building by establishing a Training Institute.
- e. Making some effort to establish National Spatial Data Infrastructure (NSDI).

20. **Conclusion.** Global warming is causing large-scale disasters to many countries leading to detrimental situation. The worst hits are the countries that are not equipped to handle such a disaster, especially the developing countries like Bangladesh. We lack funds, skilled personnel or the technology to handle these disasters from a geo-information point of view. Japan's contribution to developing countries in this field is most prominent. Even few days back we had Global Mapping Forum in Tokyo Japan sponsored by the Geographic Survey Institute (GSI) of Japan. Japan is pioneer and initiator of Global mapping. We are grateful to the Government of Japan and particularly to JICA for providing assistance to Survey of Bangladesh.

21. Finally, we have a technical session in the afternoon, where we can discuss about the present situation on the use of Geo-information and digital mapping in Bangladesh and I request the representatives of GI Community of Bangladesh to participate/ and contribute for better implementation of the project.

22. Thank you all.

KEY NOTE PAPER

**GEOINFORMATION AND DIGITAL MAPPING IN
BANGLADESH: PRESENT AND FUTURE**

Presented

By

**Lt Colonel Mohammad Alauddin,psc
Director
Defence Survey Directorate
Survey of Bangladesh**

18 June 2008

GEOINFORMATION AND DIGITAL MAPPING IN BANGLADESH: PRESENT AND FUTURE

Introduction

Survey of Bangladesh (SOB) is the National Mapping Organization of Bangladesh. Main functions of Survey of Bangladesh are Geodetic Control Survey for the entire country, topographical survey in medium and small scale, preparation of Geographical & political maps in small scale, large scale contour survey, extra-departmental survey & mapping services, International Boundary Survey with India (Mizoram Sector) and Myanmar. SOB has already established National Geodetic Datum in Gulshan, Dhaka and a Tidal Observatory at Rangadia, Chittagong. In addition to her functions, SOB is the custodian of all Aerial Photographs in Bangladesh. SOB supports around 50 (fifty) Government organizations and all private companies in allied discipline by providing spatial data, technical advises & training and acts as a key organization for coordination with respect to spatial data sharing, ensuring mapping standards and Quality Control. New Projection System is introduced in SOB for topographical mapping as Universal Transverse Mercator replacing Lambert Conical Conformal Projection. SOB is using Everest-1830 ellipsoid since inception till date. At present mapping scale of SOB's Base Map is 1:50,000. SOB has just started implementing a new project titled Improvement of Digital Mapping System of Survey of Bangladesh aiming to switch over from 1: 50,000 to 1: 25,000 scale. The project is of six years duration aiming modernization of mapping technology and introducing new topographical database of 1:25,000 scale capable of providing soft copy containing data in different layers.

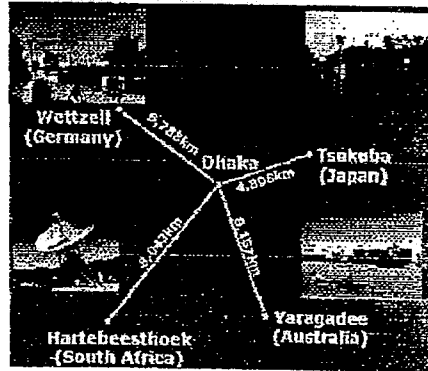
Geodetic Network in Bangladesh

Horizontal Datum of Bangladesh



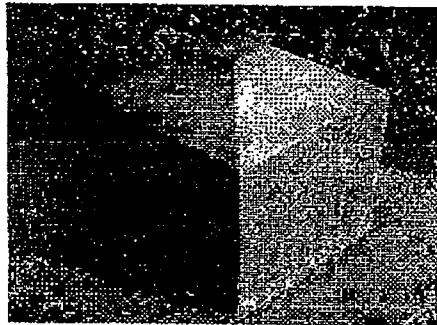
National Horizontal Datum, Gulshan, Dhaka

The geodetic control point in Gulshan had been used as a temporary horizontal datum of Bangladesh before 1990. But the accuracy of its coordinates had not been examined and the coordinates referred to Everest 1830. Because GPS refers to WGS-84, it is better to give not only Everest 1830 coordinates but also WGS-84 coordinates to the control points in Bangladesh. Consequently, the geodetic horizontal datum of Bangladesh was established in Gulshan and the coordinates on WGS-84 were determined by

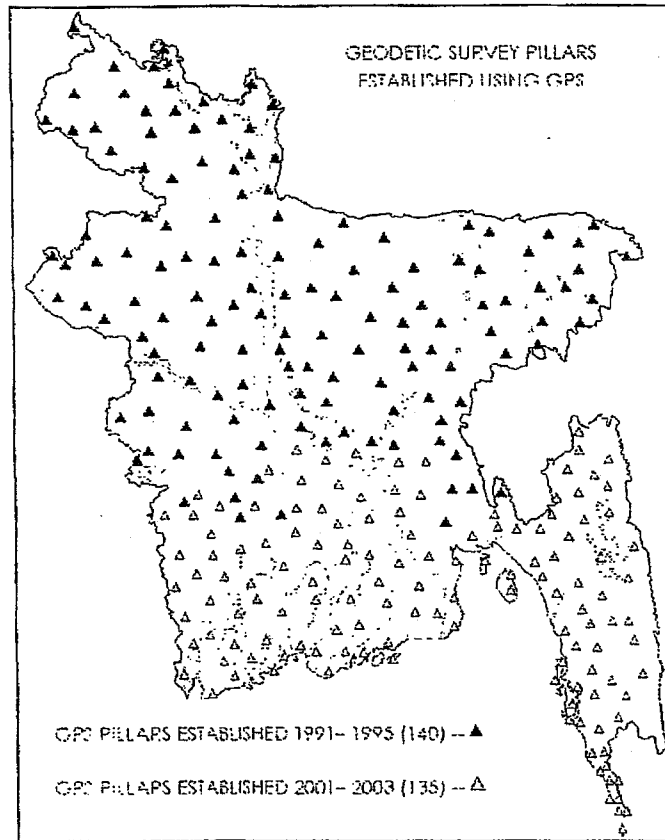


global GPS observations refers to four IGS observation stations in Germany, South Africa, Australia and Japan as shown in the figure. These four stations are operating not only continuous GPS observation stations for IGS but also Very Long Baseline Interferometry (VLBI) site or Satellite Laser Ranging (SLR) site. VLBI and SLR are the most precise global geodetic observation technique which can determine the coordinates in few millimetres accuracy and are operating to maintain the global geodetic reference system. This means that the coordinates of these stations are maintained most precisely.

A sample of Horizontal Geodetic Survey pillar established by SOB is shown on the screen. We have altogether 278 such survey pillars throughout the country established using Geodetic grade GPS. The Geodetic Network thus established is shown on the screen.

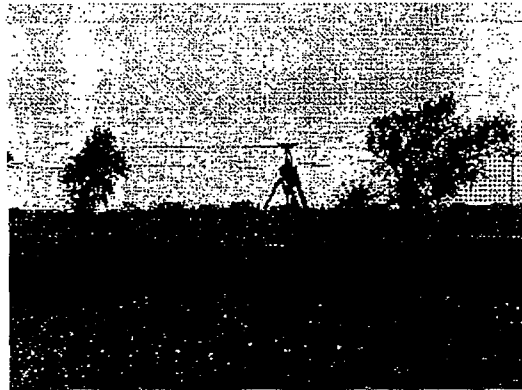


Horizontal Geodetic Survey pillar



Geodetic Control Points of Bangladesh established using GPS

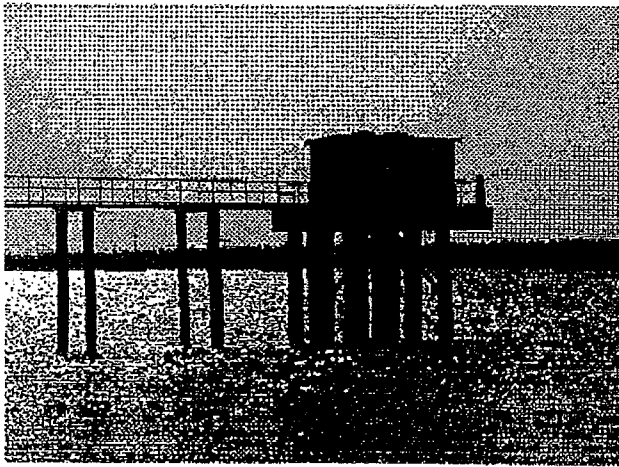
GPS data collection in Static mode for the measurement of a Horizontal control point is shown below.



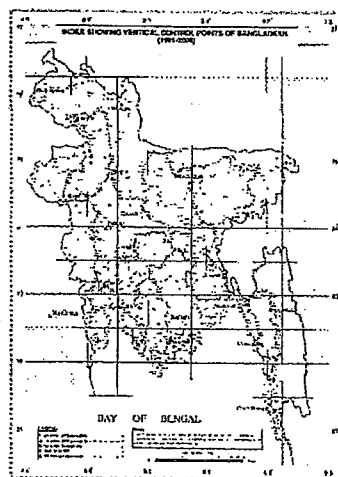
GPS data collection in Static mode

Establishment of Tide Station and Vertical Datum of Bangladesh

SOB has set up a Tide Observatory in 1993 to fix Zero Mean Sea Level at Rangadia, Chittagong with technical cooperation from JICA. This Tide Observatory is a float type and records 6 seconds data electronically. This also records tide fluctuation on graph paper. SOB has determined temporary Zero MSL using 22 months observation during 1993-94. SOB has also set up Vertical Datum at Gulshan, Dhaka connecting tidal observatory datum. We can see the vertical datum at Gulshan on the screen. It would be worth mentioning that SOB tidal observatory is connected to Indian Ocean Tsunami Warning System under the Intergovernmental Oceanographic Commission (IOC) with the financial assistance from UNESCO. This is also part of the Global Sea Level Observing System (GLOSS). Bangladesh Meteorological Department will use the data for Tsunami Forecasting. Bangladesh Navy is acting as a coordinator on behalf of the Government of Bangladesh in this matter. SOB plans to have two more tidal observatories to get a networked solution for fixing MSL and rechecking of differential settlement or rise.



Tidal Observation Station, Rangadia, Chittagong Vertical Datum, Gulshan, Dhaka



Geodetic Levelling Net of Bangladesh

Geoid model of Bangladesh

Bangladesh is very flat land. GPS is one of the most efficient technique for surveying and mapping in Bangladesh not only for horizontal coordinates measurement but also for vertical measurement. To utilize GPS for levelling, precise geoid model in whole Bangladesh is essential. This technology can give comfort to surveyors by avoiding exhaustive levelling survey. At present, SOB has 180 3D control points and plans to acquire more 3D control points to make a Geoid Model with 10 cm accuracy. A Geoid Map of Bangladesh with 100 – 3D control points is shown on the screen.

Survey Results

SOB has a lot of survey results such as control points, benchmarks, maps etc. The utilization of them is most important. The survey results exist for users. SOB maintains the results in database and also has efforts to maintain the monuments in good condition.

PRESENT METHODS OF MAP MAKING

At present, we are using two methods of map making, Analogue and Digital method. In analogue method, we use conventional method with plane table survey and hand drawing cartography. In analogue method specially maps prepared by analogue photogrammetric method. In digital method, maps are prepared either by using digital cartography, digital photogrammetry and remote sensing technique.

Analogue Method

In conventional mapping system maps are produced freshly using plane table survey and manual cartographic technique. Later on, surveyors verify and update the maps using plane table survey in blue print of existing base maps. During field verification, the area of survey is controlled in the field by permanent or temporary generated ground control points by traversing using theodolite and chaining. Fair mapping is carried out by manual cartography. Then proof copies are printed and edited by the surveyors before final printing.

Digital Cartographic Method

Existing maps are scanned and digitized. Surveyors verify and update the topographic details in the field taking help of the ground control points. Digital compilation is done to get final hard copy printed map and soft copy data.

LIMITATIONS OF PRESENT MAPPING SYSTEM

Present small scale analogue map is a hard copy paper map which does not satisfy the requirement of digital data of the users. Hard copy paper maps can neither be segregated into different topographic layers nor can GPS data be integrated. At the era of information and communication technology the digital information is basically offered in GIS format. The

user do not get the layered data such as communication, hydrography, vegetation, forest resources, built up areas and of course the administrative/political boundaries. SOB is yet to prepare DEM for the entire country. To update altimetry information like spot heights SOB could not carry out appropriate survey for many years.

At present SOB uses conventional plane table survey which is very exhaustive, time consuming and ultimately production cost is higher, Surveyors need to stay in the field for quite long time and sometimes work in remote and inaccessible areas like Chittagong Hill Tracts, Sundarbans and offshore islands. Some of the pictures of field survey are shown here.

FUTURE MAPPING SYSTEM

Digital Photogrammetric System

Now a days GPS INS integrated airborne digital sensors are available for acquisition of aerial images. This technology will reduce the requirement of number of ground control points (GCPs) and eliminate the photo processing and scanning steps, and thus reduces the difficulties of storage, maintenance and man hour. This will facilitate the production of orthoimages, DEM with more accuracy along with or beside acquiring digital images. We can also derive spot heights with this technology.

Digital Mapping With Space Image

Spatial measurements are done in stereo images acquired using airborne photo sensors. Photographs are taken by aerial metric cameras. At present, various types of space images are available in the market with varied resolution and spectral band. Satellite Images, both monoscopic and stereoscopic are available with few image providers like Spot, Quickbird, Ikonos. Besides, airborne shuttle missions of USA also offers DEM with 3 sec and 1 sec of arc accuracy. Based on the accuracy of particular images, we can select appropriate space images e.g. for mapping in Chittagong Hill Tracts and low lying coastal belts requires different types of space images because of the nature and type of elevation difference.

GPS Mapping

Digital cartographic database may be verified using DGPS mapping or Total Station mapping as appropriate for any topography. At present, many good solutions are available in the market with either GPS or Total Station or combine. Verification of topographic details with modern technology will save lot of man hour and thus reduce the expenditure.

Building of Geo-database in Bangladesh

A Geo-database is designed to store, query and manipulate Geographic Information and Spatial Data. In Bangladesh, we have maintaining so called Geodatabase in different departments like WARPO, LGED, Department of Forest, SOB etc. Thus data sharing is difficult. With the present condition of ICT already available in Bangladesh, probably this is the time to establish a Central Database for all the departments.

SOB till now does not have a good database for its own. The department is working to establish a geodatabase with the basic topographic information on different theme of different scales. The future SOB geodatabase will also have altimetry information to make it 3D GIS database. Besides, the new database will also include DEM, Orthophoto, Orthoimage Geodetic and Tidal data.

Many of the developed countries has set up National Spatial Data Infrastructure for sharing topographic, cadastral, marine and other types of primary data. To set up NSDI in Bangladesh, we need to make a feasibility study and it may take sometime. For the interim period, we can think of National Spatial Data Centre where interested Government Departments may be connected using SOB server.

SOB plans to acquire the potentiality of representing DEM with appropriate accuracy for the Sundarbans, low lying coastal belts, river corridor and islands and char lands in the river corridors of Ganges, Brahmaputra and Meghna. Besides, SOB will have the potentiality of preparing orthophoto for the towns and cities and generate the same on demand of the users. SOB will also acquire the potentiality of meta-data management and introduce pathway to establish national spatial data centre for the country. SOB plans to establish a national spatial data infrastructure (NSDI) with the stakeholders within Dhaka and also outside Dhaka. In future the department will generate 1:50k, 1:250k, 1:500k and 1:1000k topographic database and maps out of present initiative.

Immediate Impact of Digital Mapping

SOB is going to have trained workforce on modern mapping system. After establishing Geo-database we can produce hardcopy paper map of 1:25k for the entire country and 1:5k for 5(five) divisional cities of Bangladesh. All the government and non-government organizations will have the same mapping standard and access to Geo-database, Digital Elevation Model and contour information for the whole country will be used for disaster preparedness and prevention of natural calamities. Tidal information from the tidal gauge will be used for monitoring sea level rise and will predict Tsunami and potential coastal inundation due to global warming. Private transportation agencies (on land, river and air), Bangladesh Police, Rapid Action Battalion and other intelligence agencies will be able to integrate topographic database in its vehicle and criminal tracking system.

Future Impact of Digital Mapping

Future impacts are focused below with respect to different organizations and agencies:

SOB

- SOB can prepare urban mapping database in large scale in other cities under vision 2020.

- Compile, prepare and publish smaller scale maps in 1: 5000, 1:25000, 1:50,000, 1: 250,000, 1: 1000000.
- Preparation and publish DEM, Orthophoto of any area inside the country as per the user's demand.
- Support other Government bodies with Tidal data, Geodetic Survey as per the demand.
- Update and share spatial information with other stake holders.
- Introducing National Spatial Data Infrastructure to share online geo-information among all the government departments and thus fulfils a part of the governments initiative of establishing e-governance in Vision 2020.

RHD

- Can use the topographic information (hard and soft copy in GIS format) related to road communication.
- Can use the topographic database for new road planning.
- Height information for constructing roads and bridges.

LGED

- Can use the topographic information (hard and soft copy in GIS format) related to all types of road and river communication.
- Can update her infrastructure and other thematic maps.
- Can use DEM, contour and other height information for planning small irrigation projects.
- Can use height information for constructing roads and bridges.
- Can use GPS Control Points for her infrastructure mapping.

BWDB

- Can make model for Flood Forecasting and Management using SOB's Digital Elevation Model (DEM).
- Can use DEM, contour and other height information for planning irrigation projects.

BIWTA

- Can use tidal gauge data for Tsunami forecasting, sea level change.
- Can use the topographic information (hard and soft copy in GIS format) related to river communication and river ferries, shoals, islands.

Department of Forest

- Can use the topographic information (hard and soft copy in GIS format) related to all types of forest features for preparing thematic Forest Maps.
- Can use the topographic information (hard and soft copy in GIS format) for afforestation program.
- Can use the topographic information (hard and soft copy in GIS format), orthophoto on coastal areas for coastal afforestation program.
- Can use high resolution satellite imageries for classification of forest type, density for afforestation program.

Department of Environment

- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic Maps on Conservation of Natural Resources (Bill, haor, marshy land).
- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic Maps on Land Use.

Department of Land Records and Survey

- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic Maps on Land Administration (Cadastral Maps for example Mouza Maps).
- Can use GPS Control Points for physical survey and preparation of Cadastral Maps.
- Can use the topographic information (hard and soft copy in GIS format), orthophoto for preparing thematic Cadastral Maps on new river/coastal chars for land reclamation.
- Can use the topographic information (hard and soft copy in GIS format) for preparing Boundary Strip Maps on International Boundary.
- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic Maps on Revenue Zone.

Disaster Management Bureau

- Can make model for Flood Forecasting and Management using SOB's Digital Elevation Model (DEM).
- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic Maps on flood /cyclone /earthquake /drought/ physiography.

Department of Fisheries

- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic Maps on Fisheries Resources (Inland and coastal areas).

Department of Food

- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic maps of food production/ storage.
- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic maps of food scarcity and poverty.

Department of Relief and Rehabilitation

- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic maps of Cyclone/ cattle Shelters/ Relief Infrastructures (Food silo, Helipads, river ports, river and sea harbor areas).
- Thematic Maps damage after natural calamities.

RAB and Bangladesh Police

- Can use topographical database for introducing vehicle and criminal tracking system.
- Can use DEM for planning radio relay communication.
- Can use topographical Hard copy maps for law enforcing.

BDR

- Can use DEM for planning radio relay communication.
- Can use topographical Hard copy maps for law enforcing.

ARMED FORCES

- Can use the topographic information (hard and soft copy in GIS format) for Operation and Training purpose.
- Can use DEM for planning radio relay communication.
- Can use the topographic information (soft copy in GIS format) for the mapping system of weapon locating radar.
- Can use the topographic information (hard and soft copy in GIS format) for preparing thematic maps.
- Can use DEM and contour information for land to land/ sea to land/air to land ballistic weapon system.
- Can use GCP control points for establishing Bearing Picket (BP) for artillery system.
- Can use DEM for flight simulation for BAF & Army Aviation
- Can use the topographic information (soft copy in GIS format) for military appreciation and decision making.

- Can use the topographic information (hard and soft copy in GIS format) for terrain analysis.

Limitation on the use of Geo-Information in Bangladesh

Neither the national Mapping Agency nor any Geoinformatic Service Providers has the aerial photography capability at present. Fund allotment, bidding process, flying and processing time would require at least a year for acquiring aerial photography as per present practices.

Bangladesh does not have a permanent GPS Beacon Network manned by the National Mapping Organisation to support data acquisition from the field using DGPS, navigation with GPS or observing tectonic motion. There are few beacons owned and operated by Bangladesh Inland Water Transport Authority and Bangladesh Navy. These initiatives are not yet coordinated and capitalized by the National Mapping Organisation.

There is no undergraduate or postgraduate diploma or degree curriculum on Surveying Engineering or Geoinformatics in the universities and colleges of Bangladesh. Department of civil engineering, infrastructure planning, forestry, geography, water resource engineering covers few credit hours on theory and practice on terrestrial surveying and GIS. There is some vacuum in teaching and spreading right kind education on geoinformation with adequate faculties graduated on Geoinformatics. There is no scope in Bangladesh to learn Photogrammetry and Geodetic Survey.

Potential Capacity for the Advancement of Survey of Bangladesh

Establishment of New Tidal Observatory: A national body should be formed to monitor and link up the tidal observatories of SOB and BIWTA to analyse the change of Mean Sea Level. SOB should establish more two tidal observatories for checking and get a networked solution of establishing vertical datum beside its only observatory established in 1993-94 with technical assistance from JICA (Japan International Cooperation Agency).

GPS Beacon: Permanent GPS Beacons should be established at appropriate interval covering the entire country for providing a networked solution for DGPS survey for quick and accurate field data acquisition. In addition to surveying support, these Beacons would be used for monitoring tectonic motion by Geological Survey of Bangladesh (GSB), provide navigation support to aircrafts, naval crafts and vehicles and facilitate location based services to mobile phone operators, law enforcing agencies, fishing boats etc. Until SOB establishes permanent GPS Beacons, the department should carry out similar type of GPS campaign on the same time interval for monitoring tectonic motion.

Capacity Building: Capacity building may be in two interlaced stages. A group of professional may be trained from renowned foreign institutes on different professional level and thus may acquire the capability of imparting the same locally. On the other hand, a modern and workable training institute should be planned reorganizing, reforming and upgrading the existing training office of SOB. This should be able to run undergraduate

courses with affiliation to public universities and Higher Secondary Level Certificate Courses (popularly known as undergraduate Diploma in Bangladesh). In addition few thematic post graduate certificate courses should be run on Geo-database Programming and customizing, Geodetic Survey, Photogrammetry, Remote Sensing Application, DEM with Interferometry, GIS application for infrastructure, GIS application for Water Resource, GIS application on Forestry etc.

Establishing NSDI (National Spatial Data Infrastructure). In Bangladesh there are approximately 50 stakeholders, both Government and private, who need and possess geo-information of their own requirements. However, there is a lacking of coordination and sharing of this geo-information. The sharing would enable these departments to manage their resources more diligently, adding value to their information; avoid duplication of works thus saving government expenditure. This problem could be solved by establishing a NSDI under the control of SOB. Again, to share data from one organization to another requires that the other produces information in the same format. Thus Global Mapping Initiative and all its members should adopt a common format to make geo-information exchange more fluid.

Open Source Geo-Information: Geo-information has become a vital part of the present civilization and no contradictory policy can be accepted to restrict this information to the public. The openness will not only contribute infrastructural development, but also will help all government, semi-government, and private institutes to add value to the core geo-information for adaptability to disasters. As today climate change is occurring rapidly, which is dangerous worldwide, the Global Campaign for Open Source Geo-information should be accelerated so that all the necessary parties are aware of the current geo-information.

Conclusion

Digital Maps and GIS to be prepared by SOB will be immensely helpful for the development of the country. SOB has taken a new initiative to develop a geodatabase with the theme of medium scale in 1:25k for the entire country. The department will have the potentiality of generating Orthophoto in any part of the country. At the same time, the department is addressing the preparation of geodatabase for the cities of Chittagong, Khulna, Rajshahi, Barisal and Sylhet along with the Orthophoto. Under the guidance of MOD, rules for geodata issues and distribution are being reformulated to open geodatabase for all concerned. We understand that there is a huge demand of geoinformation data from the users with soft copies in appropriate GIS format. The department hope that proper planning for infrastructural development and preparedness of disaster management will be easier and the life and property will be better taken care of by the availability of new geoinformation data.

Digital Mapping

Process and products

Dhaka, 2008 June the 18th

by
Christophe Grateau
Chief Consultant

Digital Mapping Process and products

Dhaka, 2008 June the 18th

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1/



Digital Mapping

- ✓ Is there any true benefit from Digital Mapping ?
- ✓ Or are we dealing with fashionable and costly cartography ?

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1/

Digital Mapping

✓ Benefits of Digital mapping

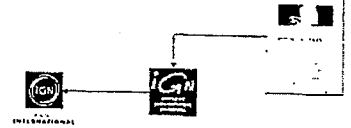
- **Producer point's of view**
 - Better quality
 - Faster process
 - Lower costs
- **User point's of view**
 - Better quality
 - Up-to-date data
 - Allowed massive new applications

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3/



IGN versus IGNFI



- ✓ IGN is the French National Mapping Agency (NMA).
- ✓ IGNFI is its subsidiary dedicated to export activities
- ✓ IGNFI is employing IGN experts

IGN France International

Activities & competencies

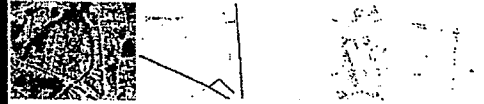


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5/



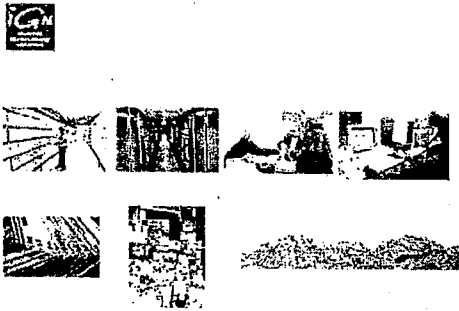
A main mission: French National Spatial Data Infrastructure (NSDI)



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Products Supply



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7/



Close cooperation with French MC

Data production and quality control

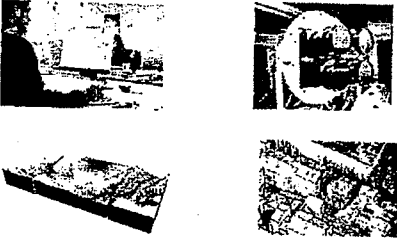


<http://eden.ign.fr/>

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Research

4 research laboratories
worldwide reknown



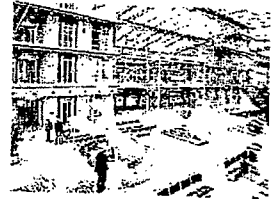
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9/



ENSG : French leading school in
Geomatics

Varied trainings:
Skilled workers
Technicians
Engineers
Master degrees
PhD



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References & History

IGN had a long tradition of
exporting its know-how



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11/



Presence throughout the world



A presence in more than 100
countries

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References

ACT Luxembourg projects : mapping at 1 : 20 000



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13/



References

Ordnance Survey projects – UK :
Updating Topographic database



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References



French Polynesia project : orthomaps
and topographic mapping



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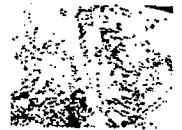
15/



References



Senegal project : mapping the
country at 1 : 200 000 scale



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References

IGN Sudan : mapping of future dams sites



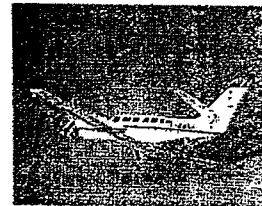
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17/



References

IGN Libya : Aircraft with Digital Camera



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18/

References

IGN Corine Land Cover



CLC quality control for the 15 countries
Technical assistance for CLC Albania
Feasibility study about CLC Central America



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19/



References

IGN EuroSION



Pan-european database
implementation
on coastal erosion



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Mapping Bangladesh

The Project :

-Improvement of Digital Mapping System
of Survey of Bangladesh

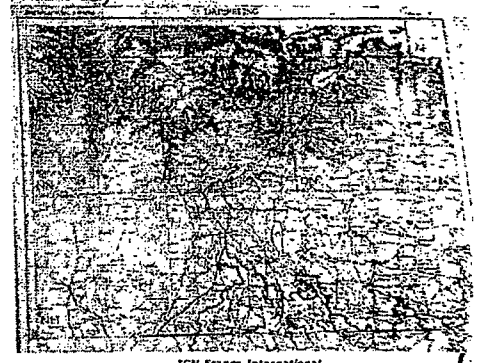
Stage I : Project Management assistance

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(23/)



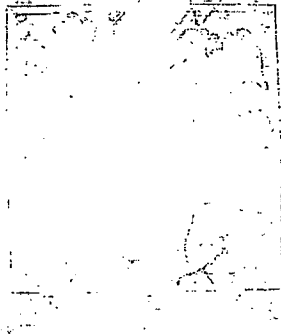
Maps in Bangladesh 1/500 000



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Maps in bangladesh 1/50 000



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(23/)

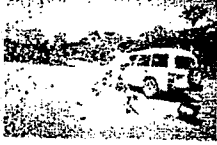


Mapping Bangladesh 1/50 000

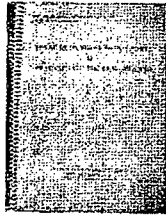


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A modern Geodesy network



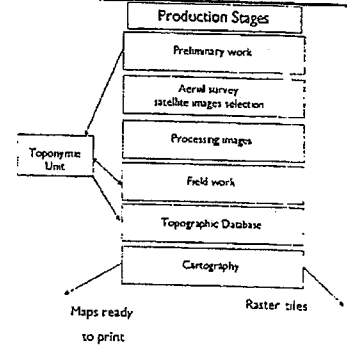
SOB has carried out a modern and accurate geodesy network with the help of Japan



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(25/

Mapping Bangladesh



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Cartography

Cartography

Example of one map
« Ready to print »

Example of one tile
of raster maps

- The results of the cartography stage are:
- A set of roughly 1,000 maps "ready to print"
- Seamless raster products based on different maps scales

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(27/

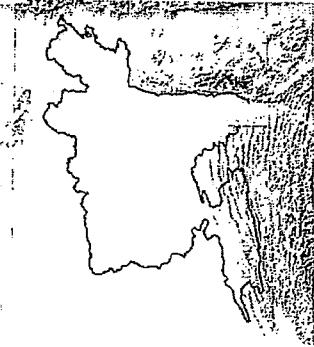
Cartography

Tiles of Raster maps makes a seamless cover of Bangladesh



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Mapping Bangladesh the altimetry issue



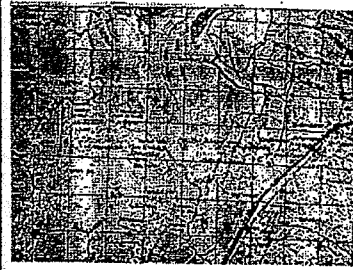
- ✓ Few contour lines
- ✓ Mainly Spot height will provide useful information
- ✓ We can't follow standards for 1/25k map

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Altimetry on old maps



- ✓ Spot heights have been carried out using spirit levelling
- ✓ Accurate but the density very poor

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Photogrammetry and altimetry

- ✓ Photogrammetry allowed 3D Digitizing
- ✓ Unfortunately, because of the very flat area of the Bangladesh, it would be not enough accurate for a reasonable cost.
- ✓ We should go on other technology
 - Spirit levelling
 - Lidar
 - Radar
 - GPS levelling

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31/



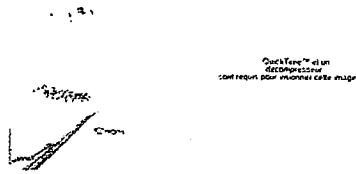
Lidar Technology

Optech™ et un decompresseur sont requis pour visionner cette image

Optech system

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Lidar Survey



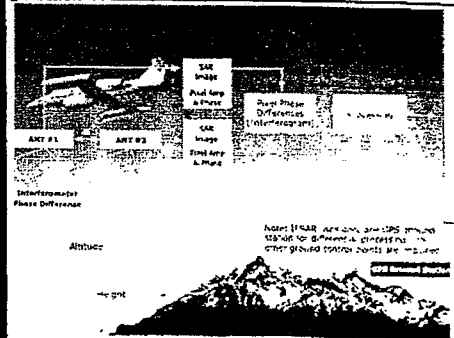
From Optech

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33/



Radar - Basic



From Intermap

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Lidar or Radar ?

	Advantages	Drawbacks
Lidar	<ul style="list-style-type: none"> ✓ Precision 20cm ✓ Density ✓ DTM and DSM 	<ul style="list-style-type: none"> ✓ Need good weather ✓ Swath small - cost ✓ DEM and DSM
Radar	<ul style="list-style-type: none"> ✓ No weather restriction ✓ Density ✓ DTM and DSM ✓ Wide Swath- cost 	<ul style="list-style-type: none"> ✓ Precision roughly 1m

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GPS and Altitude

- ✓ In order to be able to measure accurate altitudes using a GPS in Bangladesh, we must improve on the Geoid's model over the whole of country
- ✓ This may need a mix between
 - Precise levelling
 - GPS measures on Benchmarks
 - Gravimetry measures

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Digitizing Planimetry features

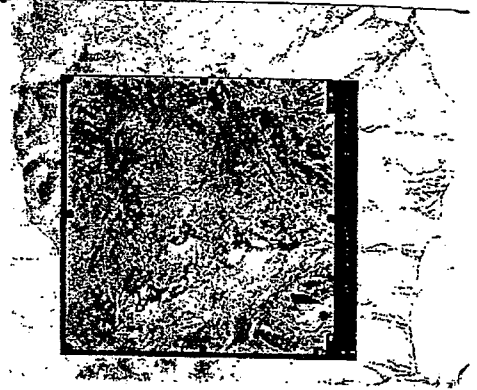
- ✓ Orcho-images will be mainly used
 - Because it is an accurate and cost effective methodology
 - Orthophotography will correct the raw image from the perspective alteration
 - Orthophotography will correct the raw image from the relief alteration

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Raw photography



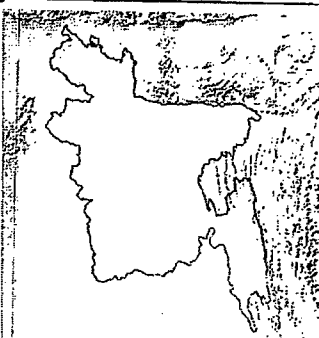
Orthophotography



39

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Satellite Imagery

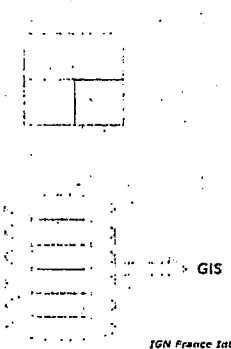


- ✓ Satellite images required along border
- ✓ It is not reasonable to program of high resolution stereopair

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Product supply available for users



- ✓ Maps
 - Hardcopies
 - Raster tiles

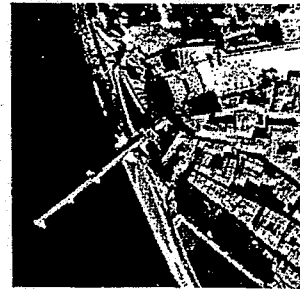
- ✓ Topographic Database

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Product supply available for users



- ✓ Images
 - orthophotos

- ✓ Tiled over the whole of Banglade

- ✓ Geofenced

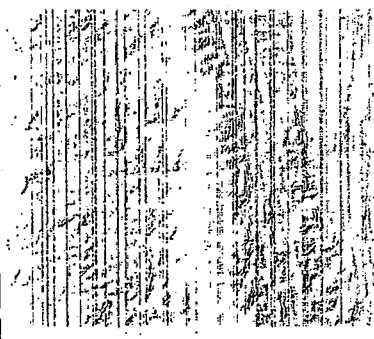
- ✓ Tiff format
- ✓ jpeg2000 ...

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DEM



- ✓ SRTM DEM

- ✓ 40m contour lines

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Digital Mapping-Some Applications

- ✓ From the French NSDI
 - House planning
 - Road project
 - Flooding

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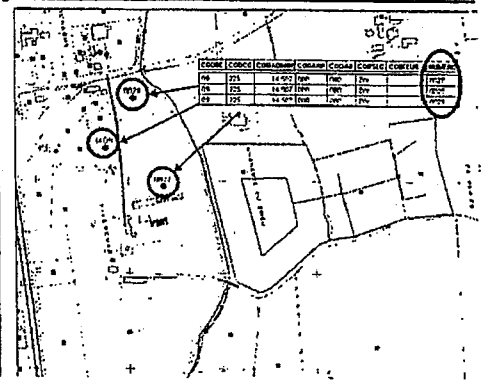
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Housing development project



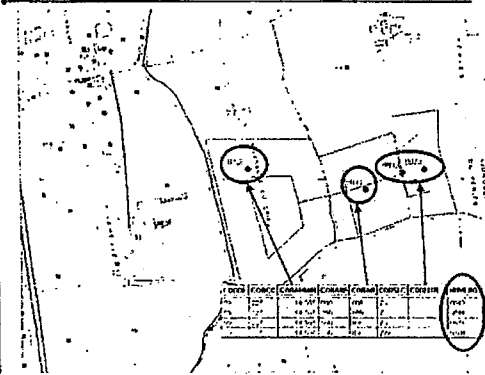
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Housing development project



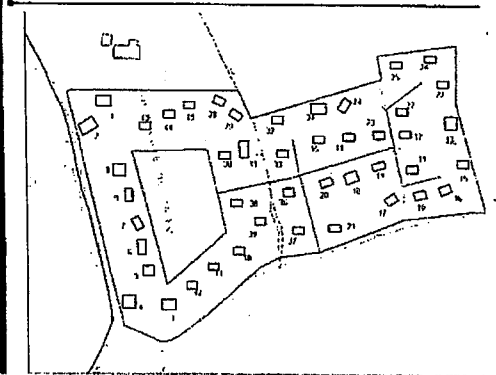
IGN

Housing development project



IGN

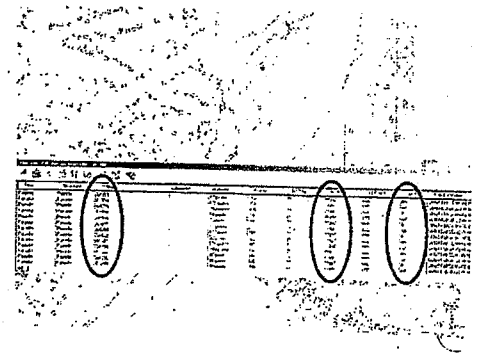
Housing development project



Road project



Localisation of prospective flooded areas - (PPRIs)



Mapping Bangladesh

- ✓ There are some specific problems to carry out maps in Bangladesh
- ✓ Provide good altimetry knowledge to this country is a major challenge
- ✓ Only Lidar technology is suitable, but it is a costly answer
- ✓ Satellite imagery along the border should be used and will increase cost

Digital Mapping, the SOB Mission

- ✓ A NSDI : A wide range of a applications
 - The « raster maps » for positioning easily you own thematic, your assets
 - Orthophotography tiled for digitizing your own features related to your specific thematic, for analysing
 - The Topographic Database for mapping, analysing, planning, and simulate
 - Accurate DTM and DEM for analysing planning and simulate

Digital Mapping

- ✓ However, the Great Benefits of GIS come from mixing different types of information
- ✓ Mixing components of the NSDI in a first step
- ✓ Then, use your own information
- ✓ Then add informations provided by some other users
- ✓ You'll get the base of a powerful tool for analyse and simulate

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Digital Mapping

- ✓ In conclusion, let us think to this paradox :
- ✓ **Might the richness be due to sharing ...?**

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TECHNICAL ASPECTS ON GEOINFORMATION AND DIGITAL MAPPING IN BANGLADESH: PRESENT AND FUTURE

Md Khairul Quadir, Superintendent of Survey

Gonesh Chandra Roy, Assistant Superintendent of Survey

This small presentation is aimed to focus key issues related to the use of Geoinformation among the GI community in Bangladesh. These issues may be a guideline for generating technical discussion where the GI community in Bangladesh present here should reflect their views.

1. **General requirement of Primary Spatial Data:** Survey of Bangladesh is responsible for preparation and issuance of primary spatial data as national mapping agency. Primary data are topographic data either in digital vector or raster format or as hardcopy paper maps, DEM, Orthophoto, Orthoimage, coordinates of geodetic control points, height data of Bench Mark etc. Survey of Bangladesh may prepare topographic GIS database. SOB has taken a very big initiative to prepare 25K maps covering the entire country and 5K urban topographic maps covering all divisional cities except Dhaka. This is an extremely challenging task and a new milestone in our history of mapping. SOB plans to generate GIS database and also paper maps. The users or stake holders of SOB products should suggest what type features should we consider and may be fields for the attributes generally possible for our surveyors to acquire from the field or sharing data with concerned government agencies.

2. **Interoperability:** This is a big problem at present we are facing. All of us should probably plan and save the vector data into other exchangeable and popular formats irrespective of what software and formats we are using. Vector data may be topography, cadastral, thematic, DEM. For any vector data there are geographical and cartographic details. We should give importance to save the both.

3. **Data sharing:** This is also a big issue in Bangladesh. It is very welcoming and appreciating that many of our government departments, concerned university department and private industries, real state industries are using geoinformation more and more. The use of Geographic Information System has been started in many government, private and non-governmental bodies. Most of the concerned university departments started inclusion of GIS, RS and their application within respective degree courses. These departments are Geography, Geology, Infrastructure planning, Forestry, Water Resource Engineering and Civil Engineering. Sharing data between universities and government departments will benefit both. Because of the lack of knowledge about what others are doing, bureaucratic and systematic bottlenecks- many of us do not or cannot share others' data. Sharing data could avoid duplication of efforts and save unnecessary government expenditure. Probably, all of us should be more careful, cooperative in this aspect. For data sharing among the users, researchers and common citizens a popular culture has started in the developed countries, which is called National Spatial Data Infrastructure (NSDI). The main concept of NSDI is that it is an independent organization electronically connected among GI community for storage, exchange of data through a strong server and act as a clearinghouse for the spatial data. This also allows anyone to get digital raster data free of cost requesting through the web portal, just to say in brief. This initiative not only saves government expenditure by avoiding duplication of efforts but also popularizes maps to citizens, tourists, and students. For the

adaptability and resilience to climate change and for disaster management data sharing among different government bodies becomes important. Establishing a NSDI requires an inception study and may take some time to be implemented. A strong telecommunication infrastructure is required with appropriate bandwidth and data transmission rate. At present lots of development has taken place and significant improvement is taking place for the strong initiative from BTRC. This may encourage us to consider National Spatial Data Center for the interim period which may be under the umbrella of Survey of Bangladesh.

4. **Quality of spatial data:** As we could set national standards for some engineering works, probably we can do the same for surveying, GIS, cartographic, orthophoto, orthoimage, DEM. The government stake holders should be more aware of this issue and include the quality of data in the Terms of Reference once outsourcing. Standardization of spatial data with respect to accuracy, methodology of acquisition and may be other aspects of data quality should be addressed. For example altimetry information should be with respect to Mean Sea Level and accuracy should be set. Quality Control should be mandatory for any geoinformatic products like surveying, GIS, DEM, orthophoto, orthoimage, extracted data out of photographs and images. The expert available in the client's organization can perform this QC works. Otherwise QC should be outsourced to consultants. For Quality Control, the government department may approach to SOB for surveying and mapping or SPARSO once derivatives are from space image. We should realize the fact that Quality Control of Surveying Works is a teamwork and not possible by an individual consultant.

5. **State of Field Survey:** I shall focus on leveling survey, traverse survey using theodolite, total station, Global Positioning System Receiver and field mapping using Plane Table, Total station, GPS Receivers. Digital Levels of varied precision and price are on shelf now. This facilitates data computation in computer, requires less man-hour than before with analogue machines and may be the choice of the day. For traversing we should either use Total Station or GPS receivers instead of theodolite and chaining. GPS receivers and Total Station are also of varied precision and price. It is worth to mention that both the equipment could also be used for acquiring topographic and cadastral details. For leveling survey, we should apply appropriate methodology to get connected to National Vertical Network vis-à-vis Mean Sea level. We are lacking nationally to have the up-to-date gravity chart to provide orthometric correction on leveling observation values. At the same time due to lack of field magnetic survey SOB cannot update the data for magnetic declination in the topographical map sheets. At present SOB could not acquire technology and equipment to carry out Gravity and Magnetic Declination Survey.

6. **Geodetic Infrastructure:** Establishment of national horizontal and vertical datum is the responsibility of Survey of Bangladesh. As national mapping agency SOB has so far established 278 Horizontal Control Points and around 1400 first order and second order Bench Marks covering around 14000 KM. Both Horizontal and vertical control points are cement concrete pillars duly measured with appropriate technology and equipments. Generally, the dimension of the pillars is 2 feet by 2 feet by 2 feet over a base of four by four feet. SOB has set up horizontal datum in Gulshan. This is the only WGS 84 reference station in Bangladesh and five IGS stations were used for continuous observation to fix the value. SOB has set up a Tidal Observatory in Rangadia, Patenga, Chittagong on the estuary of River Karnafuli to fix Mean Sea Level and is operational since 1995. To fix the Mean Sea Level we require taking the statistical mean from 8.5 years to address lunar effect and 18 years to address the total celestial effect. Our present MSL is fixed with statistical mean from 1995 to 1997, three years. SOB is now in a position of 8.5 years seamless 6-second tidal data from 1999 to 2007 to address the full effect of Lunar Cycle. SOB will now recalculate and re-fix

the MSL of Bangladesh. Horizontal control points and Bench Marks are now dispersed about 25-30 KM and 15 KM respectively. SOB has undertaken a new initiative to densify these by 10 and 5 KM respectively. At the same time SOB will significantly increase number of 3D control points and make an effective Geoid Model. Our stakeholders will be much benefited if we could provide them an effective Geoid Model may be with 10 cm accuracy. With Geoid Model surveyors can acquire the orthometric height data with GPS receivers with respect to MSL and in many cases avoid exhaustive and time consuming leveling survey. SOB will try to provide more horizontal, vertical (altimetry) and 3D points in critical areas like Chittagong Hill Tracts, offshore islands and islands in the rivers. Beside SOB control points, other government stake holders are also establishing control points, both horizontal and vertical during different period of time in the past and also in the present. Probably we should mention the BMs from PWD, Bangladesh Railway and RHD. Many of these especially those from PWD and Railway are connected to old vertical Indian datum. Discrepancy of measurement between present and old datum is not unique rather varies for four to fifty cm in different places. During recent time Civil Aviation Authority, BIWTA, Chittagong Port Authority, Urban Development Directorate, Khulna Development Authority has established both horizontal control points and BM with respect to national horizontal and vertical datum.

7. **Altimetry Information:** Altimetry information available in our topographic maps, especially 50 K base maps is spot heights and contours. Both Spot heights and contour lines are very useful information for construction of roads, irrigation canals, embankments, and calculation of catchments area, planning radio relay antennas for Mobile Operators, telecommunication of civil and military departments. The physiography of Bangladesh is generally flat having gentle gradient as it belongs to the Ganges-Brahmaputra and Megna Basin except that of Chittagong and Chittagong Hill Tracts and part of Sylhet, Hobiganj, Moulavi Bazar. The hills in Chittagong are characterized by having ridge lines running north south with maximum altitude of 1000 m, numerous canals or nullahs running down from the top are non perennial and meets perennial rivers which have low flow during dry season. Bangladesh has a vast low-lying area along the coast with elevation less than a meter from MSL and numerous char lands along or inside big rivers. These areas are highly susceptible to inundation due to tidal surge, cyclone or flood. We have problem with Sundarban where salinity in the canals and rivers are migrating upstream due to low water flow from upstream during dry season and Sea Level Rise. Scientists, engineers home and abroad demands Digital Elevation Model from SOB for modeling of flood forecasting, salinity migration, designing embankment on the coast and elsewhere, radio relay etc. But then these requirements are not of the same accuracy. For example modeling the migration of salinity in Sundarban requires high degree of DEM accuracy because general gradient of the land is quite gentle. We need to know from our stakeholders about type of accuracy of DEM for particular areas. Basing on the accuracy SOB will adopt appropriate cost-effective technology. Suppose getting altimetry data using LIDAR would be more costly than that of air borne RADAR or aerial photograph or stereo high-resolution satellite images.

8. **Institutional capacity:** This is very appreciating that department of Geography, Urban and regional planning, forestry and water resource engineering in different universities introduced theory and application of GIS, RS beside theory and sessional on terrestrial surveying. In fact they have popularized the science of Geoinformatics in Bangladesh and we can find good number of young professionals working with professionalism in some private industries. Tremendous rise of application in the field of Geoinformation is foreseen in Bangladesh in near future and so the demand for the professionals. Adaptability and resilience to Climate Change is probably the most important focus of the present civilization.

GI community, home and abroad, will definitely play pioneer role to save our most beautiful and blessed EARTH as our predecessors have done in the past during different episodes of civilization. Unfortunately none of the university could introduce B Sc Engineering or Applied course on surveying engineering or Geoinformatics or Geomatic. Our faculties are doing their best to teach core GIS or RS, but probably few qualified faculties with appropriate discipline may be thought of. Postgraduate courses may be thought of in photogrammetry, application of space images, GIS database and customization. Probably we can think of modernizing or upgrading the only thematic school, that is, Comilla Polytechnic on Surveying. To ensure quality of professionalism, society for surveyors, society for photogrammetry and remote sensing may be set up with the permission form the government.

9. **Role of National Mapping Agency:** At present SOB is entrusted with providing primary spatial data like 25k and smaller scale topographic maps, DEM, orthophoto, orthoimage, registration and controlling survey and spatial works of private industries, data sharing center, quality control, advice other government department for any matter related to spatial information, preparation and assistance to armed forces and law enforcing agencies for the preparation and use of classified information.

10. **Coordination and cooperation.** Probably we are to work more closely than before because of the present situation of climate change, other disasters where generating a particular geoinformation may be cost effective if different organs of the government play their respective role. We have many examples of working together like a present example of demarcation of maritime boundary under UNCLOS-1982 under the supervision of MOFA. But I am afraid to say that we have also some poor examples of discoordinated efforts which resulted in total failure.

LIST OF INVITIES

SL. No	Name and Address	Remarks
01.	Adviser Ministry of LGRD & Co-operative Ministry of Labour & Employment, Textiles & Jute Government of the People's Republic of Bangladesh	Chief Guest
02.	PS/APS to Advisor Ministry of LGRD	
03.	H.E Ambassador Embassy of Japan Embassy of Japan in Bangladesh Plot No-5&7, Dutabash Road Baridhara, Dhaka, Bangladesh.	Special Guest
04.	Secretary Ministry of Defence Gono Bhaban Complex Sher-a-Bangla Nagar, Dhaka.	Special Guest
05.	Resident Representative JICA JICA Bangladesh Office UDOY TOWER Gulshan, Dhaka-1212.	
06.	Deputy Resident Representative JICA JICA Bangladesh Office UDOY TOWER Gulshan, Dhaka-1212.	
07.	Deputy Resident Representative JICA JICA Bangladesh Office UDOY TOWER Gulshan, Dhaka-1212.	
08.	First Secretary Development Cooperation and Economic Affairs Embassy of Japan in Bangladesh Plot No-5&7, Dutabash Road Baridhara, Dhaka, Bangladesh.	
09.	Joint Secretary (Works) Ministry of Defence Gono Bhaban Complex Sher-a-Bangla Nagar, Dhaka.	
10.	Joint Secretary (General) Ministry of Defence Gono Bhaban Complex Sher-a-Bangla Nagar, Dhaka.	
11.	Deputy Secretary (DS-16) Ministry of Defence Gono Bhaban Complex Sher-a-Bangla Nagar, Dhaka.	

SL. No	Name and Address	Remarks
12.	Senior Assistant Chief Ministry of Defence Gono Bhaban Complex Sher-a-Bangla Nagar, Dhaka.	
13.	Engineer Adviser Ministry of Defence Gono Bhaban Complex Sher-a-Bangla Nagar, Dhaka	
14.	Director General UNCLOS Project Ministry of Foreign Affairs Shegun Bagicha, Dhaka.	
15.	Director South Asia Desk Ministry of Foreign Affairs Shegun Bagicha, Dhaka.	
16.	Rep of PSO Armed Forces Division Prime Minister's Office Dhaka Cantonment, Dhaka.	
17.	Rep of Engineer-in-Chief AHQ, E- in C's branch Dhaka Cantonment, Dhaka.	
18.	Rep of CGS AHQ, GS Branch Dhaka Cantonment, Dhaka.	
19.	Rep of Commander 14 Independent Engineer Brigade Dhaka Cantonment, Dhaka.	
20.	Rep of Director Military Operation General Staff Branch Dhaka Cantonment, Dhaka.	
21.	Director (Hydrography) Naval Headquarters Banani, Dhaka.	
22.	Rep of Director General Bangladesh Rifles Pilkhana, Dhaka.	
23.	Rep of I.G.P Police Head Quarter Ramna, Dhaka.	
24.	Rep of Director General Rapid Action Battalion (RAB) RAB HQ Dhaka.	

SL.No	Name and Address	Remarks
25.	Rep of Director General National Security Intelligence (NSI) Segunbagicha, Dhaka	
26.	Rep of Vice Chancellor BUET, Dhaka.	
27.	Head Town & Regional Planning Department BUET, Dhaka.	
28.	Head Water Resource Engineering Department BUET, Dhaka.	
29.	Head Geological Department Dhaka University, Dhaka.	
30.	Head Department of Geography &-Environment Dhaka University, Dhaka.	
31.	Head Department of Geography & Environment Jahangirnagar University, Savar, Dhaka -1342	
32.	Joint Secretary Ministry of Food & Disaster Management Disaster Management & Relief Bhaban 92-93 Mohakhali C/A, Dhaka-1212	
33.	Rep of President Bangladesh Institute of Engineer's Ramna, Dhaka	
34.	Rep of Chairman Bangladesh Water Development Board WAPDA Bhaban Motijhil, Dhaka	
35.	Chief Engineer PDB Dhaka.	
36.	Chief Engineer PWD Dept. PWD Bhaban, Shegun Baghicha, Dhaka.	
37.	Chief Engineer LGED Sher-a-Bangla Nagar, Dhaka.	
38.	Urban Planning Officer LGED Sher-a-Bangla Nagar, Dhaka.	

SL.No	Name and Address	Remarks
39.	Rep of Chairman Rajdhani Unnayan Kartiphaka(RAJUK) RAJUK Bhaban, Motijhil, Dhaka.	
40.	Chief Executive Officer DCC Nagar Bhaban, Dhaka.	
41.	Rep of Chairman BIWTA BIWTA Bhaban, 141-143, Motijil, Dhaka.	
42.	Rep of Chairman SPARRSO Agargaon, Dhaka.	
43.	Rep of Director General Bangladesh Meteorological Dept. Meteorological Complex Bhaban Agargaon, Dhaka.	
44.	Chief Engineer Road & Highway Dept. Sarak Bhaban, Ramna, Dhaka.	
45.	Rep of Director General Land Record's & Survey Dept. Tejgaon, Dhaka-1208.	
46.	Chief Conservator of Forest Forest Dept forest Bhaban Gulshan Sarak Mohkhali, Dhaka.	
47.	Director General Geological Dept. Pioneer Road, Shegun Bagicha, Dhaka.	
48.	Rep of Chairman Bangladesh Civil Aviation Authority Kurmitola, Dhaka.	
49.	Director (Planning) T&T Telejugagug Bhaban 37/1, Paribag, Dhaka.	
50.	Rep of Chairman BTRC Dhaka.	
51.	Chief Engineer Public Health Engineer Dept. Kakrail, Ramna, Dhaka.	
52.	Director SRDI Krishi Khamar Sarak, Dhaka-1205.	

SL.No	Name and Address	Remarks
53.	Rep of Chairman BARC Khamarbari, Farmgate, Dhaka.	
54.	Rep of Director General Fire Service & Civil Defense Kazi Alaudin Road, Dhaka.	
55.	Rep of Director General Higher Secondary Education Board Education Bhaban Ramna, Dhaka	
56.	Rep of Chairman DESA, Dhaka.	
57.	Rep of Managing Director DESCO, Mirpur-13, Dhaka	
58.	Rep of Chairman BAPEX, Dhaka.	
59.	Rep of Managing Director Titas Gas Transmission & Dist. Co. Ltd. 105, Kazi Nazrul Islam Avenue, Dhaka.	
60.	Rep of Chairman Bangladesh Oil, Gas & Mineral Resource Corp. Petro Center, 3, Kawran Bazar(Petro-Bangla) Dhaka-1205	
61.	Rep of Managing Director WASA WASA Bhaban Kawran Bazar, Dhaka.	
62.	Joint Chief ERD Agargaon, Dhaka.	
63.	Executive Director (Secretary) Dhaka Transport Coordination Board(DTCB) Ministry of Communication, Government of Bangladesh Setu Bhaban(1 st floor) Amtali, New Airport Road Banani, Dhaka-1212.	
64.	Rep of Chairman Bangladesh Bureau of Statistic (BBS) Shere Bangla Nagar, Dhaka	
65.	Director General Urban Development Directorate Shegun Bagicha, Dhaka.	
66.	Rep of Director General WARPO Banani, Road-1, Dhaka.	

SL.No	Name and Address	Remarks
67.	Chief Scientific Officer Fisheries Inspection & Quality Control Fisheries Dept. Fisheries Bhaban, Ramna, Dhaka.	
68.	Rep of Director General Department of Environment Shere Bangla Nagar, Dhaka.	
69.	Chief Consultant Climate Change Cell	
70.	Rep of Chairman National Tea Board Dhaka.	
71.	Training Coordinator CEGIS House No-05, Road No-23/C Gulshan-I, Dhaka -1212	
72.	Executive Director Institute of Water Modeling (IWM) House No-496, Road No-32 New DOHS, Mohakhali, Dhaka-1206.	
73.	Chief Representative USAID Bangladesh Gulshan, Dhaka.	
74.	Rep of Country Director ADB Plot # E-31, Shere Bangla Nagar, Dhaka-1207	
75.	DFID Bangladesh 10 Gulshan Avenue, Gulshan, Dhaka-1212	
76.	CIDA Canadian High Commission House # 16/A, Road # 48, Gulshan-2, Dhaka-1212	
77.	France Trade Commissioner Gulshan, Dhaka	
78.	Project Manager Asian Disaster Preparedness Center (ADPC) House # 531/4 (3 rd Floor), Lane # 11 (New) Baridhara DOHS, Dhaka-1206	

SL.No	Name and Address	Remarks
79.	Rep. of Chairman Bangladesh Center for Advanced Studies (BCAS) Dhaka.	
80.	Country Manager International Union for Conservation of Nature (IUCN). Dhaka	
81.	Rep of GRAMEEN PHONE Dhaka.	
82.	Rep of AKTEL Dhaka	
83.	Rep of CITY CELL Dhaka	
84.	Rep of WARID Dhaka	
85.	Rep of BANGLA LINK Dhaka	
86.	Managing Director The Mappa 112, Green Road, Farmgate, Dhaka.	
87.	Managing Director Sheltech Planners	
88.	Director Dev. Design Const. Ltd. (DDC) DDC Center, 47 Mohakhali, Dhaka-1212.	
89.	Managing Director GRAPHOSMAN	
90.	Managing Director Land Survey Team (LST) 404/1-4 (1 st Floor), Khilgaon, Chowrasta Dhaka-1219.	
91.	Managing Director GEODESEC Consultants & Services Ltd. Delwar Complex, (5 th Floor), Hatkhola Road, Dhaka-1207	

SL.No	Name and Address	Remarks
92.	Managing Director Engineering & Planning Consultant Ltd. (EPC) 7/4 Block # A, Lalmatia, Dhaka-1207	
93.	Managing Director ECOSURV Engineering Survey & Construction Co. 19/12 (2 nd Floor), Tajmahal Road, Mohammadpur, Dhaka-1207	
94.	Managing Director SURVEY 2000	
95.	Ms. Salma Akter Program Officer JICA Bangladesh Office UDOY TOWER Gulshan , Dhaka-1212.	
96.	Mr. Md. Anisuzzaman Program Officer JICA Bangladesh Office UDOY TOWER Gulshan , Dhaka-1212.	

List of Inter- Ministerial Meeting at Survey of Bangladesh

1. Secretary, Ministry of Defence, Ganabhaban Complex, Sher-e- Bangla Nagar.
2. Secretary, Ministry of Foreign Affairs, Segun Bagicha, Dhaka.
3. Secretary, Ministry of Home Affairs, Bangladesh Secretariat, Dhaka
4. Secretary, Ministry of Local Government Rural Development & Cooperatives, Bangladesh Secretariat
5. Secretary, Ministry of Water Resource, Bangladesh Secretariat, Dhaka
6. Secretary, Ministry of Works, Bangladesh Secretariat, Dhaka
7. Secretary, Ministry of Environment and Forest, Bangladesh Secretariat, Dhaka
8. Secretary, Ministry of Shipping, Bangladesh Secretariat, Dhaka
9. Secretary, Ministry of Land, Bangladesh Secretariat, Dhaka
10. Secretary, Ministry of Planning, Bangladesh Secretariat, Dhaka
11. Secretary, Ministry of Communication, Bangladesh Secretariat, Dhaka
12. Secretary, Ministry of Agriculture, Bangladesh Secretariat, Dhaka
13. Secretary, Ministry of Culture, Bangladesh Secretariat, Dhaka
14. Secretary, Ministry of Information, Bangladesh Secretariat, Dhaka
15. Secretary, Ministry of Food and Disaster, Bangladesh Secretariat, Dhaka
16. Principal Staff Officer, Arm Forces Division, Operations and Planning Department, Dhaka Cantonment (Representative from each Forces (Army, Navy, and Air force)
17. Director General, Defence Forces Intelligence, Dhaka Cantonment, Dhaka
18. Director General , NSI (National Security Intelligence), Segunbagicha, Dhaka
19. Chairman, SPARSO (Bangladesh Space Research and Remote Sensing Organization), Agargaon, Dhaka
20. Director General, Bangladesh Beau of Statistics, Agargaon, Dhaka
21. Chief Engineer, Local Government Engineering Department, Agargaon, Dhaka
22. Chairman, BIWTA (Bangladesh Institute of Water Transport Authority), Motijheel, Dhaka
23. Director General, Bangladesh Water Development Board, Wabda Bhaban, Motijheel, Dhaka
24. Director General, WARPO, House no. 103, Road 1, Banani, Dhaka
25. Managing Director, WASA, Wasa Bhabn, Karwan Bazar, Dhaka
26. Chief Conservator of Forest, Forest Department, Mohakhali, Dhaka
27. Director, Institute of Land Resource Development, Krishi Khamar, Dhaka
28. Director General, Land and Survey Department, Tejgaon, Dhaka
29. Chief Engineer, Public Works Department, Segunbagicha, Dhaka
30. Chief Engineer, Road and Highway Department, Ramna, Dhaka
31. Director General, Department of Marin Transport, Dhaka
32. Director General, Department of Disaster and Relief, Dhaka
33. Director General, Disaster Management Bureau, Mohakhali, Dhaka
34. Chairman, Rajdhani Unnoyan Kartipokka, RAJUK, Motijheel, Dhaka,
35. Chief Executive Officer, Dhaka City Corporation, Dhaka
36. Executive Director, CEGIS, House no. 6, Road 23/c, Gulshan, Dhaka
37. Project Director, Detail Air Plan, RAJUK Annex Bhaban, Dhaka

C.C. to Internal distribution:

1. Director, Defence Survey Department
2. Director, Development Survey Department

Date: 12 Nov 2008

Presentation

On

The Project

**“Improvement of Digital Mapping System of
Survey of Bangladesh”**

Presented

By

**Major Md. Nurul Amin Chowdhury
Project Manager
Survey of Bangladesh**

**WELCOME
TO
SURVEY OF BANGLADESH**

Presentation
On
the project
**“Improvement of Digital Mapping System of
Survey of Bangladesh”**

Presented
By
Major Md. Nurul Amin Chowdhury
Project Manager
Survey of Bangladesh

INTRODUCTION

AIM

To apprise you about the on going project
“Improvement of Digital Mapping System of
Survey of Bangladesh” and Scpoe of further
Japanese Assistance to support this project

SCOPE

- Background of the project
- Objective of the project
- Major aspects/activities of the project
- Project Calendar
- Sequence of activities
- Effects of the project
- Output of the project
- Scope of assistance from JICA

BACKGROUND OF THE PROJECT

OBJECTIVE

- 1:25,000 Scale Topographic Map & Database covering entire Bangladesh
- 1:5,000 Scale Topographic Map & Database of 5 Divisional cities
- Digital Mapping Center

PROJECT ACTIVITIES

- Acquisition of Aerial Photograph for entire country & 5 cities
- Acquisition of Satellite Images for border areas ⇨
- Setting up Photogrammetric, Cartography & GIS workshop
- Setting up Printing Press Suite

PROJECT ACTIVITIES (Cont..)

- Training of the Technical staffs of SOB
- Consultancy during real time job & imparting training
- Construction of Digital Mapping Center
- Photogrammetric, GIS and Cartographic works

PROJECT ACTIVITIES (Cont..)

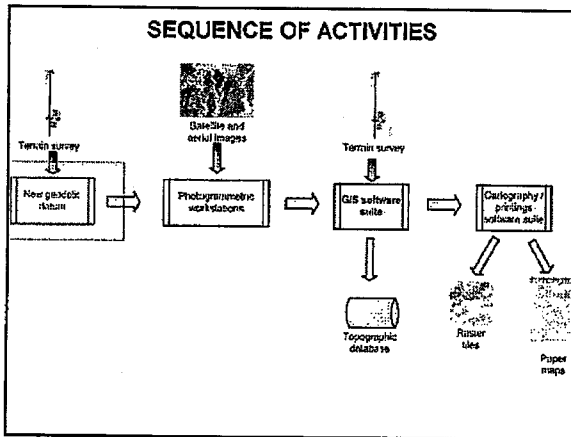
- Field verification
- Construction of Survey Pillars & Densification of Geodetic Network
- Printing of Maps (1:25,000 & 1:5,000 scale)

PROJECT CALENDAR

• Acquisition of Aerial Photograph	2009-2010
• Acquisition of Satellite Images	2011-2012
• Settings of Photogrammetric, Cartography & GIS workshop	2009-2010
• Setting up Printing Press including Computer to Plate Image setter	2011-2012
• Training of the Technical staffs of SOB	2009-2010

PROJECT CALENDAR (Cont..)

• Consultancy during real time job & imparting training	2009 -2012
• Construction of Digital Mapping Center	2008 -2012
• Construction of Survey Pillars & Densification of Geodetic Network	2009 -2011
• Printing of Maps (1:25,000 & 1:5,000 scale)	2012-2016



- ### IMPACTS OF THE PROJECT
- National development works
 - Avoid duplication of budget
 - Sharing of data
 - Base topographic database

- ### BENEFICIARIES OF THE PROJECT
- Agencies related to
- Water resource management
 - Disaster management
 - Telecommunication
 - Internal and national security
 - Urban and regional planning
 - Highway and rural communication
 - Railway
 - Agriculture Sector and irrigation
 - Cadastral, Hydrography and Geological survey

- ### OUTPUT OF THE PROJECT
- 1:25,000 scale GIS database
 - 1:25,000 scale topographic map
 - 1:5,000 scale urban GIS database
 - 1:5,000 scale urban map
 - Technology transfer.
 - New Geodetic Datum
 - Densification of Geodetic Network
 - Modern digital mapping centre

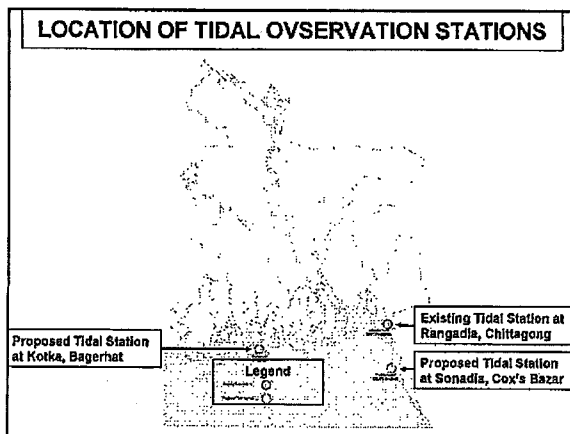
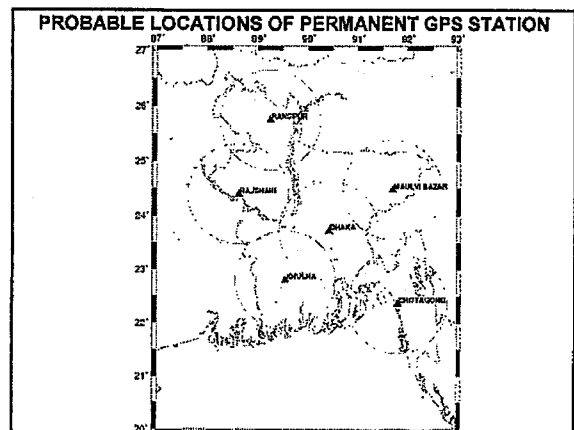
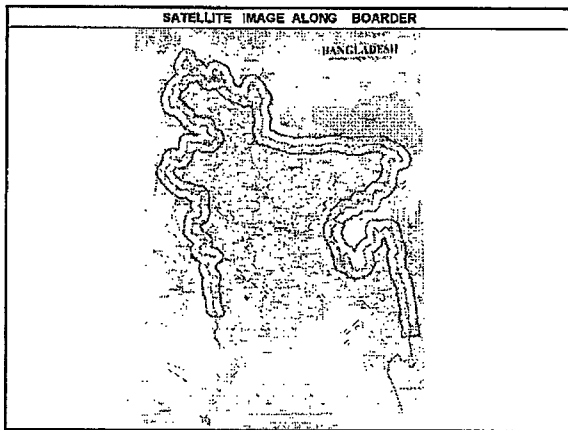
- ### OUTPUT OF THE PROJECT (Cont..)
- Possibility of generating:
 - orthophoto
 - digital elevation model (DEM)
 - Contour map

SCOPE OF ASSISTANCE FROM JICA

1	Long-term Consultancy
2	Modern Printing Suite
3	Establishment of Permanent GPS Station ⇒
4	Establishment of New Tidal Observatory ⇒

CONCLUSION

THANKS



**PRESENTATION ON THE PROJECT- IMPROVEMENT OF DIGITAL MAPPING
SYSTEM OF SURVEY OF BANGLADESH**

INTRODUCTION

Delegates from Japanese mission, JICA officials in Bangladesh, respected Project coordinator, Director Development Survey and my colleagues present , Assalamualikum and very good morning. I Major Md Nurul Amin Chowdury, Project Manager welcome you all for this presentation.

Gentleman, Survey of Bangladesh is one of the oldest organization of the country which started its journey since 1767 over 250 years back as Bengal Survey under British India. Before emerging as Survey of Bangladesh after Independence it was part of Survey of India and Survey of Pakistan.

Survey of Bangladesh is the only national mapping organization of the country is responsible for topographic mapping, geodetic network and partially Boundary Demarcation Survey. The department has been using old manual Survey technique for topographic Survey. We have limited scale of digital cartographic capability.

Gentleman, the department carried out considerable good job in geodetic Survey. Here we recollect the technical and financial support from JICA for establishing Tidal station, Setting up printing press and setting up a geodetic network including datum for the entire country.

AIM

The aim of this presentation is to apprise you about the on going project “Improvement of Digital Mapping System of Survey of Bangladesh” & scope of further Japanese Assistance to support this project

SCOPE

I will cover my presentation under the following sequences

- Background of the project
- Objective of the project
- Major aspects/activities of the project
- Project Calendar
- Sequence of activities
- Effects of the project
- Output of the project
- Scope of assistance from JICA

Background of The Project

Gentleman, we have 1:50,000 scale topographic maps of whole territory of Bangladesh, basic data and information for national development, are approximately 40 to 50 years old and almost all sheets have not yet been updated. This means existing 1:50,000 scale topographic maps do not represent the present geographic features such as land use, topography and vegetation and can not be used as basic data for any kind of development plan. Therefore, updating 1:50,000 scale topographic maps and production of 1:25,000 scale topographic map covering whole territory of Bangladesh is urgently needed for national development planning and its smooth implementation. Besides, 1: 5,000 scale maps are required for planning and development of the major cities.

As mentioned above, Bangladesh was not in a position to produce precise and unified topographic maps such as 1:5,000 and 1:25,000 scale for a long time.

Gentleman, with the advancement of technological development in the field of Surveying & Mapping we can not remain isolated from the world. As a result we have taken an initiative to modernize our mapping system. This is a very challenging initiative and we are fortunate that govt. of Japan has come forward to support this initiative through Debt Relief Grant Assistance counter part fund (DRGA). We have started this project from August 2007. This initiative was primarily designed for twelve years by JICA expert, again revised to nine years finally it was designed for six years. At the very beginning of the project we employed a consultancy firm to redesign the project in the form of Total Design Document (TDD) where the consultant has recommended the duration for nine years.

OBJECTIVE

The Objectives of the project are as follows

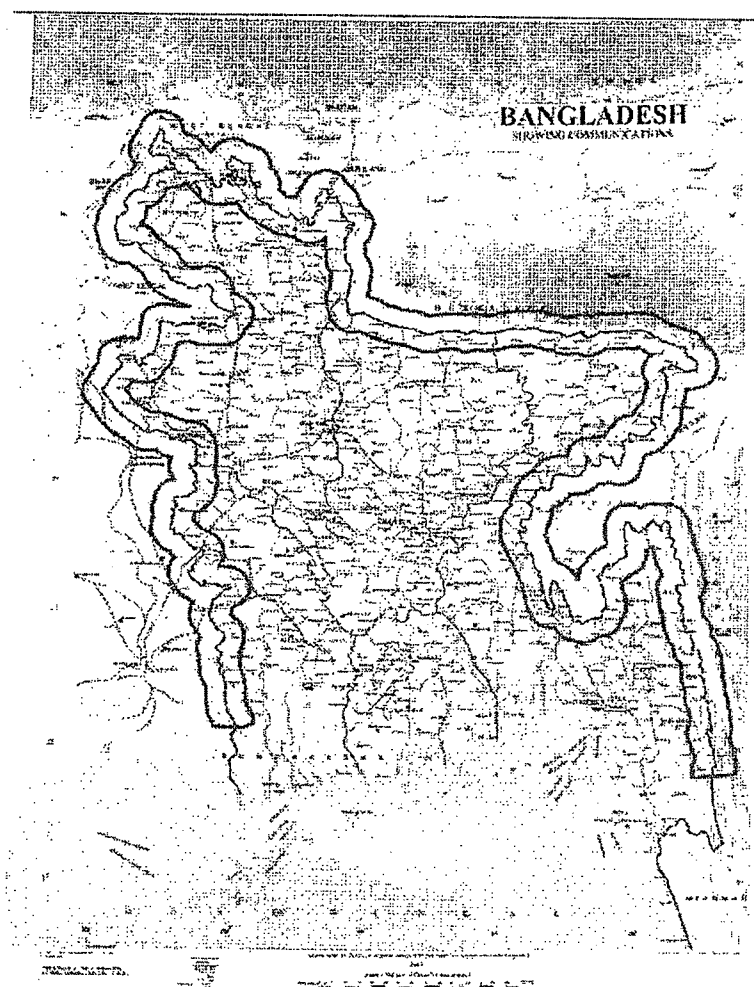
- 1:25,000 Scale Topographic Map & Database covering entire Bangladesh
- 1:5,000 Scale Topographic Map & Database of 5 Major Divisional cities
- Construction of Digital Mapping Center

PROJECT ACTIVITIES

During the implementation of the project following activities will be carried out

1. **Acquisition of Aerial Photograph for entire country and Five Major Cities.**
Acquisition of digital aerial photograph will be taken by 2009-2010 and 2010-2011 both , 1:25000 with resolution of 50 cm , 1:5000 with resolution of 25 cm with GPS INS. Total area will be covered approximately 1,15,000 sq Km for 1: 25000 and 1,100 sq km will be for 5 Major Cities. The border area will be covered by satellite images.
2. **Acquisition of Satellite Images for border areas:** Since the aerial photography can't be taken along the international boundary therefore the satellite image will be used for mapping this area. The area will cover approximately 29,000 sq km.

SATELLITE IMAGE ALONG BORDER



3. **Settings of Photogrammetric, Cartography & GIS workshop** Under this project for processing the aerial photograph and satellite images Photogrammetric, Cartography & GIS workshop will be established by 2010.
4. **Setting up Printing Press including Computer to Plate Image setter** At present we don't have modern technology on computer-to-plate image setter and offset printing press. Under this project the equipment will be procured by 2012.
5. **Training of the Technical staffs of SOB** A good number of officers and staffs will be trained at home and abroad to implement the project successfully.
6. **Consultancy during real time job & imparting training**
 - (a) **JICA**. JICA has provided consultancy for 8 man year in the field of surveying, mapping and geodesy upto 2007. Initially basing on their technical opinion the project was designed for a duration of 12 years. After that the Development Project Proposal was sent to JICA for their necessary suggestion. Then the duration of the project was changed to 9 years. Later on considering other aspects finally the duration of the project has been designed for 6 years in 3 phases.
 - (b) **Short Term Consultancy-IGN** As per the approved project proposal international tender was floated on November 2007 and finally IGN France was selected to prepare total design document of the project. As per the consultants opinion the project has been designed for 9 years in 3 phases.

Foreign and Local consultant will be hired for real time on job training and smooth implementation of the project. We have already floated tender for local consultants.
7. **Construction of Digital Mapping Center** An independent digital mapping centre will be constructed where all the modern equipments and printing press will be installed. It will be 6 storied building located in Dhaka. Tentative year of completion is by 2012.
8. **Photogrammetric, Cartography & GIS works** After aerial photography and satellite image acquisition Photogrammetric works will be carried out. Again after field verification cartographic and GIS works will be carried out for onward development of soft database, raster data and printing of maps..
9. **Field Verification.** It will be carried out for GIS data and data will be updated accordingly.
10. **Construction of Survey Pillars & Densification of Geodetic Network.** Total 1000 survey pillar will be constructed under this project during 2009-2010. After the

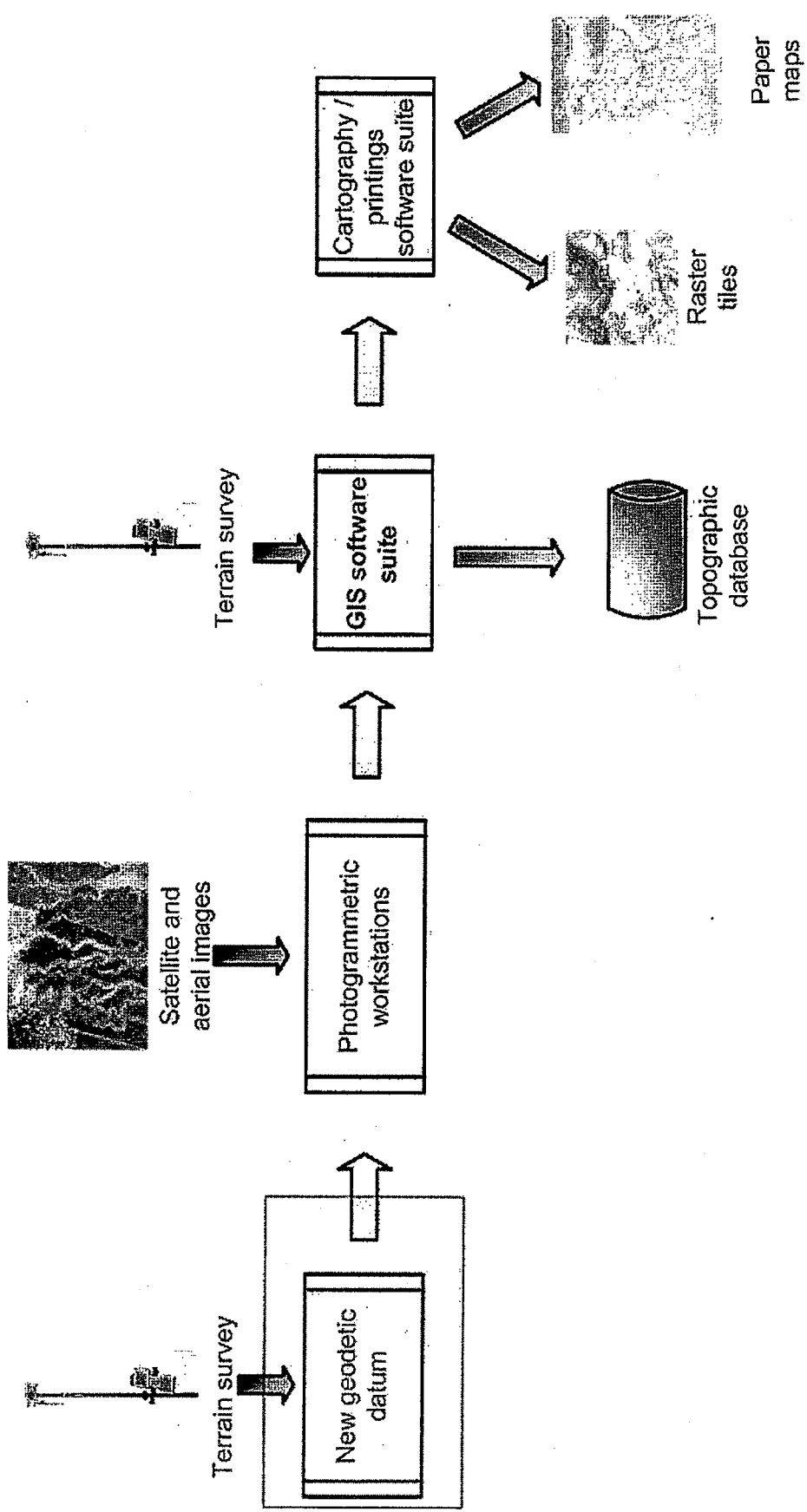
construction the geodetic network will be densified all over Bangladesh . It will help in generating geod model ,aerial and space triangulation ,field verification and adjustment of entire geodetic model.

11. **Printing of Maps (1:25,000 & 1:5,00 scale).** After completion of aerial photography ,photogrammetry works ,field verification and cartographic works total 1164 map sheets will be printed by 2016.

PROJECT CALENDAR

Ser	Activity	Time
1	Acquisition of Aerial Photograph for entire country	2009-2010
2	Acquisition of Satellite Images for border areas	By 2011
3	Settings of Photogrammetric, Cartography & GIS workshop	By 2010
4	Setting up Printing Press including Computer to Plate technology	By 2012
5	Training of the Technical staffs of SOB	By 2011
6	Consultancy during real time job & imparting training	By 2013
7	Construction of Digital Mapping Center	By 2011
8	Construction of Survey Pillars & Densification of Geodetic Network	By 2010
9	Printing of Maps (1:25,000 & 1:5,00 scale)	By 2016

SEQUENCE OF ACTIVITIES



SEQUENCE OF ACTIVITIES

At present Survey of Bangladesh is using Ellipsoid Everest 1830 but after adjustment of geodetic network the WGS84 Ellipsoid will be used for the new maps. Aerial photography of the whole country will be taken which will be processed through photogrammetric work stations and also satellite images will be processed for generating GIS database. After field verification topographic database will be developed. Again after field verification cartographic works will be done accordingly and finally raster data will be ready for map printing. Besides, soft copy of raster data and topo data will be available for users.

IMPACTS OF THE PROJECT

After implementation of the project following impacts will take place under this project.

- **National development** Smooth planning and implementation of national development can be executed.
- **Avoid duplication of budget** It is possible to avoid duplication of budget for topographic mapping for the GOB.
- **Sharing of Data** Sharing of data will be easier due to mutual use of data and information among the Govt. and NGOs will be possible.
- **Base Topographic Database** Any organization can use accurate, unified and latest topographic maps and digital data as a basic data for their work.

BENEFICIARIES OF THE PROJECT

Due to implementation of the project following agencies will be benefited out of the project..

- Water resource management
- Disaster management
- Telecommunication
- Internal and national security
- Urban and regional planning
- Highway and rural communication
- Railway
- Agriculture Sector and irrigation
- Cadastral, Hydrography and Geological survey

OUTPUT OF THE PROJECT

After successful implementation of the project following output will take place.

- Production of 1:25,000 scale digital topographic map covering whole country and its digital database.
- Production of 1:5,000 scale digital topographic map of 5 divisional cities of the country and its digital data base.
- Capability of SOB in production of digital map will be strengthened.
- Technology transfer.
- Possibility of generating orthophoto and digital elevation model (DEM)
- Establishment of modern digital mapping centre of SOB.

SCOPE OF ASSISTANCE FROM JICA

Serial No	Description	Cost (Million Tk.)	Remarks
01	Long-term Consultancy on : <ul style="list-style-type: none"> ➤ Photogrammetry ➤ GIS & Cartography ➤ Remote Sensing 	130.00	3 years 2 years 2 years
02	Modern Printing Suit	132.00	
03	Establishment of 06 GPS Permanent Station	60.00	1 year
04	Establishment of 2 New Tidal Observatory	300.00	2 years

Long-term Consultancy. According to TDD the consultants recommended for long term experts of ¹Topography, ²GIS, ³Cartography and ⁴Remote Sensing. Topography expert will be responsible for map ¹specification which includes specification for plotting, cartography and overall implementation of the project. Accordingly GIS & Cartography expert will be responsible for GIS and Cartographic works as well as Remote Sensing expert will be responsible for the data extraction from satellite images.

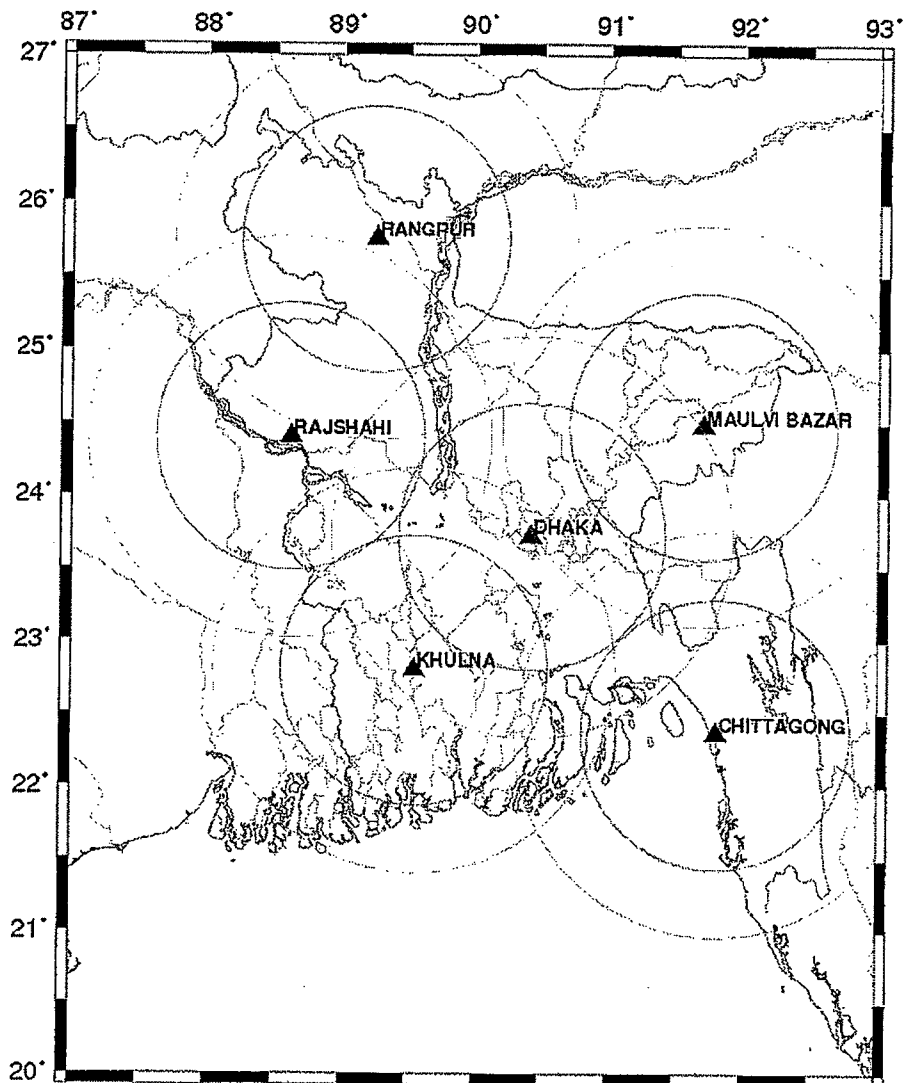
Modern Printing Suit At present SOB is using 2-colour printing press provided by JICA under Supply of Cartographic Equipment project in the year 2000 but this press is out of order for long time. As a result, we need a new Computer- to -Plate Image Setter and Printing Press for printing of new maps which will be produced under this project.

Establishment of 06 GPS Permanent Station

We would like to mention here that JICA has provided technical assistance to establish geodetic network and establishment of national geodetic datum. If we get JICA assistance for establishing 06 GPS permanent stations it will help to

1. Control Point densification will be cost effective.
2. Aerial Survey ground support will be easier.
3. DGPS service will be possible with in 15km.
4. Link up with IGS station will be established thereby Tectonic Plate movement monitoring will be easier.

PROBABLE LOCATIONS OF PERMANENT GPS STATION

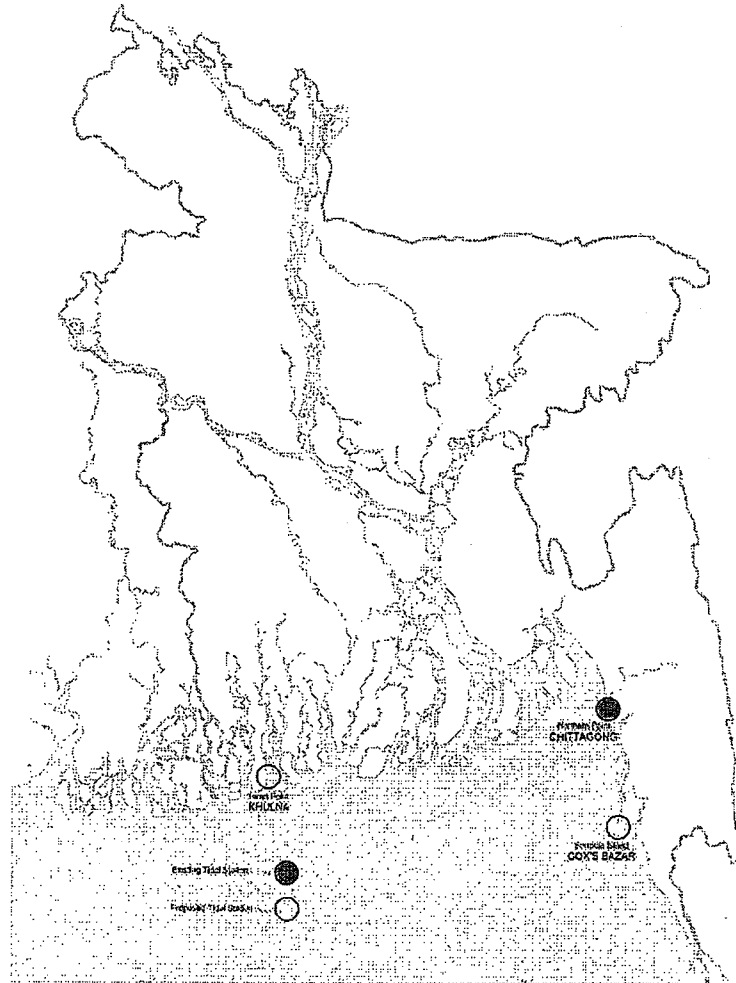


Establishment of 2 New Tidal Observatory

At present we have one tide observatory in Chittagong which was established with the technical assistance of JICA in 1993. Since Bangladesh territory is funnel shape and Sea level of Indian Ocean is not equal we would like to have more two tide observatory to monitor sea level rise and help to link with International Oceanography Centre.

- Two Tidal Observatory will be established one at Kotka(Sundarbans) and one at Sonadia (Cox's bazaar).
- It will facilitate MSL rise observation at Bay of Bengal.
- It will help adjustment of existing leveling network.

LOCATION OF TIDAL OVSERVATION STATIONS



CONCLUSION

SOB has been trying to acquire new technology for Improvement of Digital Mapping System. I hope during mission in SOB JICA mission will learn more about its mapping capability. The implementation this project will help to fulfill the ultimate goal of preparing 1: 25,000 scale map for whole country and 1:5000 scale map for 5 major cities.. We hope JICA will extend their help to make the project a successful one. Gentleman thank you very much for your patient hearing.

(2) GIS UNITの現状

<p>GIS UNITの概要</p>	<p>【主要業務】</p> <ul style="list-style-type: none"> ● Digital Upazila Base Map (DUBM)の維持管理、更新、計画部門等への地図の提供 ● Digital Poursheba Base Map (DPBM)の開発 ● GISに構築するデータベースの開発支援 (道路、教育施設など) 	<p>【体制】</p> <ul style="list-style-type: none"> - Executive Engineer 1 - Assistant Engineer 1 - Contractual Professionals 20 	<p>Digital Upazila Base Mapの概要</p>	<p>開発の経緯</p>	<p>【開発当初】</p> <ul style="list-style-type: none"> ● システム開発時期 → 1993年から1994年にかけて開発、94年に480郡すべて完成 ● データ作成方法 → 既存地図の図化 → RSデータからの判読 (スポット衛星画像、航空写真) ● 導入資格村 → Arcinfoを導入し、データ変換及び地図出力 → 投影方法については、Lambert Conformal Conicを使用 	<p>【その後】</p> <ul style="list-style-type: none"> ● 2005年からGPSを使用した位置更新のための現地調査が行われている。 → 行政界、道路、病院、学校等 	<p>【地図の性能】</p> <ul style="list-style-type: none"> ● 2005年から学校の区分を細分化している。 	<p>【地図の性能】</p> <ul style="list-style-type: none"> ● 高解像度衛星画像で検証したが、河川等位置が移動するもの以外は正確 <p>自然環境も移動する</p>
<p>Digital Poursheba Base Mapの概要</p>	<p>システムの内容</p>	<p>【データの種類】</p> <ul style="list-style-type: none"> ● データの種類 → 行政界、道路、河川、行政庁、グロースセンター及びマーケット、堤防、鉄道、教育施設、社会経済施設、森林、保健医療施設、集落、電力線など 	<p>【地図の作成】</p> <ul style="list-style-type: none"> ● 現行の5万分の1ウパジラ地図は、保有データの一部を、13レーヤーに整理して出力したものである。 	<p>GISとリンクしたデータベースの構築</p>	<p>【道路データベース】</p> <ul style="list-style-type: none"> ● 経緯 → 農村道路の計画及び維持管理を目的として作成された。 → 1997年に着手 ● データ作成方法 → 現地調査 ● データ → 道路の形状及び舗装面の状態 ● 進捗状況 → 64県中22県で整備 	<p>【学校位置図】</p> <ul style="list-style-type: none"> ● 経緯 → 教育省と連携して、2003年に着手 ● データ → 学校の属性データ ● 進捗状況 → 64県中28県 	<p>【学校位置図】</p> <ul style="list-style-type: none"> ● 経緯 → 教育省と連携して、2003年に着手 ● データ → 学校の属性データ ● 進捗状況 → 64県中28県 	

(3) 郡内市街地(ボウルシヨバ)及び郡(ウバンジラ)地図作成実習①
 -Digital Upazla Base Mapにおける持続性及び発展性の確保-

活動の進展となる課題	改善の方向の活動の具体化	活動の進捗状況	今後の活動予定
<p>システムの安全性の確保</p>	<p>【データアップの準備】 一職員のパソコンをLANで接続し、データは各職員のパソコンのハードディスクに分散して管理している。 一データを特定のサーバーで管理していないため、統一したデータのバックアップができていない。 一このため、事故等の発生によりデータが復旧できない可能性がある。</p> <p>【ウイルス対策】 一適切なウイルス対策が行われていない</p> <p>【データ更新の課題】 一データの更新ルールが定められておらず、データの更新経路が存在しない。このため、データの信頼性を確保し、誤り、他者とのデータの相互利用を難しくしている。</p>	<p>【バックアップルールの作成】 一CDベースでの管理を基本にデータ管理のガイドライン及び管理マニュアルを作成する。</p> <p>【データ用サーバーへの移行の検討】 一現行のハードウェアの状況及び現状のシステム管理能力を評価し、ハードウェア体系の改善の可能性について検討する。</p> <p>【ウイルス対策ソフトの導入】 一必要なソフトを導入する。</p>	<p>【バックアップルールの作成】 一今後土地利用図作成実習を通じて、管理マニュアルを作成する。</p> <p>【新ハードウェアへの移行】 一バックアップ業務の成果を評価を踏まえ、その後サーバー等採与の必要性について、LEGEDと協議。</p> <p>【ウイルス対策ソフトの導入】 一対策ソフト供与の必要性について、LEGEDと協議。</p>
<p>地図の品質確保</p>	<p>【データ更新ルールの設定】 一データ更新に関するガイドライン及び管理マニュアルを作成する。</p> <p>【河川など経年変化する面データの更新】 一当面、現行地図及び土地利用図を5万分の1で運用するときは、中継年度のランドサット画像により、データの更新を行う。</p>	<p>【データ更新ルールの作成】 一必要なガイドラインを整備した。</p> <p>【河川など経年変化する面データの更新】 一6万分の1地図におけるランドサット画像の適用性を確認した。</p>	<p>【データ更新ルールの作成】 一今後土地利用図作成実習を通じて、管理マニュアルを作成する。</p> <p>【河川など経年変化する面データの更新】 一ハンブルグランドシステム上のランドサットデータを供与し、順次更新を行う。</p>
<p>業務の効率化</p>	<p>【業務マニュアルの作成】 一システム開発改良、システム管理業務などシステムの特長性の維持に必要な業務も含めて、必要な業務を定義し、業務マニュアルとしてまとめる。</p> <p>【職員の技術管理】 一業務別、階層別の必要技術を整理し、上位GIS技術者養成のための研修システムを整備する。</p>	<p>【業務マニュアルの作成】 一必要なガイドラインを作成した。</p>	<p>【業務マニュアルの作成】 一今後土地利用図作成実習を通じて、業務マニュアルを作成する。</p> <p>【職員の技術管理】 一研修カリキュラムの開発を行う。</p>
<p>地図の質の向上</p>	<p>【データ体系の現状】 一データはすべてデータのコード番号で分類されているが、一部に矛盾したコード設定があり、GISが持つ未来の分析機能に阻害している。</p>	<p>【新データコード(案)の作成】 一新データコード(案)を作成し、提示した。</p>	<p>【データコードの再編】 一データコードを再整理する。 一他年度は開発計画の作成に土地利用データ及び位置座標データ等へのコードに必要な位置座標データ等へのコードの割り付けにも配慮する。</p>

TERMS OF REFERENCE
FOR
LONG TERM EXPERTS IN TOPOGRAPHY, PHOTOGRAMMETRY AND GIS
THE SURVEY OF BANGLADESH

1 INTRODUCTION

1.1 About this document

This document (Terms of Reference-TOR) specifies the Terms Of Reference for middle term experts and describes the requirements to project execution.

1.2 Foreword

Any firm / Industry / Institute likely to be awarded for the assignment must in his proposal make reference to every requirement quoted in the document and explain how the submitted proposal meets the requirement. Identifiers of the requirement must be quoted in the proposal.

Italic quotations are also to be integrated in the Proposal.

1.3 Notions and abbreviations

AT	Aerial Triangulation
DTM	Digital Terrain Model
GIS	Geographic Information System
SOB	Survey Of Bangladesh (hereunder called 'Client')

2 SCOPE OF WORK

2.1 Overall scope of work

This Survey Of Bangladesh started surveying and mapping activities being a part of Survey of India since 1767. Thereafter it was a part of Survey of Pakistan. After independence in 1971, the department emerged in its new name as Survey of Bangladesh (SOB). This department inherits most of the mapping culture from its predecessors.

At present SOB is facing huge demand for updated mapping products in medium and large scale from various users.

Survey Of Bangladesh therefore aims at producing a 1: 25000 scale map on entire Bangladesh and moreover a 1: 5000 scale map on urban areas.

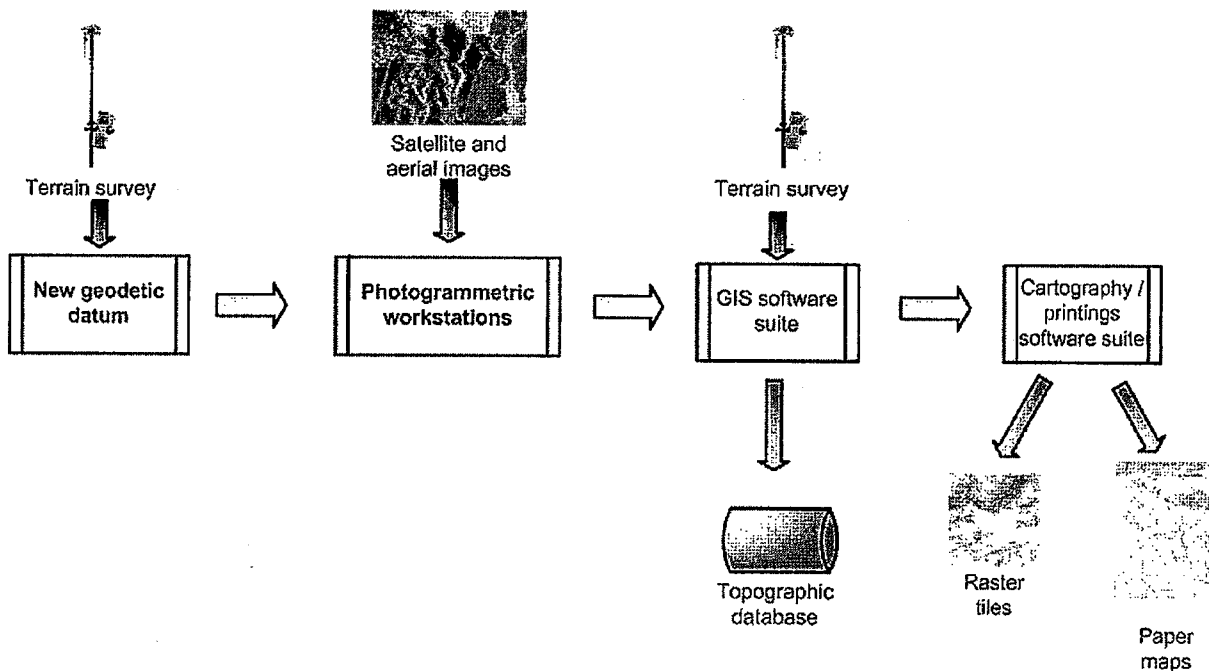
2.2 Objectives of the assignment

The Survey Of Bangladesh requires 3 (three) long-term experts to help defining the specifications and carrying the mapping production out.

Objectives of this assignment are:

- > LOT 1: Long-term expertise in topography
- > LOT 2: Long-term expertise in photogrammetry
- > LOT 3: Long-term expertise in GIS and cartography
- > Lot 4: " " " in cartography

The chart hereunder explains the project in which the experts would come into.



3 LOT 1: LONG-TERM EXPERTISE IN TOPOGRAPHY

3.1 Duration and location of the assignment

Id	Requirement	Comments
3.1.1	Duration	The duration of the current assignment is 2 (two) years
3.1.2	Location	The assignment will take place at the Survey Of Bangladesh, located in the city of Dhaka, in Bangladesh
3.1.3	Language	English will be used all along the assignment.

3.2 Description of the assignment

The assignment will aim at providing the Client with topography expertise.

The Contractor will have following responsibilities:

1. Design the content specifications of the Topographical database of Bangladesh
2. Design the capture specifications of the Topographical database of Bangladesh for stereoplotting process
3. Design the capture specifications of the Topographical database of Bangladesh for field completion
4. Professional and on-the-job training of all staff involved.
5. Supervision for all the staff involved in stereoplotting and field completion, including assistance of the staff in capturing 3D database during stereo plotting.
6. Monitor the product training delivered by the Supplier of the staffs involved

The assignment can be splitted in 2 main chronological parts:

1. Design of the specifications, design and provide the training, and monitoring the process before the aerial survey. The expert will however make use of latest sets of photos available in Bangladesh to carry specifications tasks out. Photos will be available at the beginning of the assignment.

Within this framework, he will have to:

1. realize a 2 months field visit of the different landscapes of Bangladesh.
2. analyse the existing maps on the country
3. design all the trainings related to the stereoplotting and field completion.

The aerial survey is scheduled from November 2009 until February 2010 and from November 2010 to February 2011. All those specifications must be finalised by February 2010.

2. Back up for Client's staff during stereoplotting and field completion steps.

3.3 Description of the required profile

The Contractor must be able to justify 15 (fifteen) years of experience in following fields:

- Photo-identification
- Field completion
- Management of a stereoplotting unit
- Design of topographical specifications (including content and capture specifications)

Experience in those latter fields must have been applied to mid-scale issues, such as 1:25K and 1: 50 K.

4 LOT 2: LONG-TERM EXPERTISE IN PHOTOGRAMMETRY

4.1 Duration and location of the assignment

Id	Requirement	Comments
4.1.1	Duration	The duration of the current assignment is 3 (three) years
4.1.2	Location	The assignment will take place at the Survey Of Bangladesh, located in the city of Dhaka, in Bangladesh
5.1.3	Language	English will be used all along the assignment.

4.2 Description of the assignment

The assignment will aim at providing the Client with photogrammetry expertise.

The Contractor will have following responsibilities:

1. Prepare as soon as possible preliminary datasets using available aerial photos so as to feed Client's staff with data for training before the first aerial survey, which is scheduled on November 2009
2. Provide technical assistance for staff during stereo plotting
3. Set the global photogrammetric process up, which also includes monitoring the stereopreparation
4. Design and set up the workflow to carry out photogrammetric process
5. Backup Client's Staff for photogrammetric issues during the plotting phase
6. Provide additional training for operators and supervisors in AT, stereo plotting & DTM in collaboration with the Topographic expert

The Client intends to use both aerial and satellite surveys to cover all the territory of Bangladesh. This includes the setup of a global photogrammetric workshop that would carry following tasks out:

- Stereo preparation
- Aerial triangulation
- Preparation of the images for both stereoplotting processes. Stereoplotting will be mostly made with 3D processes.
- DTM / orthophoto processing including tiling

4.3 Description of the required profile

The Contractor must be able to justify at least 10 (ten) years of experience in following fields:

- Aerial triangulation

- Field experience of stereo preparation
- Experience on Orthophoto and DTM processing
- Backup of an aerial triangulation workshop
- Design of topographical specifications (including content and capture specifications)

Having a complementary experience in stereoplottting workshop management would be relevant.

5 LOT 3: LONG-TERM EXPERTISE IN GIS AND CARTOGRAPHY

5.1 Duration and location of the assignment

Id	Requirement	Comments
5.1.1	Duration	The duration of the current assignment is 2 (two) years
5.1.2	Location	The assignment will take place at the Survey Of Bangladesh, located in the city of Dhaka, in Bangladesh
5.1.3	Language	English will be used all along the assignment.

5.2 Description of the assignment

The assignment will aim at providing the Client with GIS expertise.

The Contractor will have following responsibilities:

1. Set the GIS workflow up, which encompasses all processes from the integration of stereoplotted and field completed data until the production of cartographic databases ready for cartographic treatments
2. Implement the specifications of the topographic database, in collaboration with the Topography expert.
3. Design the specifications of cartographic databases. 5 mapping processes are to be prepared:
 - a. 1 : 25 K map
 - b. 1 : 50 K map
 - c. 1 : 250 K map
 - d. 1 : 500 K map
 - e. 1 : 1 000 K map
4. Prepare the cartographic rules of generalisation to digitally feed the 5 cartographic databases from the topographic database
5. Monitor the population of the topographic database from stereoplotted data and digitised field data.
6. Monitor the mapping production and monitor the cartographic workshop

5.3 Description of the required profile

The Contractor must be able to justify at least 15 (fifteen) years of experience in following fields:

- GIS modelling
- Backup for a GIS workshop
- GIS data treatments
- Mid-scale cartography
- Generalisation issues from 1:25 K to 1:50 K
- Management of a mapping unit

