A Case for GIS

Information Generation Through Spatial Data

by Dr Iftekhar Ghani Chowdhury

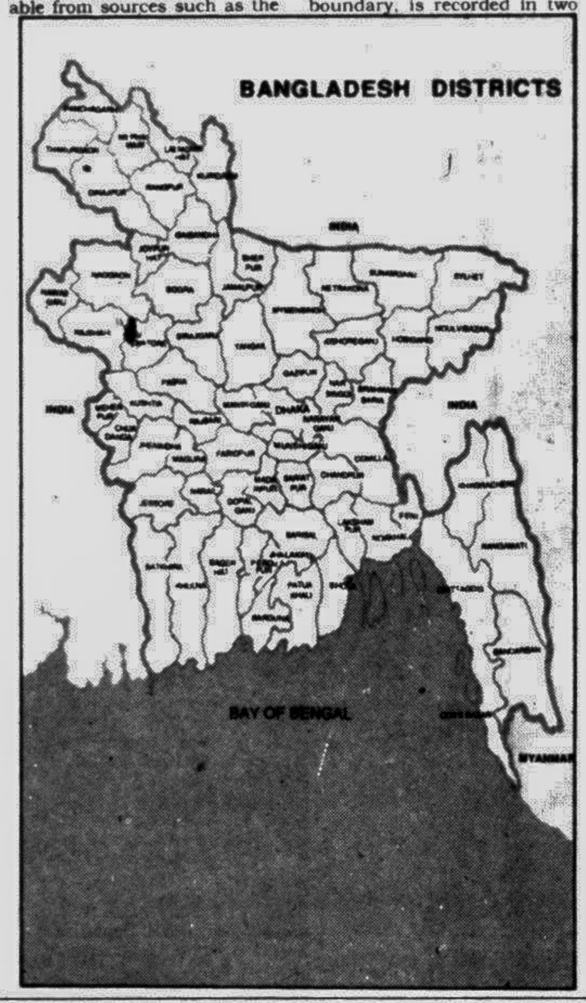
THE problem of setting up a Geographical Information System (GIS) in an organization is manifold. Thematic maps are still considered a domain of geography than a tool of management. A traditional information system uses maps as illustrations of themes derived from various analytical or numerical exercises while a GIS uses maps as primary source of data providing information towards a decision. Hence, there is a dichotomy between the two approaches as to what comes first, the cart or the horse. This is a recent phenomena brought on by the advances in computer technology.

Large disk space and fast processing, with digitizing and plotting facilities, are a prerequisite towards the implementation of GIS. Today PCs (Personal Computers) have come a long way in meeting this requirement through easy add ones such as larger digitizer, plotter, scanner, CD-ROM/WORM as well as faster processors providing access to very large internal memory. In addition, the fierce competition in the computer market, especially PCs, has pushed the price of common hardware to unbelievable lows. Consequently, the GIS applications on PCs have become relatively easier over the recent years.

Data, either attribute or spatial, can be expensive. A GIS mainly relies on spatial data available from sources such as maps, photographs or images. The types of spatial data are locations, span of locations or areas. Maps are the cheaper and more readily available form of spatial data. The primary source of such data is the Survey of Bangladesh (SOB), though agencies such as Municipal Corporation, Water Board make detailed maps to suit their particular requirements. The most common format of data from the SOB are the 1:50000 scale (1" to a mile is 1 : 63360) topographic sheets. Such sheets are available for the entire country as well as an index map showing the areas of coverage of individual sheets in terms of geographic coordinates. These maps are normally adequate for planning exercises at the strategic level.

Maps at larger scale are not so readily available and mostly relate to specific locations created through detailed surveys. For example, the detailed Cadastral Survey (CS) maps, available through the Department of Land Registration (DLR), show land holdings at 1:3960 scale. However, procurement or creation of such items can be either difficult or time consuming in contrast to the attribute data that are more widely circulated by agencies such as the Bangladesh Bureau of Statistics (BBS). In addition, once produced maps are not as frequently updated as the attribute data. Survey to obtain spatial data is very expensive and most often needs special equipments such as GPS (Global Positioning System), Theodolite etc plus lengthy filed visits. A complement to the inadequacy of map data are the digital satellite images obtainable from sources such as the SPOT, France or EOSAT, USA. It is possible to obtain as recent images as a month old. SPARRSO has some images for various locations of the country at different dates. Though such images can be easily bought, without any restriction, by individuals or organizations they are fairly expensive. These come in Computer Tapes or CD-ROM. In comparison though the attribute data are relatively cheaper they are not exactly free and the total cost of procurement can easily dent a generous budget.

Spatial data are available in two different forms i e vector and raster. Vectors are equivalent to ordinary attribute data where each geographic location, such as an administrative boundary, is recorded in two dimensional coordinate system or higher. Though a traditional database can conveniently process such data a GIS software handless such data more meaningfully through the creation of topology of the space where the characteristics of the surrounding data are also accounted. This facilitates the design of query system on factors such as distance between locations, areas of interaction etc obtainable from both tables as well as graphs.



The possible areas of application is as wide as ones imagination. In the early stages of mapping, users were happy with a mapping information system where maps and data were interactively used in queries and presentations. But with the advances in the computing ability of machines more intensive methods of interrogating data are used that range from overlays of two or more maps to modelling in three dimension. Images offer the additional advantage of land classification without elaborate land surveys. Collected images over a length of time can be used in time series analyses.

In satellite imagery the recording of features through reflectance is a function of surrounding geographical contrasts e g an image having 10 square meter resolution may not necessarily show all objects with such or higher dimension. Hence, sample data about the terrain being studied can be a helpful guide in the interpretation of images. It is somewhat discomforting to see that the easily available satellite imagery have thrown many of the old concepts of classified information out of the window due to their surprisingly crisp resolution.

One handicap to the spread of GIS is still the relatively weaker computing capability of PCs today. However, this cannot stay for long considering the present situation where the newer software demand 16M RAM with a processing speed 100 MHz. Implementation of GIS is still expensive compared to that of a database, where in many cases the software is almost free, no extra cost is involved in data input and a laser printer for report output is an affordable a luxury. In contrast a GIS is a serious business commitment with extra cost on each of these items. But, there are ample signs that organizations are taking it seriously.

Photovoltaic Energy : A Total Concern

EVERY day, the Earth absorbs billions of kilowatts of energy from the sun, and men have long dreamed of being able to convert even a small part of that inexhaustible supply of energy into electricity. The dream began to come true in 1839 when Emdond Becquerel discovered the photovoltaic effect — a way to convert light directly into electric current.

But although the sun has abundant energy to give, that energy is very difficult to harness, and it took years of research to develop a method of conversion efficient enough to make solar electricity economical.

For a long time, only a handful of scientists were interested in converting solar energy into electricity. Then after the first oil crisis, there was a revival of interest, with optimistic energy forecasts pointing to solar electricity as a way ahead.

Admittedly, the experimental high-voltage solar power stations built at that stage never proved as economical as conventional electricity generation methods, but photovoltaic systems were proving extremely effective in many small plants.

Solar power systems, which were first development for use in satellites, were soon found to be an efficient way of generating power in remote locations, for uses like pumping, cooling, lighting and telecommunications.

Total, a French company, has been involved in solar heat conversion and the construction of solar modules since 1976, gradually reorienting its activity towards photovoltaic systems. In 1983, this new direction led the Group to create a subsidiary called Total Energie.

What is Photovoltaic Energy?

Photovoltaic energy is produced by direct conversion of light into electrical energy, generally by means of silicon-based cells. To obtain the required voltage, several cells are connected up to form a module or solar panel. If even greater voltage is required, several panels can be grouped together to form a photovoltaic array. When the solar panel is simply connected to a load, the system works on a simple supply basis, without storing electricity, and the voltage varies with the amount of sunlight (voltage peaks at midday and drops to zero at night). Systems with no storage capacity are perfectly suitable for pumping: the water is stored in reservoirs.

But electricity demand may not always coincide with the sunniest times of day, or there may be a need for steady voltage (for lighting, or to power a refrigerator for instance). In this case, the system is equipped with a set of accumulator batteries which store electricity to meet later demand. A regulator is also required to protect the batteries against overcharging or excessive discharging, both of which can shorten their useful life. And finally, depending on how the electricity is to be used, an inverter may be required to convert the direct current generated by the solar panel into alternating current.

Photovoltaic systems differ from solar hot water systems, which transform sunlight into heat rather than generating electricity. Solar hot water systems are generally used to provide domestic hot water, but they can also be used to meet the larger-scale hot water needs of businesses such as laundries. Solar hot water systems are the perfect complement for photovoltaic power systems. They can provide economical hot water for whole apartment blocks and hospitals, as well as single dwellings, and are also effective when used for home-heating systems.

The Advantages of Solar Power :

By drawing on a universally available source of energy, solar electricity systems eliminate many of the obstacles to a regular electricity supply, such as lack of investment capital, import restrictions or transport difficulties. Needing nothing but the sun to power them, these stand-alone systems provide total energy independence.

Solar electricity units need only minimal maintenance, and this can be carried out by local technicians with the necessary training, or even by the villagers themselves in the case of non-storage systems.

Solar units are highly reliable. Un-like motor-driven generators, photovoltaic units function perfectly even under extreme climatic conditions. As there are no moving parts, mechanical failures are rare; and in the unlikely event of a breakdown, only very simple repairs are required and power can be restored without delay.

Such great reliability is a very significant advantage when it comes to professional applications for solar electricity, such as powering safety equipment or telecommunications systems; but is also important when water supply or cooling systems are involved.

The initial cost of setting up a solar unit may seem very high, but cost-effectiveness, studies have shown that for remote sites, photovoltaic systems are competitive in comparison to the cost of extending a grid into inaccessible areas.

Total Energie: the leading European systems company:

Over the years, Total Energie has development considerable know-how and is today leading supplier of photovoltaic systems in Europe. The company's experience has enabled it to expand its areas of operation and offer a comprehensive range of service.

Total Energie is primarily a service company, designing and installing integrated solar power systems adapted to the specific needs of each project. Total Energie's role begins with project inception and continues right through to the final start-up phase. Rather than just supplying equipment, Total Energie brings its overall experience into play by offering a comprehensive service.

CESTI Report

Orlan-DMA semirigid spacesuit and UMK spacebike. The bike in combination with the independent spacesuit, ensure research, assembly, maintenance and rescue EVA. The bike weighs 80 kg.

Technology a Stategic Variable in Development

by Raffat Binte Rashid

POVERTY in the Bangladesh scenario is quite different. International Fund for Agriculture Development,(IFAD) has branded the country as the world's 5th poorest country. Poverty is not the same in developing countries as in the developed countries,

A land of rivers, it comprises of about 68,000 villages where 85 per cent of the total population live in the rural area.The annual income is $210 per person and the majority of the rural people remain unemployed for at least some months of the year. Here the economic and social conditions for most people are extremely difficult. Although agriculture is the largest sector of the economy and land is the main productive asset in the rural areas, more than half of the rural people are landless and another 25 per cent find it difficult to ensure subsistence from their land and therefore seek supplementary source of income. In this context technology can be considered as a strategic variable in the process of development.

The important impact of technology is on the economic growth and resulting improvement in living standards. The technological backwardness in Bangladesh may be because of

the relative scarcity of human and material resources and ofcourse most importantly the lack of political will which is supposed to set social goals and objectives. Actually technology, once considered as a residual thing in the development process, is in reality, the most important factor, even more important than capital. It has been proved in the developed nations that technology with productive change by human capital is responsible for more than 50 per cent of the achieved economic growth. The field of engineering plays a great role in the development process. This was stressed at a seminar on the 'Role of Engineers in Poverty Alleviation in Developing Countries,' organised by Institution of Engineers Bangladesh on 23rd-25th July, 1993. By taking effective techno-engineering programme the employment and income level can be raised. Agriculture, housing, development of infrastructure, role of telecommunications in poverty alleviation are all sectors where technology and engineers are very much the basic requirement.

The engineers are the key elements in all development programmes, they can contribute in developing the technology to many general improvements, which will be promoted in the rural areas to strengthen the local economy and so significantly contribute to poverty alleviation.

Mechanized crop drying, improved technology for seed production, storage of fishes upto 24 hours are great contributions to help the economy. Moreover, the use of solar energy and other non-conventional energy sources, country boat mechanization and improvement of the mechanized country boat, setting up of light engineering industry, rapid expansion of cottage industry and development of small industries at the rural level are also among many other improvements that will be made possible through technology.

All efforts should be directed to giving proper incentives to boost engineering and the role of engineers to help alleviate poverty.

Giant clams face extinction in Philippine seas

by Suzanne M Mingoa-Licuanan

MANY Filipinos have their first encounter with giant clams in churches where the shells are commonly used as baptismal and holy water fonts.

Their use in Catholic churches is apparently widespread that the French called the giant clam *Benitier* or the clam which blesses.

Indeed, giant clams are an extra bounty from the seas, prized by Filipinos as a delicacy in coastal villages where they may supplement local diets when fish are scarce. Giant clam meat is not regularly sold in local markets but its actual consumption is greater than it seems as many fishermen gather it for domestic use.

Giant clam meat is not a significant source of protein for Filipinos. But this may change if giant clams are farmed and readily available in the market.

Strangely, most stories about giant clams have pictured the myth of a diver caught between the clam's maw-like valves (or " shells"). They may indeed look like " killer" clams, with the largest specimen — *Tridacna Gigas*, the true giant clam — measuring as much as 4.37 metres or 4 feet, 6 inches long.

The giant clam is actually a benign creature. The external shell is the clam's only means of protection from predators. To ward off potential predators such as fish, the clam expels a strong jet of water from one of its siphons, scaring off the predator.

In the unlikely event of a diver's arm or leg caught between the valves of the larger species, the soft flesh within the valves serve as a cushion, such that the diver can pull away his or her arm. The worst that can happen is a wounded finger if it is poked into the clam.

In fact, man has acquired a taste for the giant clam and has become its most dangerous predator.

Giant clams are gathered from reef flats during a low tides by women and children. Smaller spices are gathered by free diving with a blade shaped like a long handled spoon used to carve out the clam's flesh from the shell.

Giant clams are eatern raw, with vinegar, onions, ginger and hot chilli pepper. Occasionally cooked in coconut oil, the T Gigas meat may be sun-died then broiled. In some countries, the meat is highly sought as an aphrodisiac.

Because of its size and appealing colours, the shell attracts collectors and curio enthusiasts. Ornamental items like figurines and lamps, made of giant clam shells are commonly sold. Giant clams are also popular home and garden decor, as salad bowls, soap dishes, ashtrays and even — for the large ones — wash basins.

In less than 20 years, after commercial exploitation, the larger species of giant clams face extinction in Philippine waters

Until 1984, giant clams have been harvested in the Philippines commercially and for export. Much of this harvesting was not regulated and even foreign ships were able to poach in local waters for giant clams. While its export is now banned, smuggling is believed to continue.

Now, in less than 20 years, after commercial exploitation, the larger species Tridacna Gigas, T. Derasa and Hippopus Percellanus face the danger of extinction in Philippine waters.

These species are among the seven giant clam species found in the Philippines, including T. Squamosa, T. Maxima, T. Crocea and Hippopus hippopus. There are actually eight giant clam species found in the tropical waters of the Indo Pacific region. The eighth, T. Tevorod, has been found only in Tonga and Fiji.

As early as 1987, a survey made by the Marine Science Institute (MSI) of the University of the Philippines found that, in general, there is widespread local extinction of T. Gigas T. Derasa, H. Hippopus and H. Percellanus. Mortality rates of these species in southern Palawan and the Sulu archipelago waters, estimated from export records and warehouse inventories in Zambonaga, showed that "all four species are undoubtedly overexploited" in these areas in southern Philippines.

This finding, according to the survey report, is alarming since southern Palawan and the Sulu Sea are thought to be the last stronghold of giant clams in the Philippines.

"The severe reduction of H. Porcellanus in the Sulu Sea which is the centre of its distribution has serious implications on its survival. In view of the critical state of giant clam resources, their management must be undertaken to prevent the total extinction of these species in Philippine waters."

Similar scenarios are happening in other Pacific countries. All species of giant clams have been listed by the Convention on International Trade and Endangered Species of Wild Flora and Fauna (CITES) as threatened, with the lager species considered endangered. The exportation and commercial harvesting of giant clams from the wild is banned in the Philippines.

The MSI has a giant clam hatchery and culture facilities here in its Bolinao marine laboratory, in northern Philippines. It has an ongoing research project on the breeding, propagation and conservation of giant clams. The MSI giant clam project is supported by the Australian Centre for International Agricultural Research (ACIAR), the International Centre for living Aquative Resources Management (ICLARM), the Philippine Council for Aquatic and Marine Research and Development (PCAMRD) and is collaborating with Silliman University Marine Laboratory.

Since February 1992, the International Development Research Centre (IDRC) has been supporting MSI in a project to reseed Philippine reefs, especially in the Lingayen Gulf area. The aim is to increase giant clam broodstock (a group of clams which has reached reproductive maturity) for breeding purposes and to mass produce giant clams for reseeding, clam farming and possibly for export.

The giant clam is a bivalved mollusk, same as oysters and mussels. It is usually found in a coral reef environment, often interspersed between staghorn corals or simply sitting on the sand between the coral mounds. The smaller species are imbedded in coral rock, displaying only their colourful mantels on the rock surface. The shell is coloured brilliant shades of turquoise blue, emerald green and chestnut brown — all in attractive mantle patterns.

The ultimate aim of the MSI is to re-establish in Philippine waters the largest of the giant clam species, T. Gigas Through culture, there will be enough juveniles, or "clam seed," that can be used to re-stock reefs that have been depleted of giant clams.

The commercial production of clams is still in its infancy in the Philippines. There are four phases of clam culture: clam spawning and hatchery, land-based juvenile nursery, ocean-based juvenile nursery and growout.

The operation of a giant clam mariculture facility, particularly for the hatchery and the land-based nursery, will entail some capital investment since these require onshore sea-water facilities. For the ocean-based nursery and growout, there is minimal capital requirement.

Seed clams (about 2 cm length) are grown in their natural habitat, initially using cages that protect them against predators. Later, when the clams reach the 20 cm length — a size considered predator-free —they are simply left on the bottom to grow.

The MSI is propagating clam culture in the hope of providing a livelihood project for local fishermen, particularly for the ocean-based phases. But because the project is contingent upon conservation awareness, initial attempts have been directed towards information campaigns, and the re-establishment of breeding grounds, with the locals as overseers.

Batches of clams are being re-established in seven reef areas, six of them protected by law: Hundreds Islands National Park, San Salvador Island, Scarborough Shoals, Puerto Galera Man and Biosphere Reserve, Mabini, Bongao and Dumaguete.

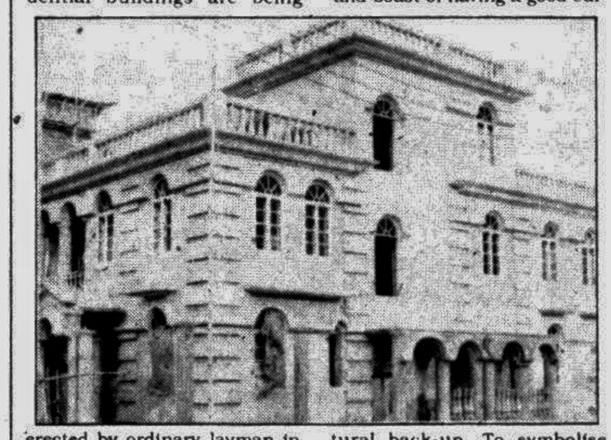
— Depthnews Asia

Status-Making in Urban Dwellings

by M Mohibul Arefeen Khan

WHENEVER a building or structure is erected in a place, either in an urban setting or in a rural setting, it transmits a message both externally and internally. External communication is made in macro level relating to a wider area or zone around it. Internal communication is made in micro level incorporating smaller scale experiences of the users. It is the desire and choice of the owner that determines the message it will convey to the community and to the individual — outwardly and inwardly. The decision to a message is agreed upon may be by an individual or by a group. In this paper we shall dwell upon the trend of the affluent class in the urban area, specially in Dhaka in their endeavour to status-making through their dwellings.

In low-educated and non-educated business community, considerable members of residential buildings are being



erected by ordinary layman in consultation with owners lacking efficient handling of the mass in organising spaces and evolving a beauty out of it.

Rather emphasis is laid upon creating wealthy images by using costly finish materials in somewhat desperate way. The status symbol for the old Dhaka people is fixed on glossy finish materials like marbles, terrazo, glaze tiles, brass and use of motifs borrowed from different references signifying prestige-value. On the other hand, the wealthy educated class of the city focus their attention towards designed expression of their dwellings by engaging trained professionals. Although involvement of architects are evident, most of the decisions in creating the facial expression or the external language are dominated by the owners. Recent trend shows imposition of classical features and treatments in greater extent. To them, classical elements have become the elements of status-making. Revival of cornice, use of dentals and various mouldings, emergence of rose windows with arches, bilastard railings, exploitation of classical columns are common practice now-a-days in high cost residential projects.

In the first case where neo-wealthy people are engaged in building activities, the picture is due to the absence of a tradition-base and prior-experience in a livable high-gloss urban dwellings. This may be cured by generating awareness through orientation, motivation, counseling and above all creating an education-base for them, opening up options and enhancing exposure to the effects of better environment. This will help people to create a language that sets up dialogue with its environs conveying appropriate message of status building.

The problem is severe in the case of those who are educated and boast of having a good cultural back-up. To symbolise status by means of classical order is not an appropriate borrowing, rather a mean can be achieved by exploiting modern technology with the modern philosophy of life. This will be expressible in architectural forms and their faces. The blind following of the ancient symbols is a kind of turn around from the ever-growing human advancement. It is the responsibility of the professionals to come ahead shading off prejudices and compromises. They must evolve the suitable expressions and let the clients be convinced with them.

It is always apparent that riches of the society will always love to make lavish houses and deliver message to the rest about their might. And so, the rightful expression is always sought, not an ambiguous, misconceived notion.

This article is contributed by the Post Graduate Centre Development of Architecture BUET.