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Review Paper

NFED FOR COMPUTERIZED LAND INFORMATION SYSTEMS IN BANGLADESH

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ABSTRACT

Land is the most important and valuable of all resources available to human being. Land is probably the most limited commodity in supply in Bangladesh and therefore its distribution and use are of vital importance. The Cadastral Survey (CS) maps produced for the areas of Banglandesh by the time British Government in 1914 are outdated. Since that time there have been two attempts, one during the Pakistani period and the other after the liberation of Banlgadesh, to update the cadastral maps but no attempt was successful. The need for a comruterized land information system, possible benefifs of using this system, use of Land Information Systems (LIS) in other countries, problems and prospects of LIS in Bangladesh are discussed in this paper.

INTRODUCTION

Land is the meaning of life without which man could never have existed and on which his coutinued existence and progress depends (Bins, 1953). Land is the source of all material wealth. From it we get everything that we use of value, whether it be food, clothing, shelter, metal or precious stones. We live on this land and to the land our bodies or ashes are committed when we die. Resources that had taken many million years to accumulated have been squandered or allowed to waste away in a few decades, and thus squandering and wastage are likely to coutinue on an increasing scale whenever definite measures to stop it are not undertaken (Bins, 1953).

Specific problems such as provision of housing for urban poor has also been linked to management issues of land resources in the urban areas. "A review housing problem in most developing countries reveals that the main problems ie not really shelter ... ... one of the real barriers of affordable shelter ... is land ..." (Laquian, 1987).

It has been argued that the availability of land is the single most troublesome and intractable problem of economic development of all levels and in almost all sectors (Doebele, 1983). Many of the problems In less developing countries like Bangladesh stem from or are closely influenced by land tenure and / or land administration issues.

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Access to land, rights to land, who owns and occupies what land and where it is, and the value of land, are all major problems to be faced. This applies to both urban and rural areas. These issues are closely related to squatting problems, poverty eradication, rural income disparities, supplying urban services and associated infrastructure, and environmental issues.

THE NEED FOR LAND INFORMATION IN PLANNING AND MANAGENEMENT

The basic resource of a decision maker is the necessary information base. All decision making should be based upon knowledge, of course, in turn is information based. A planner (whether urban or rural) requires all the available relevant information which helps him/her understand the existing environment, all the causes and effects of the various forces that shape our socio-physical enviroement before he/she can propose the future plans which will achieve the desired goals of the society.

The most important resource for a planner, therefore is the availability of relevant information. It is equally important, if not more so that there should be easy access to his information. Information that is difficult to access is of little use or no use. Availability of information provides better understanding of the basic problems thereby better decisions are possible. In Bangladesh, decisions are based on inadequate information resulting in improper use of land resources. Most of these inadequacies are due to lack of recently accessible information. The effect of these are more apparent in fast growing urban centers in Bangladesh which are often noted for very poor housing environments, inadequate transport, an imbalanced and inefficient distribution of services, and generally incompatible and haphazard urban development.

An adequate land information system is vital in the proper planning and management of land. It is from such compelling interest in land information aided by recent progress in computer technology which has resulted in the development of the "Procedures ' what is now called GIS (Geographic Information Systems) or LIS (Land Information Systems).

COMPUTERIZED LAND INFORMATION SYSTEMS

GIS/LIS may be defined as a computerized database systems in which data are spatially indexed and upon which a set of procedures operates in order to answer queries about spatial entities in the database. Spatial entities are entries of items that describe the location and shape of geographic features and their spacial relationships to other features.

Technological advances in the computer industry and particularly the ability to handle graphics and image analysis initiated early work on the development of GIS in the 1960's. The conceptual framework of GIS / LIS accommodated many disciplines, which needed a computer-based information system for storing, retrieval and analysis of land

related data or part of their decision-making processes. A modern GIS / LIS utilizes numeric and textual data but it also has the significant additional capability of providing a spatial view of all information. In other words it can store, create and display maps.

A useful distinction between GIS and LIS can be made based on existing literature on current practice. Traditionally GIS has been used to deal with land information at a regional scale, while LIS has been applied mainly at the urban or local scale where there is often detailed property related information about land parcels available.

Data Types Used in LIS and Data Analysis

Data for input to LIS are typically acquired in a variety of formats, including graphic and non-graphic information (i. e. nominal data. descriptive or attributive data, and textual data). In a LIS. each spatial data type or theme is reffered as ***spatial data layer*** or ***data plane*** which is capable of holding four possible types of geographic entities : points, lines. surfaces and areas—enclosing lines or polygons. For each spatial data layer, spatial objects may be encoded employing two basic techniques ; Raster mode (using grid cells) and vector mode (using lines defined by exact co-ordinate points rather than grid cells). Entities are stored in raster mode or in vector mode. The raster mode is often preferred since it is simple to analyze grid cells than the vector lines. Usually boundaries and maps are first digitized in vector mode (using a digitizing table) and then converted to grid cells.

The three principal classes of land informations commonly required by planners are : (a) Natural resources ; (b) Socio-Economic conditions and (c) Property (land-parcel) level informations. LIS/GIS has the ability to integrate all these informations in achieving successfnl analysis of land-related information.

Three main categories of data analysis are usually available to be derived from a LIS system using graphic (mapping) and / or non graphic (numeric and textual) processing of the information.

a) Spatial analys, including procedures such as polygon overlays , cell overlays , connncting and neighborhood statistics :
b) Measurement of line and area lengths , point-to-point distance , areas and volumes ;
c) Statistical analysis, forecasting, and modelling.

A LIS can display and produce maps, graphs and tabular information in a variety of output media.

Application of LIS in Land Management

A very important aspect of the land management process is day-by-day operations by land administrators, such as property conveyancing, property valuation, tax and rates

collection, allocation of buildiug permits, development and management of utilities and services, management of resources such as forestry, soils, agriculture, etc, administration of land use and envirunmental policies, and maintaining other activities that effect land resources. A computerized LIS can assist a land administrator by providing easy storage, updating, retrieval, analysis and mapping of information crucial for such administrative activities. Most LIS applications utilize some form of geographic or spatial analysis. LIS's of today can also be used to predict crop yields, electricity demyd, financial flows, automation of mapping, conducting elections etc.

LIS can therefore help improve containty of ownership, security of tenure in the reduction of land disputes, in improved conveyancing, in simulation of land market, sensitivity of credit, in achjeving more efficient and equitable land taxation systems, improvement in physical planning, efficient land resource management, etc. (Dale and Mclarrghlim, 1988).

Land Suitability Analysis Using LIS

Land suitability (or capabilty) analysis helps a planner to identify those areas which are most suitable for particular uses under consideration. A series of maps are first generated to show the distribution of those factors that would influence the suitability of the land use in question. These variables or factors are then assigned values based on their relative importance. Resultant maps indicate the location and relative importance of each variable according to its value.

Individual factor maps are overlaid physically by placing them on transparencies which then forms a composite map showing the spacial spread of the combined effect of those variables. It is then a ralatively straightforward task to locate areas exhibiting a particular combination of factors which indicates the suitability of land for a particular use.

With the advent of the computerized LIS all required map overlay and land suitability analysis may now be done using the computer. Instead of being transformed into maps by hand, the geographic data are now converted to computer readable format, digitized, and the resulting information may be processed using software routines that allow changes of scale, overlay, and the contextual production of land capability map.

Application of LIS In Other Countries

The technique developed in North America when the Canadian GIS was first implemented in 1964 , the New York Land Use and the Natural Information System in 1967, and then the Minnesota Land Management Information System which was implemented in 1969.

In Australia all State Governments have now established their own LIS's to administrate planning and management their land resources. The State Government of Victoria has established LANDDATA which on completion would provide information on :

1. Details of land ownership and land description.
2. Maps showing the boundaries of all properties of Victoria.
3. Municipal (local government) rates, land tax, and valuations.

LANDDATA will also provide a useful service as a database for individuals and organizations alike. State Government agencies and municipal and rating authorities are currently the main users of the information generated by LANDDATA. In the long term, however, anyone in Victoria requiring land information (for, say building a house, or developing a property) will directly benefit from LANDDATA system. Certain property details will also be made available to banks and financial institutions for use in relation to loans and security. A public enquiry service will be established to provide information on each property in the state from a single outlet.

In Malaysia, a computerized National Land Information Systems to facilitate land management throughout the country began in 1982. In Papua New Guinea PNGLIS was initiated in 1987 with the help of Mainframe computer and 300 microcomputers. A total of 55 work stations will be supported throught the country to access the PNGLIS (Hoorner, 1987). In Oman a systematic GIS decision study has been carried out recently for the purpose of establishing a National LIS. In Thailand a major project has been undertaken with assistance from World Bank and Australian Develapment Bureau to develop a cadastral and land registration system. In India a nationwide National Resource Information System is in the process of development using GIS/LIS technology.

PROBLEMS AND PROSPECTS OF LIS IN BANGLADESH

Land is probably the most limited commondity in supply in Bangladesh. The ratio of land to population has already gone up far beyend acceptable levels. Land in Bangladesh, specially in the crowded urban centers, therefore deserves most attention in regard to its utilization. In this respect the need for a LIS system in Bangladesh is probably much more important for planning and management than in countries like Australia where land resources are far more abundant.

In 1914, the then British Government produced the cadastral (CS) maps for all parts of India, including the areas now forming Bangladesh to assist their revenue collection. Since that time there has been two attempts, one during Pakistani period and the other after the liberation of Bangladesh, to update the cadastral maps. However, for many areas the cadastral version of 1914 is still the most up to date. Although the existing maps

are outdated they still provide a useful base map leading towards establishment of a computerized Land Information System.

Establishment of a large, comprehensfve, and multi-functional LIS is very costly exercise which many developing countries could not afford. For example, even the digitizing the base maps at the land parcel level at a desired seale may take many years to complete and represent a huge cost to the government.

While achievement of a comprehensive multi-purpose LIS is highly desirable, Bangladesh may not simply be able to afford it. A more feasible approach for Bangladesh would be to establish a progressive LIS that offers basic applications and which can be updated when required.

Some of the key issues which need to be resolved before it is possible to consider developing a full scale LIS for Banladesh are consided below :

1. Reorganization of existing land recording systems to suit LIS;
2. An updating and digitizing of cadastral maps at considerable cost;
3. Sub-division of basic land parcels would complicate the operation of a LIS, Existing land parcels can be sub-divided and sold individually thereby fragmenting the original land parcel. This happens mostly as a result of inheritance practices and inadequate legal protection against unlimited lard fragmentation. In many other countries sub-division of basic land parcel is restricted;
4. The education and training necessary for the staff responsible for maintaining the LIS;
5. A financial commitment to this huge task required at National Government level;
6. The need for political will on the part of the Government (and ultimately the elite of the society) to achieve such a system. The question is whether the elite of society are ready to place their property-related information in such a system which can be easily accessed and analyzed ?

A systematic LIS design study is a prerequisite for establishing a LIS to decide on the design and scope of the LIS. Such a study may take a year or so.

CONCLUSION

It may not be feasible to establish a comprehensive National LIS System for managing land resources in Bangladesh in the near future unless international agencies is available. In the meantime, however, low-cost small scale urban land information systems could be developed to stimulate and improve the overall decision-marking capability of a local government. These systems would assist planners and other decision makers to

address specific current problems in land management, housing, transport, and utility services, and in the overall planning and management of the urban landscape.

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