

2. Literature Review

This chapter provides an overview of the developments in the field of information system and land clearance. It describes the concepts and developments expressed in literature and the emerging methodologies.

2.1 Land Developments

Land use is the relationship between how man act and land. Land use should be viewed as a process more than an output. Therefore land use is the process of determining, allocating, and realizing the use of land for sustainable development. An information system to support monitoring process of land developments. The following definition of land development is:

This evaluation is useful for planners for their future urban expansions. Least suitable areas for development and conservation is important to decision making, when making a planning decision it should be considered. These combinations are difficult areas for decision-making process. At that time planner wants to exert judgment to decide whether land should be developed or conserve (Weerakoon and Lokupitiya, 2001).

A variety of monitoring and controlling mechanisms was used for land development. Bandung issued building permit licenses and industrial location permits, and a Land Control Committee existed for determining the concurrence of land use to actual schemes and development plans. In Dhaka, land development was controlled by the Capital Development Authority and Urban Development Directorate of the national Government. However, Dhaka City Corporation monitored whether private land development was carried out in accordance to the legal provisions. In Makati, private developers had to secure municipal approval that the development conformed with allowed land use and, furthermore, projects were inspected before the occupancy permits were approved. Penang's innovative honour system required that all

professional consultants were required to honour their professional work ethics to ensure that land was developed in accordance with the approved plan (UN, 1995).

2.2 Land Use

Land use zoning plan identifies specific areas of land use such as for housing, industries, commerce, institutions, etc.

A comparison of the amount of land available per capita for different purposes showed that only Kandy and Makati had more land available for commercial land use than agricultural which suggests that tertiary economic activities still played an important role in the economy of the case-studies. Furthermore, Kandy and Penang indicated that as much as about 100 square meters of land was available for residential land use per capita. This figure may be even higher than figures prevalent in many European cities and indicated that the cities were to some extent successful not only in implementing their respective minimum plot sizes but also a spacious housing pattern.

In contrast to the organized single land use patterns of developed countries from which zoning models developed, mixed land use is a reality in practically all municipalities in the developing countries. Asian cities are fascinating concentrations of people where all types of activities appear to be carried out in most areas. The fact that land is often used for mixed purposes makes planning, taxation and government policies from developed countries difficult to implement. Entirely different approaches are required (UN, 1995).

2.3 Land Registration System

Within every society there is a need for some form of land registration. New systems must be created or old systems improved.

In most developing countries it is difficult, extremely time consuming and financially costly to identify what land is available, its ownership, the rights and effective limitations to its use and its price as compared to roughly similar lots; and then to accomplish a transfer with clear title. Necessary information is lacking or contradictory. The recording systems function poorly at best. (Peter & John, 1998)

The juridical cadastre normally consists of two parts: The first part is a written record or register with information on each parcel, such as owner and the rights of the land, while the second part includes a detailed description of the parcel in the form of a map or survey measurements. The second part is normally cross referenced with the first. The land registration system is normally the responsibility of the national or regional governments. The major arrangements for this approach is that the land registration system normally is very cost intensive and that there are major cost savings to be gained by operating on a larger scale. The problems which governments are facing in developing countries can be divided into four categories: institutional, technical, economical and lack of motivation (UN, 1995).

2.4 Land Information System

Land use relies on varied information from different databases. Land information is widely being used in many activities of different sectors. The information requirement is getting increased and becoming analysis is complicated as planning and monitoring are for various applications.

An information system may be formally defined as a combination of human and technical resources, together with a set of organizing procedures, that produces information in support of some managerial requirement. Data are raw collections of facts. Data relating to land may be acquired and held in alphanumeric form (for example, written in notebooks and surveyors' field books), or graphically (for example, as maps or aerial photographs), or digitally (for example, using electronic

methods). To become information, the raw data must be processed so that it can be understood by a decision maker. A land information system gives support to land management by providing information about the land, the resources upon it and the improvements made to it. (Peter & John, 1988)

2.5 Digital Mapping and Land Information System

Digital mapping is the process of providing maps from spatial data held in numerical rather than in graphical form. The concepts of digital mapping are inherently simple, but the practice tends to be more complex. The greater the range of demands that are put upon the data, the greater the complexity of the processing becomes. Essentially, digital mapping comprises three operations:

1. data capture or data acquisition, which involves converting data into digital form;
2. data processing, in which the data are transformed into different structures to serve different functions;
3. data presentation, using either computer graphic techniques for visual display or electronic methods for transmitting the data to other users.

(Kang,1999)

2.6 Starting the Information System Development Process

Information systems projects may be launched for a variety of reasons and in a variety of ways. In some cases the need for a new information system is clear and the expected gains can be well expressed. In others, views about whether a new information system is needed, or the gains to be expected, are only vague. Information systems development projects may be conceived for three general reasons: to provide a solution to a specific problem, to respond to a pressure, or to exploit an opportunity. Some information system development projects begin with a widely recognized problem to be solved a clear view of why and how the new system will contribute to solving it (Kang,1999).

2.7 Geographic Information System

The relatively sophisticated software products that are available today provide tools that help the user to capture, store, manage, manipulate, analyses and display spatial data. Typically GIS software has five components:

- tools to help import data,
- a database,
- a database management system,
- tools to transform and analyze spatial data, and
- tools for displaying and printing data.

GIS software differs from most other types of software because of the need for 'real' input data (compare this with say, a word processor, where you make up the 'data' as you go along!). Obtaining the input data for a GIS is often a long, hard, expensive operation. Understanding the data and making sure the database is fit for its intended purpose may take even longer. (Richard & Jo,1999)

2.8 Importing Data into a GIS

Most GIS use a 'field' model of data storage using either raster or vector format. Object-oriented GIS are beyond the scope of this work and will not be discussed further. In essence spatial data consist of one or more attributes at a specific location. The location can be determined using either explicit spatial coordinates such as x-y, latitude-longitude or easting-northing, or implicitly such as row-column identifiers. The term attribute is used rather loosely in GIS and can apply to what is being represented (a tree, a river) or how it is being represented (a point, a line)

Each GIS typically uses its own data format, which is optimized in some way to reduce storage, allow efficient manipulation of data or avoid law suits (because someone else has patented the 'obvious way to do it'). However, it is usually possible to convert between systems without too

much trouble, although it is often necessary to use a spatial export format to ensure that all the data are transferred. (Richard & Jo,1999)

2.9 GIS Modeling

A model is a simplified representation of a phenomenon or a system. GIS modeling refers to the use of GIS in building analytical models with spatial data. A very useful GIS operation for modeling is map overlay, which combines spatial and attribute data of different variables into a composite map. Because each map feature on the composite map represents a select set of data characteristics by location, the composite map can be further processed to extract new information for modeling purposes. Analytical models differ in the degree of complexity (Kang,1999).

2.10 Creating a GIS Database

The geographical data model links spatial data and attribute data by the feature ID. Each map feature has a unique label ID. Attribute data are stored in a table, called the feature attribute table, which contains the label ID and a default set of attributes, such as area and perimeter for the polygon features. Each row of the feature attribute table represents a map feature, and each column describes an attribute of the map feature. A row is also called a record, and a column is also called a field or an item.

One method for defining attribute data is to use the data types allowed in a GIS package. Data types used in a GIS and in computer programming include character strings, integers, floating points or real numbers, dates, and time intervals. Each field in an attribute table is defined with a data type, which applies to the domain of the field (Kang,1999).

2.11 Zoning Regulations for City of Colombo

For a systematic development of the Colombo city, a zonal categorization has been introduced in it mentioned below are there zones. Each zone has its own set of regulations (Appendix E). All development activities within there zones are governed by their regulations which help the maintenance of qualities of them.

The following regulations are taken from UDA development plan that deal with land clearance process.

- Special Primary Residential Zone (SPRZ)
- Primary Residential Zone (PRZ)
- Commercial Zone (CZ)
- Mixed Development Zone (MDZ)
- Concentrated Development Zone (CDZ)
- Port Related Activity Zone (PRAZ)
- Recreational Zone (RZ)
- Environmental Conservation Zone (ECZ)

The study area ie. Thimbirigasyaya Ward (40) consists with 3 zones out of 8 mentioned above. They are SPRZ, PRZ, and MDZ. Basic requirements which are being imposed in these 3 zones are listed out in Table 2.1.

Table 2-1 Permissible Development Activities

No	Activity	Minimum Site Extent (Square meters)	Maximum Floor Area Permitted (Square meters)	Max. No of Floors
<u>Special Primary Residential Zone</u>				
01	Dwellings	1000	150	03
02	Flats			
03	Dormitories			
04	Hostels			
05	Children's Homes			
06	Orphanages			
07	Home for Aged			
08	Diplomatic Embassies			
09	Consulates			
10	Restaurants			
11	Public Offices			
12	Institutions			
13	Bank Offices			
14	Hotels – 10 rooms			
15	Lodges – 10 rooms			
16	Professional Offices		100	
17	Consumer Oriented Services			
<u>Primary Residential Zone</u>				
01	All Activities in SPRZ	1000	150	03
02	Professional Offices	250	50	10
03	Indoor Entertainment			
04	Hotels – 30 rooms		300	
05	Lodges – 30 rooms			
06	Banking			
07	Insurance		150	
08	Commercial Offices			
09	Multi-Story Housing Complex			
10	Retail Shops			
11	Markets			
12	Open Air Trading Area			
13	Professional Consumer Offices		No Limits	
14	Private Consumer Offices			
15	Indoor Amusement			
16	Place of Public Worship			
17	Social Cultural Institutions			
18	Multi-Story Car Parks			
<u>Mixed Development Zone</u>				
01	All Activities in SPRZ & PRZ	1000	150	03
02	Professional Offices	150	50	No Limits
03	Department Stores			
04	Super Markets			
05	Laundries			
06	Dry Cleaning			
07	Repair Shops			
08	Health Institutions			
09	Place of Public Assemblies			
10	Educational Institutions			

Source: UDA Zoning Regulations, 1999