

GIS Enabled Central Database System for Land Information

by

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The work described in this thesis was carried out by me under the supervision of Dr. (Rev.) Pinnawala Sangasumana & Mr. Gamini Dharmapriya, and a report on this has not been submitted in whole or in part to any university or any other institution for another Degree/Diploma


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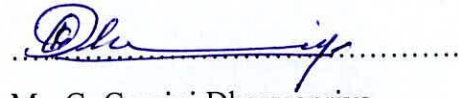
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Abbreviations

1NF - 1st Normal Form

2NF - 2nd Normal Form

3NF – 3rd Normal Form

AM - Automated Mapping

CADD - Computer Aided Design and Drafting

DB - Database

DBA - Database Administrator

DBMS - Database Management System

ERD – Entity Relationship Diagram

FM - Facility Management

GIS - Geographic Information System

HTML - Hypertext Mark-up Language

IIS - Internet Information services

IT – Information Technology

LAN - Local Area Network

LIS - Land Information System

MAN - Metropolitan Area Network

PL/SQL - Procedural Language/Structured Query Language

SOC - Server Object Containers

SOM - Server Object Manager

SQL - Structured Query Language

WAN - Wide Area Network

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ABSTRACT

Land values are increasing over time with the increasing of population as well as development activities. One of the main problems in land resource management in Sri Lanka is lack of effective and easy accessibility to land information. Such information is available in conventional hard-copy format, but it is not easily retrievable and accessible. In addition, these data are located in several organizations and departments. A Land Information System (LIS) is a tool for legal, administrative and economic decision making and is an aid for planning and development. A LIS, which consists of a database containing spatially referenced land related data for a defined area of procedures and techniques for the systematic collection, updating, processing and distribution of that data. Therefore, it is highly essential to establish a land information system which can be updated and accessed by multi-users in developing countries like Sri Lanka. The main objective of this study is to develop an improved system with centralized database for land information system. To achieve the objective of the study, a conceptual model of a GIS enable centralized database system for land information system was developed after reviewing related literature. A prototype model was developed with ArcGIS Desktop, ArcGIS Server, Java and PostgreSQL as main software. The prototype model provides user friendly information on land parcels and also enabled users to retrieve them efficiently. System users or authorized users have the facility to update data on Centralized database through the Web and public users can view or search information as required. The web based information system for land parcel information developed in this study will be useful not only for the land owners but for policy makers and relevant authorities in Sri Lanka. It is recommended implementing the results on national level to open the facility to the general public and awareness on the enormous potentials of Geographic Information Systems will promote e-governance in the country.

CHAPTER 1

INTRODUCTION

1.1 Background

This is a study of the implementation of Geographic Information System (GIS) enable central Database system for Land information. In Sri Lanka, Several Departments, Public and Private Organization are used land information for their own works and research.

1.2 Land Information System (LIS)

Land Information System (LIS) is a tool for legal, administrative and economic decision making as well as an aid for planning and development works. This involves the database containing, spatially referenced land related data and the procedures and techniques for systematic collection, updating, processing and distribution of the data to the end users in an efficient manner vice versa. The base of a land information system is a uniform referencing system that could facilitate in linking the different types of data within the system and with other land related datasets. The most important thing in the land information management is the quantity of the data which can be handled, the speed with which these data can be processed and the ways in which the data can be manipulated and analyzed. It is felt throughout the world to move towards the establishment of fully digitized cadastral systems. It is recognized that cadastral systems are not ends in themselves. It is also recognized that the cadastral systems must be tailored to facilitate an efficient land market as well as effective land-use administration and thereby, more generally, promote economic development, social cohesion and sustainable development. Cadastral systems must serve a multi-purpose use and thereby meet the challenge of a modern GIS and IT environment.

The digital land cadaster maintains the official records pertaining to land parcels, their position, shape, size, land use, and ownership. This forms a basis for property taxation that remains one of the main purposes of developing digital land cadastre. The

information derived/retrieved from digital cadastral maps can serve administration in many different ways, in addition to contributing to a comprehensive, equitable, and efficient land tax system.

1.2.1 Definition of Land Information System (LIS)

There are many definitions for LIS

A Land Information System (LIS) consists of an accurate, current and reliable land record cadaster and its associated attribute and spatial data that represent the legal boundaries of land tenure and provides a vital base layer capable of integration into other geographic systems or as a standalone solution that allows data stewards to retrieve, create, update, store, view, analyze and publish land information (Wikipedia, 2014).

Land Information System (LIS) is a flexible land surface modeling and data assimilation framework developed with the goal of integrating satellite- and ground-based observational data products and advanced land surface modeling techniques to produce optimal fields of land surface states and fluxes. The LIS infrastructure provides the modeling tools to integrate these observations with the model forecasts to generate improved estimates of land surface conditions such as soil moisture, evaporation, snow pack, and runoff, at 1km and finer spatial resolutions and at one-hour and finer temporal resolutions (NASA, 2013).

1.3 Importance of Land Information System

In the LIS, Land parcel is the basic unit for access and control of land. It is provide a base for development, land sale and other economic activity. And also provide necessary reliable land information for many public programs such as land planning, infrastructure development and maintenance, environmental protection and resource management, emergency services, social service programs. Properly maintained up to date LIS provides useful information for small scale mapping.

1.4 Some Land Information Portal in World

1.4.1 India –Kerala State

The Land Resources Information System (LRIS) is an effort to streamline rural growth and derive more benefits from development activities like the employment guarantee programme, watershed management and food security.

The LRIS project is a web-based Geographic Information System (GIS) initiated by Kerala State Land Use Board (KSLUB), and is implemented with technical assistance from the Indian Institute of Information Technology and Management (Kerala LIS, 2013)

1.4.2 New Zealand Science Datasets and Information.

It allows you to download environment data held specifically by Landcare Research for use in GIS and other applications that can handle geospatial data for mapping, querying and spatial analyses. There is strong focus on metadata and supporting documentation. The portal supports downloading data in many geospatial data formats (Landcare Research – Manaaki Whenua, 2014).

1.5 Problem Statement

Several departments and organizations in Sri Lanka are use land cadastral and related data for numerous tasks at present. But they store the information in their own systems separately and use for future expansions or other related activities. There is no inter-related or centralized computer based system. In this situation, the land parcel data are highly redundant and sometime data are not accurate or up-to-date.