Chapter 22
A Paradigm of Improving Land Information Management

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ABSTRACT

The information on land is a basic resource at the economic, social, and industrial levels. Many approaches have been made to enhance integrating the geospatial technology, enable managing the geospatial features, and provide decision makers with capabilities for best land governance. The goal behind this chapter is to develop an approach dealing with a necessary paradigm of improving land information management. Such approach is made up of a series of the fundamental requirements and principles. The requirements encompass the fundamental geodetic network supporting spatial infrastructure, a series of large-scale maps, an integrated land administration system, and a basic conceptual core model for the land information system. The principles of the new paradigm will be discussed. To achieve such objective, the object oriented approach as an emerging methodology was followed to improve land administration and management.

INTRODUCTION

The land, since the beginning, has been the basis of wealth. To provide their basic needs, the societies have been thinking, in an easiest way, how to take advantages of the land resources. Then, the earlier forms of land management were created to provide a means of describing and valuating lands. Recently, every country has become aware of the importance of administrating and managing lands. At the worldwide level, land information constitutes a basic and sensitive resource at the economic, social, and industrial levels. A multitude of emerging approaches has been conducted to develop suitable paradigms of land information management. The implementation of the new paradigms is based on a bunch of the geospatial technology encompassing the Geographical Information Systems [GIS] and the Global Navigation Satellite Systems [GNSS]. The GIS includes various process and products enabling the management of spatial features associated to their attributes. It permits storing and managing attributes related to land and natural resources. It provides users and managers with basic tools for querying, editing information,

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sharing information, and updating data. The decision makers' prospective is to get capabilities of making decision based on real spatial and factual data.

The aim behind the chapter is to present and discuss an approach of developing a necessary paradigm to improve land information management. The approach is run through an outlook scheme based on four components obviously defined as requirements of the paradigm. The first component is the fundamental geodetic network as a spatial reference frame ensuring the homogeneity of describing the whole features, utilities, and infrastructures. The second and third components based on the fundamental geodetic network are respectively a series of large-scale maps and an integrated land administration system. The fourth component is the conceptual core model of the land information system. Indeed, a synthesis analysis of the economical and social impact of the new paradigm is presented.

LITERATURE REVIEW

The General Concepts

The GIS technology affects our behavior regarding either the natural or the physical world we have built. This technology has widely been appreciated by several groups of users because it plays an important role in their everyday life. Various GIS applications are conceived and implemented to meet the user needs in different domains. A kind of applications based on this technology is Land Information System. This has promoted efficiently online delivery, electronic sharing, and transfer of information on land and property spatially referenced. A wide public of the GIS users are stressed to have a public access to land information everywhere and at any time.

Before being implemented, a GIS application must be designed to facilitate data analysis and management. Various levels and approaches are developed to deal with this subject. The levels may be grouped into three stages: conceptual, logical, and physical level (Longley et al., 2001). The conceptual level involves the tasks of identifying the real organization and its functions to be computerized. It permits to define the structure of handled data, the relationships between them, and the user views of the future system. The logical level concerns studying the data types to be used in specific software. The physical level constitutes the final step aiming to define the physical structure of the GIS to develop.

The approaches used to design GIS in general and particularly the land information systems may be divided into two major categories namely the methods based on waterfall Life Cycle and the emerging methods based on the large concepts of the Object-Oriented Approach [OOA]. The waterfall Life Cycle design assumes that the development of an information system flows through a series of stages such as: analysis, design, implementation, testing, and maintenance. The stages are mostly sequential because each stage in the "waterfall" model must be requisitioned while the preceding stage is complete. Each stage has its own method to be released. For that reason there are barriers from stage to stage (Taylor, 1992).

The OOA enhances the Life Cycle design in two manners by using three basic mechanisms: objects, messages, and classes (Haining et al., 1995). It reduces the barriers between stages using a unique language and provides specific tools to assist each stage. The real world objects are described in the object analysis phase and translated directly into system objects in the design object phase, and so on. This way makes a system easier to be tested and maintained (Muller, 1999). The structure of the GIS applications with their large database is not easy to manage using the waterfall lifecycle. The involvement of the OOA