Changing Pattern of Land Use in Kaduwela Municipal Council in Sri Lanka

By

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DECLARATION OF THE CANDIDATE

I do hereby declare that work described in this thesis was carried out by me under the supervision of Dr. H.M.Ranjith Premasiri and Dr. D.P.S.Chandrakumara, and report on this thesis has not been submitted in whole or in part to any University or any other institution for another Degree/Diploma.

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Abbreviations

RS	Remote Sensing
GIS	Geographical Information System
UC	Urban Council
UDA	Urban Development Authority
DS	Divisional Secretary
GND	Grama Niladhari Division
EVE	Enumeration of Vital Events
MSS	Multi Spectral Scanner
TM	Thematic Mapper
ETM	Enhanced Thematic Mapper
FAO	Food and Agriculture Organization
MC	Municipal Councils
TC	Town Councils
RDA	Road Development Department
LU	Land Use
LC	Land Cover
EIA	Environmental Impact Assessment
ha	Hectares
GAA	Greater Asmara Area

OBIA	Object-Based Image Analysis
LCM	Land Change Modder
UTM	Universal Transverse Mercator

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ABSTRACT

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The study of land use changes is very important to have proper planning and utilization of natural resources and their management. Traditional methods for gathering demographic, censuses data and analysis of environmental situation are not adequate for multi complex environmental studies. Since many problems are often presented in environmental issues and great complexity of handling the multidisciplinary data set. Therefore it does require new technologies like satellite remote sensing and Geographical Information Systems.

The objective of the study is to identify the changing pattern of land use in Kaduwela Municipal Council from 1970's to 2016. Primary and secondary data are to be used for the analysis. The secondary data were from the UDA, Survey Department and land sat 5 images in 1975, 1980, 1997 and 2016. The primary data was collect using field checking and discussion held with offices and residence.

The land use in Kaduwela Municipal Council is change very fast. Specially most of the land uses are change for increase of residential, commercial and service infrastructure facilities. The paddy, marshy or inland cultivation lands (Homestead) are the alternative land for use of residential, commercial and other urban activates. In addition, the land price of the area is increase very rapidly and land block outing is increase and the size of the plots is more small.

Key Words – GIS, Land Use Changes, Temporal Pattern, Remote Sensing, Urbanization and Sub- urbanization

Chapter One

INTRODUCTION

1.1 Introduction

The reaction of the man to the environmental conditions is not only a natural reaction, but also are regulatory action. Cities are also a part of this artificial environment where humans are formed and molded with its own culture. If cities are handles as an artificial environment; it present that they appear in a way closed to the ideas and ideals of their inhabitants (Hough, 1990). The rapid pace of urbanization has been shown to be a global problem present in most of the developing countries. Largely, land is a natural resource and considered as the surface of the earth where the human live. As well land use is called as how the human used the land for their various requirements. A use of the land is accessed for multipurpose; as not only for residential, institutional, recreational, commercial, industrial, agricultural and utilities, but also for infrastructure use. The land use and land cover of any particular region is an outcome of both natural and socio-economic factors and their utilization by man in time and space. In order to that the land use change in city area is a complicated process; several factors have influences on this process, including both physical and human aspects.

The study of land use/land cover (LU/LC) changes is very important to have proper planning and utilization of natural resources and their management (Asselman et al, 1995). .Traditional methods for gathering demographic data, censuses, and analysis of environmental samples are not adequate for multi complex environmental studies (Maktav et al, 2005) since many problems often presented in environmental issues and great complexity of handling the multidisciplinary data set; we require new technologies like satellite remote sensing and Geographical Information Systems (GIS).

Remote sensing has become an important tool applicable to developing and understanding the global, physical processes affecting the earth (Hudak, Wessman, 1998). Recent development in the use of satellite data is to take advantage of increasing amounts of geographical data available in conjunction with GIS to assist in interpretation (Tziztiki et al, 2012). GIS is an integrated system of computer hardware and software capable of capturing, storing, retrieving, manipulating, analyzing, and displaying geographically referenced (spatial) information for the purpose of aiding development-oriented management and decision-making processes.

In addition to remote sensing along with GIS tools used to gather, display, store, analyze and output data related to the urban and sub-urban environment, can provide planners with certain data sets (Donnay et al, 2001; Bahr, 2001) in order to better manage the urban and sub-urban areas. RS and GIS can be used in particular in: – location and extent of urban areas; – spatial distribution of different land use categories; – primary transportation network and related infrastructure; – various census-related statistics and socio-economical indicators; – 3-D structure of urban area for telecommunications and Environmental Impact Assessment (EIA) studies; and – the ability to monitor the changes in these features over time. The data set can be tackled through land use/cover mapping and land use change detection, using the appropriate techniques of image classification, change detection and analysis. The remaining data sets still require further development to be fully operational.

1.2 Study Problem

Knowledge about land use/land cover has become important to overcome the problem of biogeochemical cycles, loss of productive ecosystems, biodiversity, deterioration of environmental quality, loss of agricultural lands, destruction of wetlands, and loss of fish and wildlife habitat. The main reasons behind the LU/LC changes includes are population growth, rural-to-urban migration, reclassification urban areas, lack of valuation of

ecological services, poverty, ignorance of biophysical limitations and use of ecologically incompatible technologies.

The land use change in urban area is a composite process. Several factors influence this process, including both physical aspects and human aspects. Accelerated urban expansion is usually associated with the social-economic factors. For substantial development, municipal authorities need tools to monitor how the land is currently used and assess future demand. The understanding of urban land change is important for decision makers and planners. The main change of land use in urban areas can be described as other type of land use converting into urban land. Unfortunately, the conventional survey and mapping techniques are expensive and time consuming for the estimation of urban expansion and such information is not available for most of the urban centers, especially in developing countries. As a result, increased research interest is being directed to the monitoring of urban growth using GIS and remote sensing techniques. Remote sensing is increasingly used for identifying and analysis of urban expansion since it is cost effective and technologically efficient. In recent years, these methods have progressed and have been widely used in management of natural resource and urban planning.

However, this study focuses to identify the changes of the land use in Kaduwela MC situated surrounding area of the Colombo MC and the adjoining area of the Sri Jayewardenepura Kotte MC. Which are situated in new sub-urban area. In addition, classification is going to be analyzed use of most powerful technological tools for identify the changes of land use from 1970's to 2016.