

Survey of Land Use and Land Cover Change Detection using Remote Sensing

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ABSTRACT - Land use/ land cover is an imperative component in considerate the interactions of the human activities with the atmosphere and thus it is compulsory to screen and perceive the changes to maintain a defensible environment. In this paper a challenge has been made to study the variations in land use and land cover parts of Coimbatore and Tiruppur districts. The study was carried out finished Remote Sensing and GIS approach using SOI topo sheets, LANDSAT imagery of 2000 and IRS-P6-LISS-III 2009. The land use/land cover arrangement was accomplished based on the Survey of India topo sheets and Satellite imageries. GIS software is used to prepare the thematic maps and pulverized truth clarifications were also completed to check the accuracy of the classification. The ten year time period of 2000 -2009 shows the major type of land use change. Agricultural activities were decreased from 33.9% to 26.3%, interchangeably fallow land was increased 43.9% to 54.5% and built-up-land was increased 0.1 % to 0.3% The reasons for this change detection have been discussed. Though plantation, land with scrub, wet logged, barren rocky, tanks and reservoirs have also experienced the change. Coimbatore and Tiruppur district are recognized as one of the industrialized areas in India. It is required to closely monitor the land use/land cover changes for sustaining a sustainable environment for a proper development.

Keywords: Land use, Land cover, change detection, Remote sensing, GIS.

I. INTRODUCTION

Land use/land cover (LULC) changes are main issues of universal environment change. The satellite remote sensing data with their monotonous nature have proved to be rather useful in mapping land use/land cover decorations and changes with time. Quantification of such changes is conceivable through GIS techniques even if the subsequent spatial datasets are of dissimilar scales or resolutions. Such studies have helped in considerate the dynamics of human happenings in space and time. Land use refers to man's activities. Throughout the past millennium, humans have taken a progressively large role in the alteration of the global environment. With increasing numbers and emerging technologies, man has emerged as the major, most powerful, and general instrument of environmental change in the biosphere today. Land use denotes to man's activities and the varied uses which are accepted on over land and land cover refers to natural vegetation, water bodies, rock/soil, artificial cover and others noticed on the land. Land Cover, defined as the grouping of biotic and a biotic mechanisms on the earth's surface is one of the most crucial belongings of the earth system.

Land cover is that which protections the surface of the earth and land use designates how the land cover is adjusted. Land cover includes: water, snow, grassland, forest, and bare Soil. Land Use includes agricultural land, built up land, recreation area, wildlife management area etc. Additionally this type

of analysis provides a valuable tool to increase the productivity of land use and land cover, and to diminish the negative environmental and societal impacts related to LULC. Over the years, remote sensing has been used for land use/land cover planning in dissimilar parts of India. Submission of remotely sensed data made possible to study the changes in land cover in less time, at low cost and with better accurateness. Remote sensing and Geographic Information System (GIS) provide resourceful methods for analysis of land use issues and tools for land use planning and modeling. In this present study, an examination has been carried out in Parts of Coimbatore and Tiruppur district of Tamil Nadu to perceive the land use land cover changes. This area is known for widespread development of industrial growth activity in recent decades. It is whispered that this destructive human activity might have predisposed on the land use/land cover patterns momentous in a possible impact on the environment. This work is taken up to better appreciate this aspect.

II. STUDY AREA

The study area is placed in and around the southern parts of Coimbatore and Tiruppur district, Tamil Nadu. The area enclosed in this investigation is about 3953.3 sq.km lying in between 76° 50' 00" to 77° 30' 00" E longitude and 11° 10' 00" to 10° 20' 00" N latitude. The study area is in among the southern part regions of the Noyyal, Aliyar, Tirumoorthy and Amravati rivers. Coimbatore district The total population in (2001) – 2916620 and (2015) –

5692878 Temperature – maximum 34.90c, minimum 18.40c Tiruppur district The total population (2001) – 1917033 and (2011) - 4369081 Rainfall (in mm)

Normal - North East Monsoon- 328.9, South West Monsoon- 189.8, Actual - North East Monsoon- 410.7, South West Monsoon - 252.9.

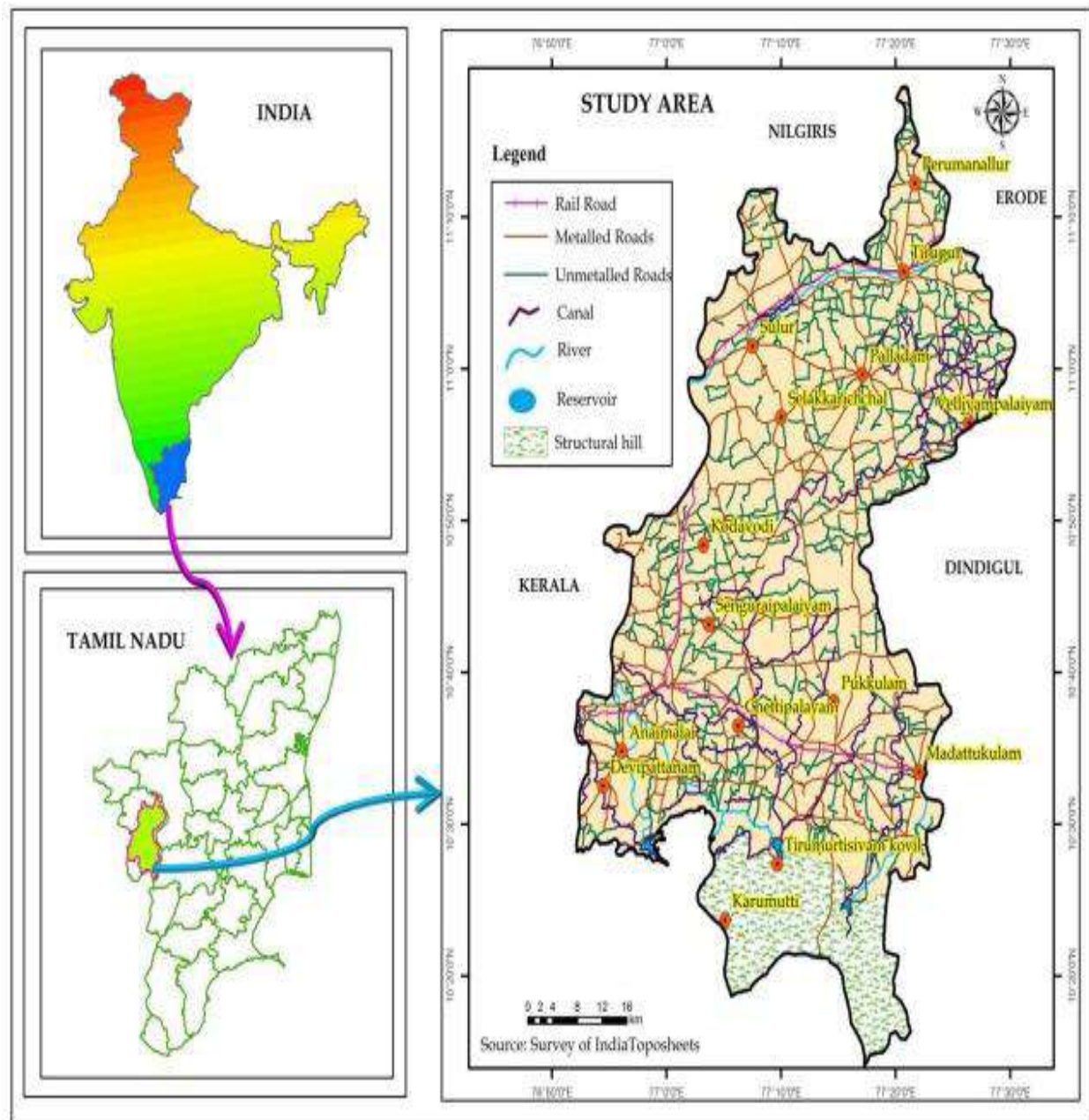


Fig.1: location map of the study area

III. METHODOLOGY

The base map of the study area is organized from the Survey of India 1:50,000 scale geographical sheets (58 B/13, 58 B/14, 58 B/15, 58 E/4, 58 E/7, 58 E/8, 58 F/1, 58 F/2, 58 F/3, 58 F/5, 58 F/6, 58 F/7 and 58

F/8). To make the change investigation of the study area, two images from the satellite LANDSAT MSS and IRS P6-LISS III 2000 and 2009. Data has been removed from the multitemporal satellite images and toposheets. Key for understanding satellite imagery elements is shown (table 1).

Table: 1. Interpretation Key for Understanding Satellite Imagery Elements

Elements	Interpretation technique	Description
Water bodies	Water bodies include those pixels reproducing dark blue to light blue and cyan color in standard FCC.	This category comprises areas with surface water in the form of ponds, lakes, drains and canals etc.
River	It lookslike light blue to dark blue in color.	This is a natural course of water ensuing a linear contiguous pattern.
Agricultural land	Pixel reflection varies from light red to bright red and green in color. Area under this grouping follows regular shape with distributed to continuous pattern.	This category involves land under crops, fallow, plantations and aquaculture/ pisciculture.
Plantation	It exhibits bright red to dark red color, smooth to medium texture and connecting to non-contiguous pattern.	This is considered as scattered plants and threatened forest with the help ofSurvey of India Toposheets.
wet logged	Eminent from other waterbodies with the help of Survey of India Toposheets.	It is perpetual or seasonally water saturated land.
Barren rocky	It looks in greenish blue and brown in color with varying size and irregular to intermittent shape.	It is a bare unprotected land devoid of vegetation.
Built-up land	It is obligating regular pattern and appears in cyan color.	This category includes urban and rural settlements, transportation, communication and entertaining utilities.

Characteristics of color reflection of pixels are with reference to standard False Color Composition (FCC):

Area statistics of a piece of land use category is calculated in Sq.kmin attribute table. The land use/land cover classes comprise crop land, fallow

land, settlements, rivers, drains, plantation, tanks etc. the feature classes were identified based on the visual clarification of the satellite imagery coupled with filed checks. These datasets were digitized and investigated to obtain land use/land cover statistics for the areas under each of these sets for both the

years. Example Flow chart of methodology for LU/LC change detection in the year of 2000 to 2009.

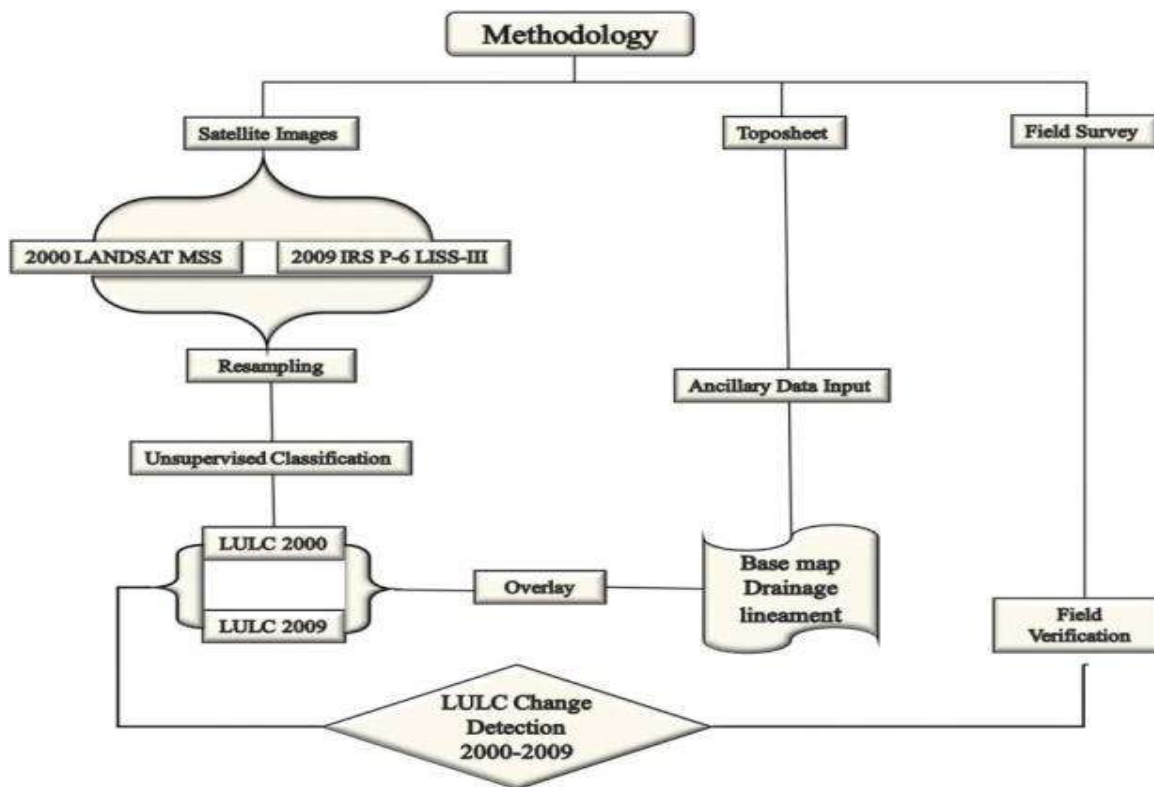


Fig 2. Flow chart of methodology for LU/LC change detection

IV. RESULT & DISCUSSION

The general land use of an area represents an idea of complete areal consumption of resources, natural or cultural. In this paper, variations in the land use and land cover of Coimbatore and Tiruppur districts are evaluated from the alterations between ten years of period (2000-2015) in figure-3. The conclusions of the present investigation are presented in table 1. Agriculture activities were decreased from 33.9% to 26.3%, interchangeably fallow land was amplified 43.9% to 54.5% and built-up-land was increased 0.1% to 0.3%. The reasons for this change recognition have been discussed. Though plantation, land with scrub, wet logged, barren rocky, tanks and reservoirs have also experienced the change. The Landsat and IRS P6 –LISS III satellite datasets used in the current study generated the following comparisons with respect to land use / land cover change uncovering. From the current study it is evident that there is extensive decrease in the study area for the period of 2000 to 2015.

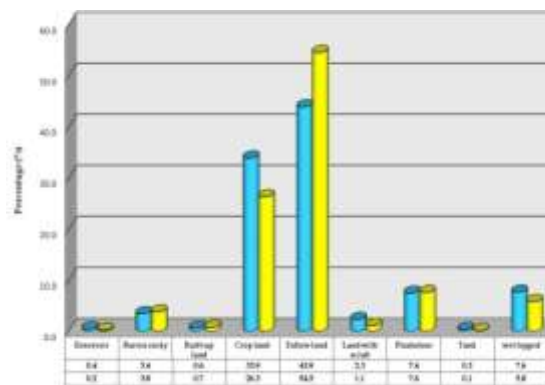


Fig 3. Land use / Landcover change, 2000-2015

V. CONCLUSION

The study was supported out in the southern parts of Coimbatore and Tiruppur districts. The study clearly conventional that the satellite remote sensing together with GIS can be a powerful tool for mapping and estimation of land use/land cover changes of a given area. The important changes in the land use/land cover during the study period between the years 2000

to 2015 recorded some interesting observations. The study exposed that the major changes occurred in cropland, wet logged and fallow land. The features namely crop land, Reservoir and tanks indicated a decreasing trend whereas the features like fallow land and areas under wet logged, plantations and clearances indicated an increasing trend. The reasons accredited for this are due to the changes in the pattern of unindustrialized activity and increased activity of suburbanization. In general the land use/land cover data during the study period (2000-2015) of the study area signposted certain significant changes which may not show any major environmental impact. Though, these trends need to be closely monitored for the sustainability of situation in future.

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