Assessment of Land use Land Cover Changes in Ennore River Mouth of Thiruvallur District, Tamil Nadu, South India

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Abstract— Coastal zones are the most vulnerable area for land use changes due to its rapid development of urbanization. Evolution of land use land cover along the coastal estuary has got importance because of drastic development. The main objective of this paper is to evaluate and quantify the land use /land cover and its changes of Thiruvallur estuary from 2004 to 2016 using multi – temporal satellite images and digital change detection techniques. The changes were carried out using ERDAS image processing and ArcGIS softwares. The study proves it's significant on changes of land use /land cover in the river mouth area. The comparison of land use/land cover for the period of 2004 and 2016 derived from satellite imagery interpretation indicates that there is a significant increase in built – up land area, water body, and vegetation lands.It noted that substantial amount of scrub land and wetland area vanished during the period of the study which due to rapid urbanization of the area.

Key words: Remote Sensing, Arc Map, ERDAS, LU/LC Changes, Thiruvallur

I. INTRODUCTION

The land cover represents the physical characteristic of earth's surface taken in the distribution of vegetation, water, soil and other physical features of the land' including those created entirely by anthropological actions(J.S Rawat et al.,2015). The land is the essential factor of production, and through much of the course of human history, it has been strongly joined with economic growth after unsuitable land use is carrying various forms of environmental degradation. The land uses land cover pattern of an area is a result of natural and socio - economic factors and their consumption by the man in period and space. And it has been an important research field, and it is one of the most complex pointers of the collaboration between human activities and natural environment it widely used for development and handling. Land in the recent year's geographic information system and remote sensing have been employed for several applications including the detection of land cover changes (Mahermilad Aburao et.al.,2015).

The remote sensed data made possible to study the changes in land cover in less time, at the low coast with better accuracy in association with GIS that provides a suitable platform for data analysis update, and retrieval (Bulent Karakus, 2015). The classification studies carried out to identify the various classes in this region which are vulnerable to the environmental degradation. Analysis the spatial and temporal variations in land use and land cover is one of the effective ways to understand the land changes. This study attempts to evaluate the land use land cover changes occurred in Ennore river estuary area of the Thiruvallur coast during the period 2004 to2016. And also identify the human intervention factors as well as their possible impacts on the river mouth occurring in the region.

II. STUDY AREA

This study area is within the limit of the city of Chennai, the capital city of the Tamil Nadu. The characteristic of Ennore mouth this is the largest river mouth in Thiruvallur district has undergone tremendous variations in the recent, and the past alternating cyclones the recurring flood has become predominant features of this estuary. This backwater placed in Ennore area the latitude and longitude is 13°14'10"N and 80°19'00"E. Chennai along the Coromandel coast of the Bay of Bengal, it is found in the zone comprising lagoons with salt marshes. Backwater submerged underwater during high tide forming an arm of the sea with the opening to the Bay of Bengal at the creek. The Creek covers an area of 2.25km^2 it sited 20km north of the city. It is oriented from west to east and opens into the Bay of Bengal to the east at Ennore.
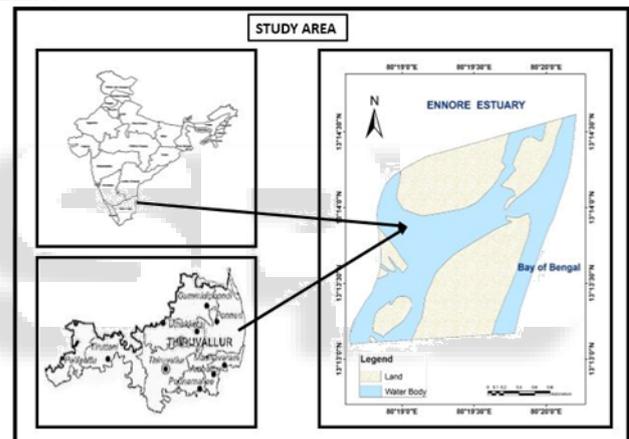

Fig. 1: Study Area Map

III. MATERIALS AND METHODOLOGY

For the purpose of analysis in this study primarily estuary area was delineated using relevant Survey of India toposheet (SOI) subsequently, the multispectral remote sensing images obtained from the IRS satellite for the period 2004-2016 is processed and analyzed.

A. Image classification

National land use land cover classification using remote sensing data for mapping. The benefits of a classification are tending to persuade for evolving slandered classification system that is guided by practical experience and continues observation. For the purpose of detailed analysis, the image land use has classified into six categories that are built up area, vegetation, scrub land, waste land, wetland, and water body the comparison and evolution of percentage variation have primarily made with the land use images captured during 2004 and 2016. The remote – sensing techniques are used f or interpreting data the goal of image enhancement technique was to improve the visual interpretability of an image by increasing the apparent distinction between the

features. ERDAS imagine image-processing software used in the present study. The land use land cover map prepared by supervised classification for Ennore river mouth based on IRS - LISSIII satellite data. Initially, land use land cover map different level of classes it's corresponding to the NRSC classification scheme. The land use classifications adopted by the National Remote Sensing Agency, Hyderabad. The classifications used for classifying the object in the present investigation. Below the (Table: 1), indicates the different sources and materials are used for the data preparation.

Data	Source
IRS - LISSIII 2004 and 2016 Satellite Data.	Bhuvan
Toposheet ;1:50000 scale	Survey of India
Field data LU/LC	Ground truth collection during field survey

Table 1: The satellite data sensors and ground truth data sources are summarized

IV. RESULTS AND DISCUSSION

A. Land Use/ Land Cover

The objective of this study is to evaluate and quantify LU/LC changes that have been taken place Ennore estuary region from 2004 to 2016 using remote sensing technologies the maps are shows LU/LC changes in 5.5 Sqkm. The satellite remote sensing data for the year 2004 and 2016 provided the recent information about the land use area. The residential areas, vegetation, wasteland, water bodies, scrub land, and wetland are various land use/ land cover categories identified and mapped. The area under different land use/ land cover classes was determined for each of these two periods (2004and 2016) and it is presented in (figure: 2&3).

B. Changes in Vegetation

A major factor responsible for main classification vegetation have increased from21 percent 2004 to 24 percent in 2016, the main reason of changes was noticed scrub lands are converted into vegetation because of the availability of tidal water, backwater, and wetness.

C. Changes in Built up Lands

Rapid development in population and number of occupied residential houses have been stated from each village of the study area. This has certainly caused changes in its main city of Thiruvottiyur. The built -up lands area is increased 1.5 percent in last 12 years.

D. Changes in Water bodies and Wetlands

Significant 4.5 percent increase was noticed in the area under water bodies. The Water also increased from 2004 to 2016 this is due to the deep erosion of the river mouth at the same time tidal activities. The area occupied by wetlands are decreased 3 percent in 2004 – 2016, the water body has increased similarly wetlands are reduced.

E. Changes in Scrub Land and Waste Land

The area under scrublands have decreased 12 percent 2004 to 7.5 percent in 2016, the vegetation lands were improved in the time of period, because of the lands are changed into vegetation. Also, waste land have decreased 1.5 percent is due to nonexistence of soil erosion and land degradation.

The area of Ennore river mouth is highly vulnerable and equally, effect with Erosion and Accretion compare of this period of data 2004 to 2016 the built -up lands are increased because of after the tsunami the people are again making a new infrastructure development in the highly disturbed area. Below the given (Figure: 4, 5) graphs are indicate the increment and reduction of land use land cover in both 2004 and 2016 of data.
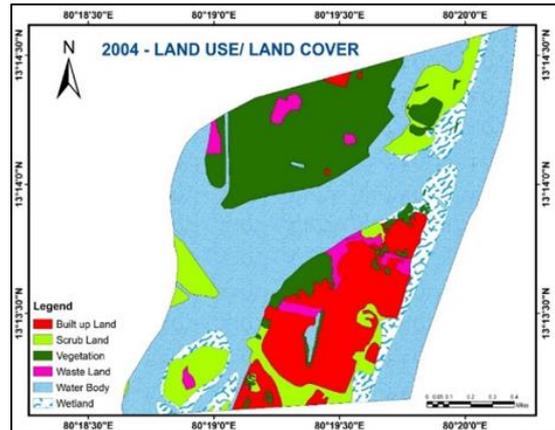

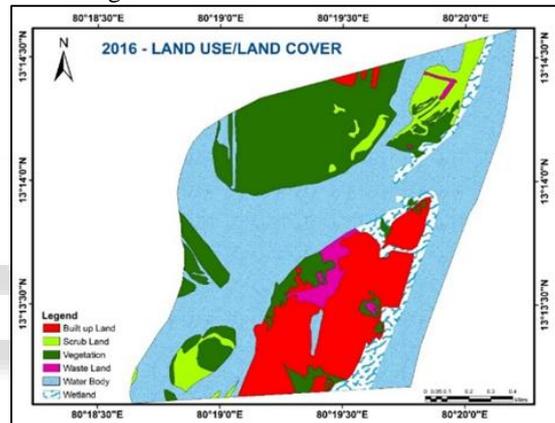Fig. 2: Land Use Land Cover – 2004
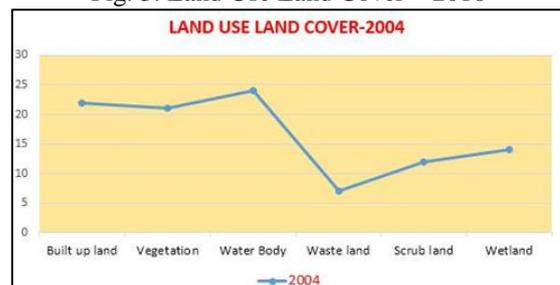

Fig. 3: Land Use Land Cover – 2016
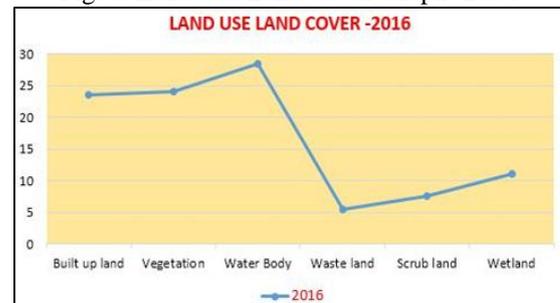

Fig. 4: Land Use Land Cover Graph -2004

Fig. 5: Land Use Land Cover Graph -2016

V. CONCLUSION

This study has given good vision into Ennore river mouth changes during the last one decades. From this study it has been observed (Figure: 6) that coastal land use types like wetlands, scrub land, wasteland is drastically reduced because of rapid urbanization. But the vegetation and built up land also increased. The river mouth contains every year of changes and this is highly erosion area of Thiruvallur coastal zone. After the tsunami peoples are again settled in the area. Proper land use land cover management strategies needed to develop to protect these important coastal estuary region. The study finally focused the impact of both natural and anthropogenic coastal developments in the study area.
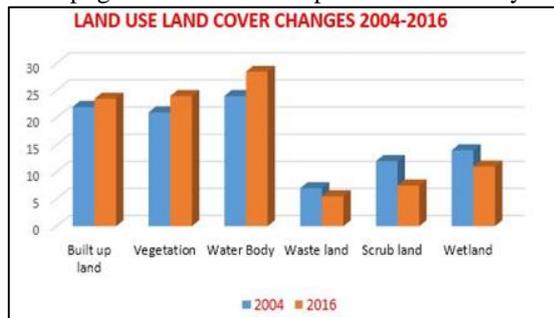

Fig. 6: Land Use Land Cover Changes Graph (2004-2016)

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