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Land Use /Land Cover Change Detection Mapping Using Satellite Data, Along The Thiruvallur Coastal Stretch, Tamil Nadu,South India

Nithu Raj , B. Gurugnanam
Gandhigram Rural Institute - Deemed University, Gandhigram, Dindigul, Tamil Nadu, India

ABSTRACT

The land use information collected for thiruvallur coastal stretches, from the analysis of Landsat data for the years 2013-2016. The main objective of this paper is to evaluate and quantify the land use/ land cover and its changes of thiruvallur coastal stretch using multi-temporal satellite images and change detection analysis. The changes were carried out using image processing and ArcGIS software. The result indicates growth of the land with scrub and while there were decreases in agriculture lands. The study proves that some significant changes of land use /land cover in the coastal stretch. This provides information is useful to local planners managers and to set up towards sustainable development in the study area.

Keywords: Land use Land cover, Change Detection, ERDAS Image Processing, ArcGIS

I. INTRODUCTION

Land use land cover assessment is one of most important parameters to plan land resource management very meaningfully. Land use and land cover change have become a central component in current strategies for managing natural resources and monitoring environment changes (Jagadeesha et al., 2015). Land cover is a physical appearance of land and represents its ecological status. It is dynamically changed due to human intervention, natural disturbance and succession GIS and remote sensing were used to determine the changes based on date series of Landsat satellite imagery (Ling et al., 2016).

Land use and land cover changes will continue to affect resilient human communities and ecosystems as a result of climate change the data is of great significance to the future research on global change (Sizah et al., 2017). Land use can be defined as the use of land by humans, usually with an emphasis on the functional role of land in economic activities (Lillisand et al., 2004). Decadal changes of land use land cover features reflect the socio-economic conditions in the area and a key driver. Indicating the hazards and vulnerability due to natural and anthropogenic activities. GIS and remote sensing provide an effective platform for assessment of land use land cover changes and transformations over time (Kaliraj et al., 2017). The overall characteristic of land use land cover types it can be drawn that the spatial patterns of land use and cover types have taken place great changes. Land use, land cover change results from the interaction of human activity and natural environment changes (Zhang et al., 2012). The supervised classification results were further improved by employing image enhancement and visual interpretation. Visual interpretation was not only useful in increasing the classification accuracy of the Landsat images but it was helpful in identifying areas (Abd et al., 2011). The classification studies are carried out in order 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 challenges to evaluate the land use land cover changes along the Thiruvallur coast during the period 2013 to2016.

II. STUDY AREA

The study area is a heavy industrial area. And it is located in the north part of the Chennai. The entire coastal stretch is 38 km length and the coastal region is mostly flat and dreary, but on the other, it is undulating and even hilly in some place. The study area located between 80˚02'30" E- 80˚22'30" E longitude and 13˚15'00" S -13˚35'00" latitude. The eastern part of the study area covers Pulicat lagoon it's a second largest backwater system in the south-eastern coast of India and it's shared over the district of Thiruvallur in Tamil Nadu and Nellore in Andhra Pradesh with an area of about 460 Sq.km parallel to the Bay of Bengal.

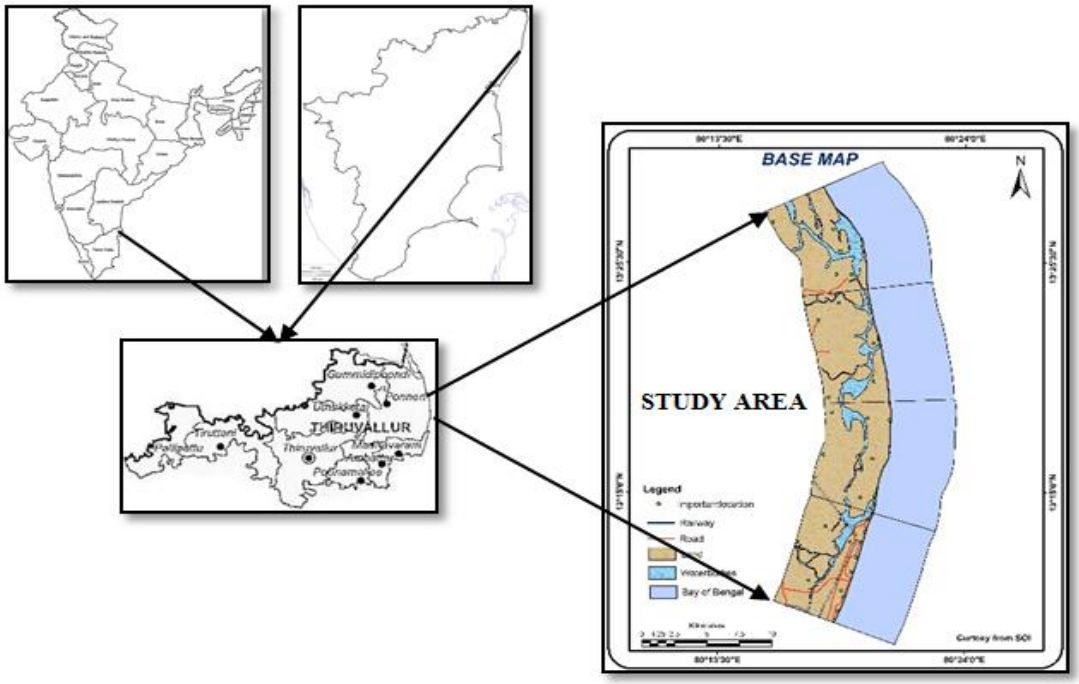

Figure 1. Study Area Map

III. DATA SOURCE AND METHODOLOGY

Base map was prepared using survey of India toposheet 1:50,000 the multispectral remote sensing images are obtained from the Landsat satellite for the period 2013-2016 is processed and analyzed. The Landsat data products were downloaded from USGS. The satellite data product was registered to the universal transverse Mercator (UTM) map projection zone 44N and scaled to planetary reflectance. The resolution of the acquired image was 30m and the data was processed into four channel data. The image quality was improved by applying various enhancement techniques. The purpose of detailed analysis, the image land use has been classified in to fifteen categories that is built up area, aquaculture pond, agriculture land, backwater/ lagoon water, dense scrubland, industrial area, Island, land without scrub, land with scrub, port, river/ canal, sandy beach area, wetland, and water body the comparison and evolution of percentage variation have been primarily made with the land use images captured during 2013 and 2016. The remote – sensing techniques are used for 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 imaging image-processing software was used in the present study. The land use land cover map prepared by supervised classification is based on satellite data. Initially, land

use land cover map had a different level of classes it's corresponding to the NRSC classification scheme. The land use classifications are adopted by the National Remote Sensing Agency, Hyderabad. The classifications are used for classifying the object in the current study. Below the (Table 1), indicates the different sources and materials are used for the data preparation.

Table1. Data Sources

Data	Source
USGS - 2013 and 2016 Satellite Data.	Earth Explorer
Toposheet; 1:50000 scale	Survey of India
Field data LU/LC	Ground truth collection during field survey

IV. RESULTS AND DISCUSSION

Land Use/ Land Cover Patten

Land use and land cover are terms frequently used interchangeably however, these terms have significantly different meanings applications. Land cover refers to physical features on the surface of the earth. Land use specifically refers to the human utility of what is on the earth's surface (Tammy et al., 2015). The purpose of this study is to evaluate and quantify LU/LC changes that have been taken place Thiruvallur coastal stretch from 2013 to 2016 using remote sensing technologies the maps are shows LU/LC changes in 188.52 Sq.km. The satellite remote sensing data for the year 2013 and 2016 provided the recent information about the land use area. built up area, aquaculture pond, agriculture land, back water/ lagoon water, dense scrub land, industrial area, Island, land without scrub, land with scrub, port, river/ canal, sandy beach area, wetland, and water body are various land use/ land cover categories identified and mapped.one of the detailed and useful ways to develop land use classification maps is use of geospatial techniques such as remote sensing and geographic information system it vastly improves the selection of areas designed as agriculture, industrial, and urban sector of the region (Zahra Hassan et al., 2016). The area under different land use/ land cover classes was determined for each of these two periods (2013and 2016) and it is presented in (figure 2&3).

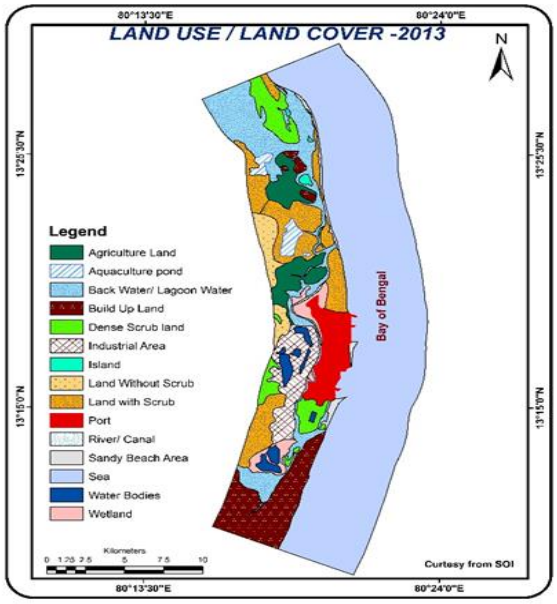

Figure 2. Classified Land use Land cover map - 2013

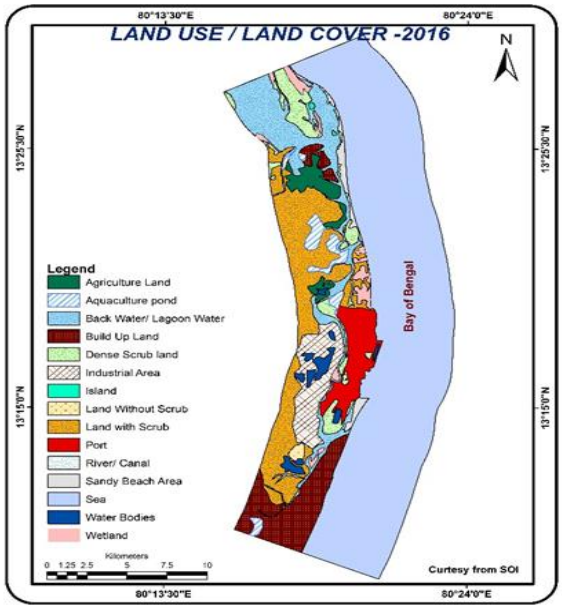

Figure 3. Classified Land use Land cover map- 2016

Table 2. The Area of Geospatial Extent in Square Kilometer

Land use/ cover classes	2013 Area in Sq.km	2016 Area in Sq.km
Agriculture pond	3.95	6.15
Agriculture land	13.52	7.37
Backwater/lagoon water	37.7	33.7
Built up land	25.2	24.02
Dense scrubland	13.72	13.12
Industrial area	13.55	15.02
Island	0.806	0.234
Land without scrub	7.22	0.934
Land with scrub	30.74	45.63
Port	14.2	14.04
River/Canal	0.594	0.482
Sandy beach area	3.02	4.23
Water bodies	5.11	4.75
Wetland	6.22	5.4

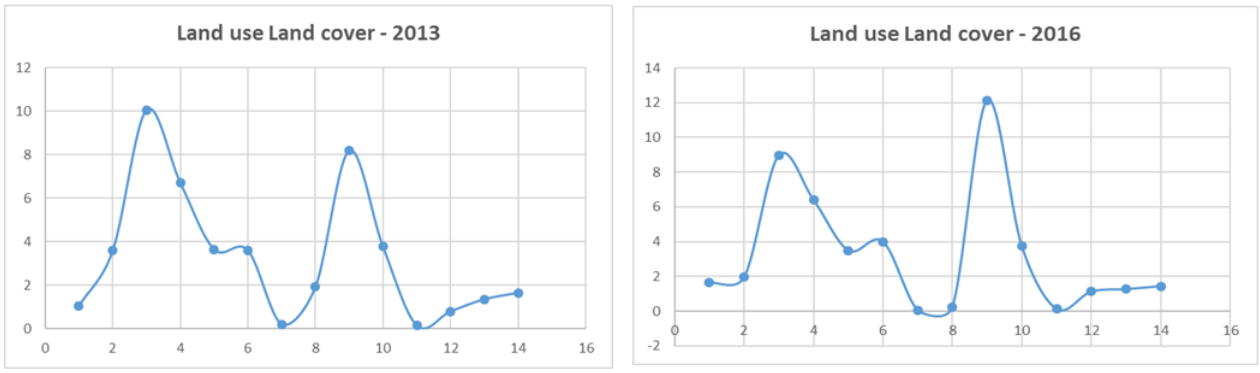

Figure 4. Graphical Representation of 2013 and 2016 Land Use Land Cover

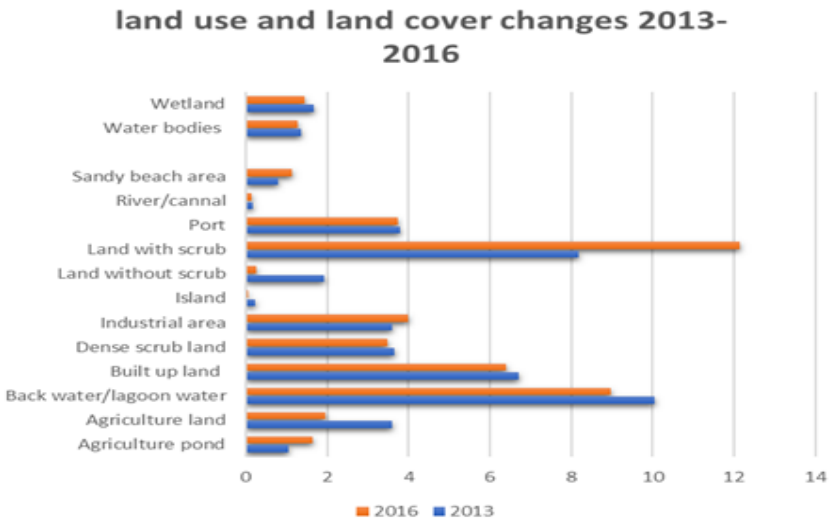

Figure 5. 2013-2016 Changes Detection Graph of Land Use Land Cover

The land use and land cover have fourteen classifications for the year 2013-2016 are shown in figure 2 and figure 3. The geospatial extent in square kilometre for the study area is shown in the table 2. The classified land cover in the study area is built up area, aquaculture pond, agriculture land, backwater/ lagoon water, dense scrubland, industrial area, Island, land without scrub, land with scrub, port, river/ canal, sandy beach area, wetland, and water body. In the present study in 2016, the land with scrub is most abundant in the terrestrial coverage. In 2013, the agriculture land has been noticed with a marginal increase 13.5 km^2 in the coverage. whereas, the agriculture land is further reduced to 7.37 km^2 of the study area. Is mainly due to frequent monsoon failure and land degradation. The land with scrub shows the drastic changes in 2016, is 45.6 km^2 in the study area. In 2013, it is showing 30.7 km^2 in the land coverage. Backwater/ lagoon water is the second most dominant land cover in the study area the spatial coverage of this area is 37.77 km^2. In 2016, it is observed with a spatial extent of 33.7 km^2 the difference between these two years 2013-2016 backwater and lagoon water cover 2% which is reduced this is happened due to the heavy rainfall and climate variations. the massive changes occur in other area is the industrial area it shows in 2016, is 15.02 km^2 the industrial area is increasing every year because of the economic development of the cities it also shows industrial growth and thereby reducing the land. In between, 2013-2016 significant amount of land transformation has occurred the changes detected in a land with scrubs, agriculture land and industrial areas.

V. CONCLUSION

This study has given good vision to Thiruvallur coastal stretch. From this study, it has been observed that

coastal land use major types like agriculture land, backwater, land without scrub, is drastically reduced because of rapid urbanization. But the industrial area and land with scrub also increased. The study area 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 regions. The study finally focused the impact of both natural and anthropogenic coastal developments in the study area.

VI. REFERENCES

[1]. Jagadeesha Pai B., Narayana Shenoy K., 2015. Land use land cover pattern in the vicinity of Mannapalla Lake, Manipal. Aquatic Procedia, 4: 1405-1412.

[2]. Lillisand M Thomas., Keifer W Ralph., Chipman W Jonathan., 2004. Remotesensing and image interpretation. Wiley India.

[3]. Ling Nashin., Lilik B Prasetyo., Agus P Kartono., Nandi Kosmaryandi., 2016. Land cover change in Kuningan District during 1994-2015. Procedia Environmental Sciences, 33: 428-435.

[4]. O.R Abd El-Kawy., J.K Rod., H. A Ismail., A.S Suliman., 2011. Land use land cover change detection in the Western Nile Delta of Egypt using remote sensing data. Applied geography, 31: 483-494.

[5]. S Kaliraj., N Chandrasekar., K.K Ramachandran., Y Srinivas., S Saravanan.,2017. Coastal Land Use Land Cover Change and Transformations of Kanyakumari Coast, India using remote sensing and GIS. The Egyptian journal of remote sensing and space sciences http;//doi.dx.doi.org. 1101016IJ.ejrs.2017.04.003.

[6]. Sizah Mwalusepo., Eliud Muli., Asha Faki., Suresh Raina., 2017. Land use and land cover data changes in Indian Ocean islands: case study of Unguja in Zanzibar Island. Data in Brief 11: 117-121.

[7]. Tammy E. Parece., James B. Campbell., 2015. Land use Land Cover Monitoring and Geospatial Technologies: An Overview. Advance in Watershed Science and Assessment, http;//doi.10.1007/978-3-319-14212-8-1.

[8]. Zahra Hassan., Rabia Sabir., Sheikh Saeed Ahmad., Amir Haider Malik., Neelam Aziz., Amna Butt., Summara Erum.,2016. Dynamic of Land Use Land Cover Changes (LULCC) using geospatial techniques: a case study of Islamabad Pakistan. Springerplus, 5(1):812.

[9]. Zhang Qingqing., Xu Hailiang., F.V Jingyi., Yu Pujia., Zhang Peng., 2012. Spatial analysis of Land Use Land Cover changes in recent 30 years in Manas River Basin. Procedia Environmental Sciences, 12: 906-916.