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Analysis of Land Use/Land Cover Changes Using Remote Sensing Data in Dindigul District, Tamil Nadu, India

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ABSTRACT

Land use/land cover (LU/LC) changes in Dindigul District, Tamil Nadu, were determined during the period 2000 to 2016 using Geospatial technology. Landsat imageries were used to study the past and present land use/ land cover changes. The study results show that there is an increasing trend in the built-up area, especially in urban built-up.

Keywords: Land Use/Land Cover (LU/LC), Change detection, Remote sensing, GIS

I. INTRODUCTION

Land use / Land cover change is a major issue of concern with regards to change in global environment (Qian et al., 2007). The land use/land cover pattern of a region is an outcome of both natural and socio-economic factors and their utilizing by men in time and space. The land is becoming a scarce commodity due to immense agricultural and demographic pressure. The change in land use pattern over space and are thus responsible for physical-economic-social and environment factors. There are different types of land use/land cover existing on the earth for e.g., cropland, water bodies, forest plantation, dense forest, barren rocky, built-up area etc. The land use/ land cover analysis is one of the common methods for development; planning and management of natural, particularly land. The remote sensing gives the synoptic view of the earth surface. The repetitive coverage of satellite has made possible to examine the changes on a regular interval of time (Mani et al., 2014). Land use/Land cover dynamics are widespread, accelerating, and significant processes majorly impelled by human actions and at the same time resulting to changes that impact human livelihood (Agarwal et al., 2002). The land use/land cover dynamics modify the availability of different important resources including vegetation, soil, water and other (Bruijnzeel, 2004 & Chomitz et al., 1998). At present, an attempt focused to study Land use/Land cover changes occurred in Dindigul District, Tamil Nadu State to understand the impact of changes in Land use/Land cover between 2000, 2008 and 2016.

II. STUDY AREA

The study area lies between 77015' and 78015'E longitude and 1000' to 10045'N latitude, which falls under the Survey of India (SOI 1973) Toposheets No:58J01-58J08 and 58F06 -58F16, on 1:50000 scale and covering a total area of 6266.64 km2. The elevation varies from 158 to 2,529m above MSL. Dindigul district is bounded by Palani hill ranges of the Western Ghats in the west, Sirumalai hills in the southern and eastern parts. The northern part of the district covers plain terrain. Figure 1 shows the

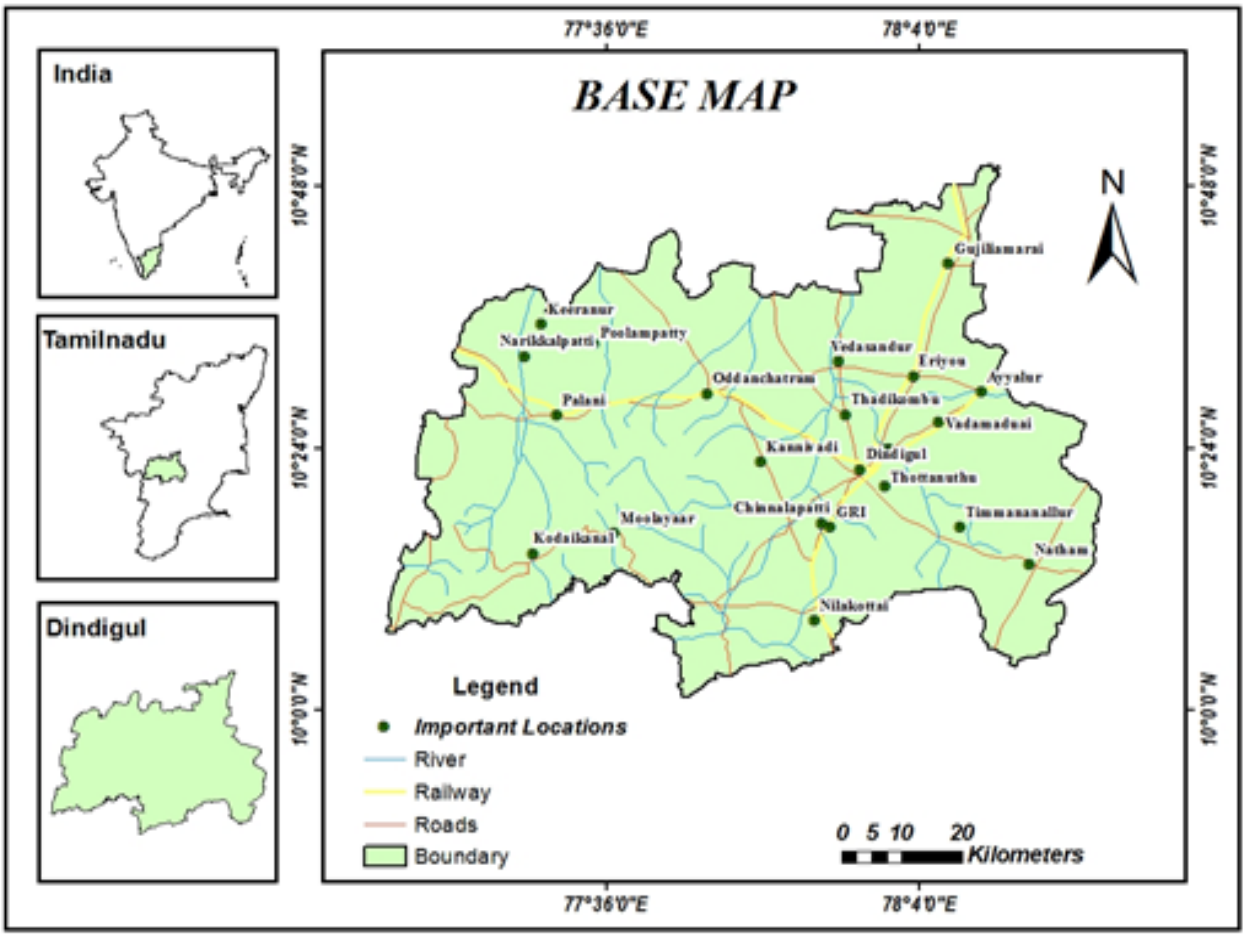


Figure 1. The Base map of the Dindigul district

III. DATA USED

In the present study, land use/cover change detection has been carried out using multispectral, LANDSAT data of 2016, 2008 and 2000-year data. All the satellite images were brought to Universal Transverse Mercator (UTM) projection in zone 44^0 N. The toposheets requisite for the study has been collected from Survey of India and the details are given in table. 1.

Table 1. Datasets Used In The Present Study And Their Source

S. No	Data type	Year of product	Scale/Resolution	Source
1	Toposheet No:58J01-58J08 58F06 -58F16	1968 -1973	1:50:000	SOI
2	LANDSAT 5	2000	30m	USGS
3	LANDSAT 7	2008	30m	USGS
4	LANDSAT 8	2016	30m	USGS

IV. METHODOLOGY

The required satellite imagery for the study area was downloaded from the USGS Earth Explorer. Processing the imagery and image interpretation for development of Land use and Land cover layers of each year is done in ENVI Imagine software and ArcGIS. The obtained maps are studied and analysed to detect the change in land use/land cover. The methodology adopted in detail is shown below Figure 2.

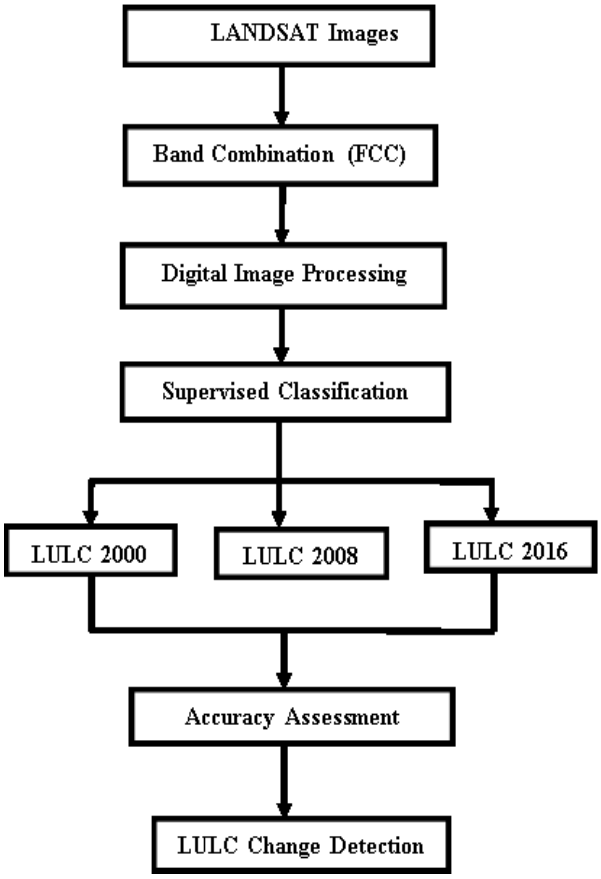


Figure 2. Methodology flowchart of Land use / Land cover Mapping

V. RESULTS AND DISCUSSION

5.1. Land Use / Land Cover Classification (2000)

The barren Rocky land is the dominant feature in the study area and it covers 1769.62 km² Fig.3. Second major land use is forest plantation land and it covers 1384.97 km² area. The Southwest portion of the district has wide forest plantation land. Total Crop Land in the district is 1292.18 km² area. Totally the settlements covered 1174.21 km² area. Dense forest covered 421.51km² area. The surface water bodies are the major source for the cultivation and drinking water for many regions. 39.36 km² area was covered by surface water bodies in 2000.

5.2. Comparison of Land Use / Land Cover from 2000 to 2008

Fig.4. shows the land use/land cover in 2008 image. Table. II. illustrates the changes in land use in 8 years from 2000. The maximum changes occurred in Barren Rocky. The 9.87% area of Barren Rocky had reduced in 2008. Crop Land and Dense Forest were increased to 1.52 km², 7.68 km², and 2.09 km² areas respectively. And they occupied 1.52%, 7.68% and 2.09% in total area of the district. The maximum changes occurred in water bodies. The percentage of changes in Forest Plantation and Water bodies are -1.26% and -0.18% respectively. The built-up land was increased. The 1267.21 km² area of built-up land increased in 2008.

5.3. Comparison of Land Use / Land Cover from 2008 to 2016

Fig.5. showed the land use/land cover in 2016 image. Table. III. illustrates the changes in land use in 8 years from 2008. The maximum changes occurred in Forest Plantation. The 9.64% area of Forest Plantation had reduced in 2016. Built-up and Crop Land were increased to 1267.21km² and 1971.75 km² areas respectively. And they occupied 20.83% and 32.41% in total area of the district. The percentage of changes in Water Bodies, Dense Forest, and Barren Rocky is -0.26%, -1.62% and -6.87% respectively was noted.

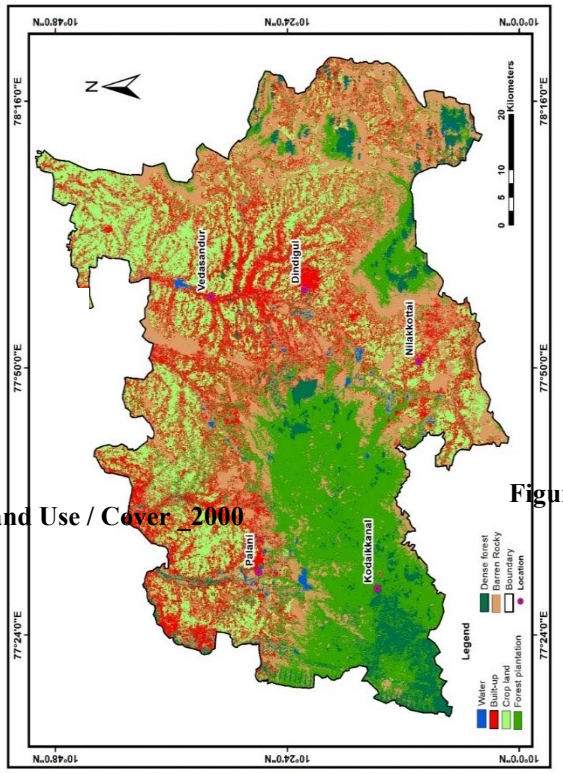


Figure 3: Land Use / Cover _2000

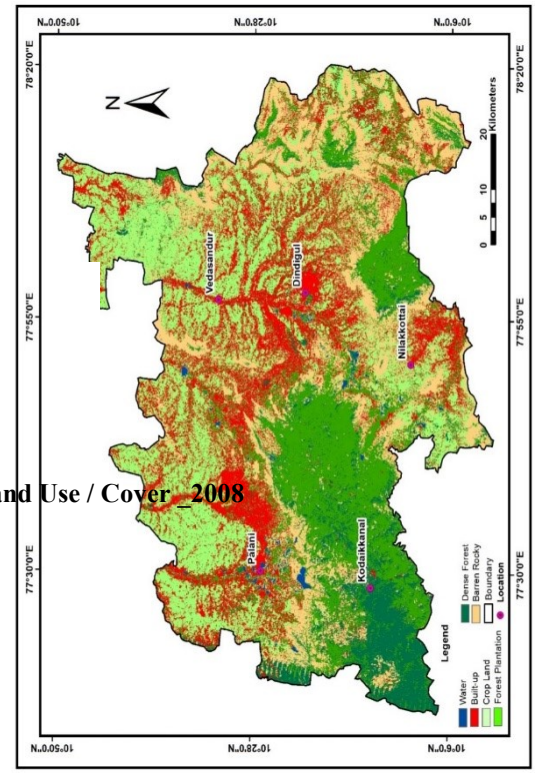


Figure 4: Land Use / Cover _2008

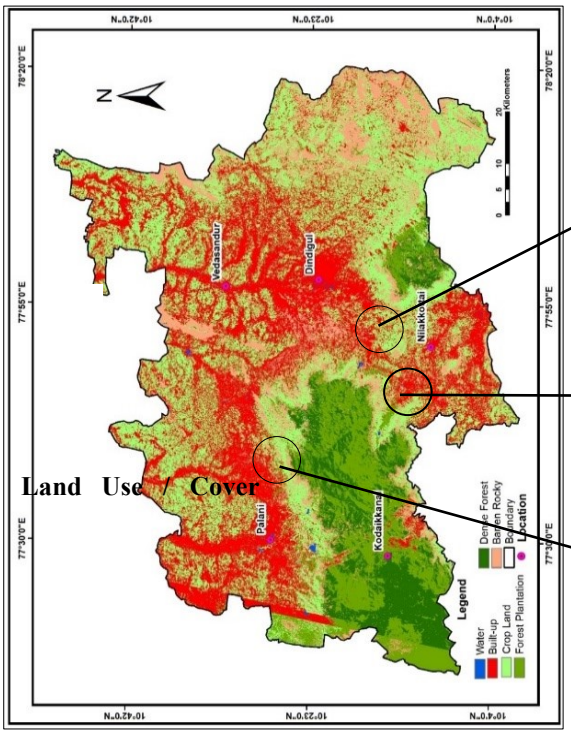
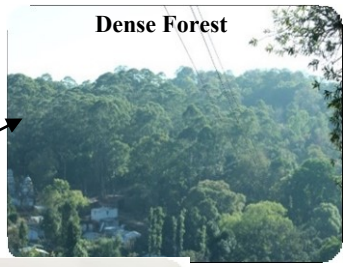
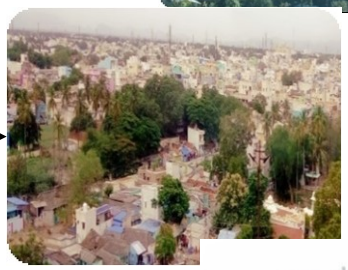
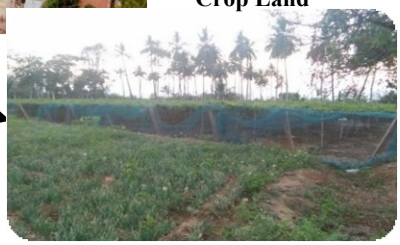


Figure 5: Land Use / Cover



Dense Forest





Crop Land

Table 2. Land Use/Land Cover Changes From 2000 To 2008

Land Use / Land Cover Classes	Area in km²		% of Area		Changes (Area in km²)	% of Changes
	2000	2008	2000	2008		
Water Bodies	39.36	28.74	0.65	0.47	-10.62	-0.18
Built-up	1174.21	1267.21	19.31	20.83	93	1.52
Crop Land	1292.18	1760.32	21.25	28.93	468.14	7.68
Forest Plantation	1384.97	1308.72	22.77	21.51	-76.25	-1.26
Dense Forest	421.51	548.91	6.93	9.02	127.4	2.09
Barren Rocky	1769.62	1170.22	29.1	19.23	-599.4	-9.87

Table 3. Land Use/Land Cover Changes From 2008 To 2016

Land Use / Land Cover Classes	Area in km²		% of Area		Changes (Area in km²)	% of Changes
	2008	2016	2008	2016		
Water Bodies	28.74	12.5	0.47	0.21	-16.24	-0.26
Built-up	1267.21	1971.75	20.83	32.41	704.54	11.58
Crop Land	1760.32	2195.51	28.93	36.04	435.51	7.11
Forest Plantation	1308.72	722.33	21.51	11.87	-586.39	-9.64
Dense Forest	548.91	432.07	9.02	7.1	-116.84	-1.62
Barren Rocky	1170.22	751.9	19.23	12.36	-418.32	-6.87

5.4. Comparison of Land Use / Land Cover from 2000, 2008 to 2016

The present study is focused on to demarcate the changes occurred in the period from 2000, 2008 and 2016 for the Dindigul district, south India. The satellite data for three different periods, NRSC land use/land cover classification scheme Arc GIS and ENVI software's are used in the present study. The change occurred in between 2000,2008 and 2016 is shown in the form of graphical representation in Figure 6

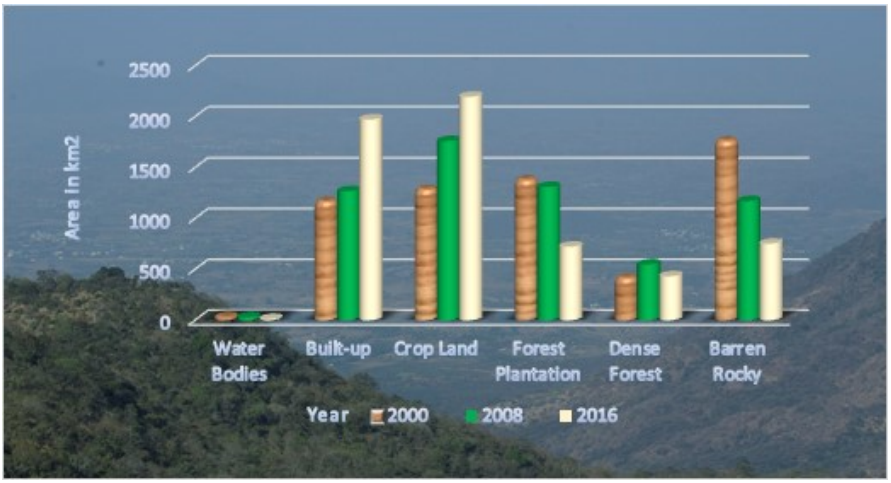


Figure 6. The graphical interpretation showing the in between periods 2000,2008, 2016

VI. CONCLUSION

This paper focuses on land use/land cover changes in Dindigul district, Tamil Nadu, India, using remote sensing data and GIS technology. Our results clearly show that land use/land cover changes were significant during the period from 2000,2008 and 2016. Forest Plantation land gradually decreased in this study area due to its conversion to cropland and Built-up area increased in the study area. While the areal extent of water bodies, dense forest, and barren rocky is decreased.

VII. ACKNOWLEDGMENT

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VIII. REFERENCES

[1]. Agarwal, C., Green, G.M., Grove, J.M., Evans, T.P., and Schweik, C.M. (2002) A Review and Assessment of Land-Use Change Models: Dynamics of Space, Time and Human Choice. Center for the Study of Institution, Population, and Environmental Change, USDA Forest Service Northeastern Forest Research Station, USA, 1-62.

[2]. Bruijinzeel, L.A. (2004) Hydrological functions of tropical forests: not seeing the soil for the trees Agriculture, Ecosystems and Environment 104: 185-228.

[3]. Chilar, J. (2000) Land Cover Mapping of Large Area from Satellites, Status and Research Priorities. International Journal of Remote Sensing, 21 (67), 1093-1114.

[4]. Chomitz, K.M., and Kamari, K. (1998) The domestic benefits of tropical forests. The World Bank Observer 13: 13-35.

[5]. Gaylan Rasul Faqe Ibrahim. (2017) Urban Land Use Land Cover Changes and Their Effect on Land Surface Temperature: Case Study Using Dohuk City in the Kurdistan Region of Iraq. Doi:10.3390/cli5010013.

[6]. Mani, N.D., and Rama Krishnan. N. (2014) Remote Sensing and GIS for Assessing the Impact of Changes on Land Use/ Land Cover in Dindigul District, Tamil Nadu, India, Volume:3/Issue 1.1000114/ 2169-0049.

[7]. Mercy C. Cheruto., Matheaus K Kauti., Patrick D Kisangau., and Patrick Kariuki. (2016) Assessment of Land Use Land Cover Chane Using GIS and Remote Sensing Techniques: A Case Study OF Makueni County, Kenya GIS 5:175. doi:10.4175/2469-4134.1000175.

[8]. Nithu, Raj., and Gurugnanam, B. (2017) Assessment of Land Use Land Cover Changes in Ennore River Mouth of Thiruvallur District, Tamil Nadu, South India. IJSRD, 4(12), 286-288.

[9]. Praveen Kumar Mallupattu and Jayarama Reddy Sreenivasula Reddy. (2013) Analysis of Land Use/Land Cover Changes Using Remote Sensing Data and GIS at an Urban Area, Tirupati, India, Article ID 268623 (6), (http://dx.doi.org/10.1155/2013/268623).

[10]. Qian. J., Zhou, Q., and Hon, Q. (2007) Comparison of pixel-based and object-oriented classification methods for extracting built-up area in arid zone. In: ISPRS Workshop on Updating Geo-Spatial Databases with Imagery & the 5th ISPRS Workshop on DMGISs, 163-171.

[11]. Reibsame, W.E., Meyer, W.B., and Turner, B.L. (1994) Modeling Land Use and Land Cover as Part of Global Environmental Change. Climate Change,28, 45-64.