

Change Detection in Forest/ Non-Forest Cover Mapping Using Remote Sensing and GIS Techniques of Patur Taluka in Akola District, Maharashtra

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Abstract:-

Forest/ Non-forest mapping is an outcome of natural and socio-economic factors and their relation with man in time. Forest is an important parameter for developmental planning. The present study aims to find out the Forest/ Non-forest mapping year 2007 and 2013 in Patur taluka in Akola district, Maharashtra. The study has made use of LISS-III and Land sat TM satellite imageries for the year 2007 and 2013 to identify the Forest/ Non-forest mapping categories in Patur taluka. Forest growth has significantly changed the landscape of Patur taluka. Core zone is totally cover in forest and endangered species, and buffer zone of Patur taluka shows both forest and non-forest area. These studies were employed by using the Survey of India topographic map and the remote sensing data of LISS-III and Land sat TM of 2007 and 2013. Arc GIS software was used to visual interpretations techniques the Forest/ Non-forest mapping divisions in Patur taluka. This research exploration of

all Forest /non-forest area and development of wildlife.

Keywords: - Forest and Non-forest Mapping, GPS, Visual interpretation techniques remote sensing.

Introduction:-

The study of Forest/ Non-forest mapping is very important to have proper planning and utilization of natural resources and their management a forest is more than an area covered by trees because it includes smaller plants, animals, soil and water. The area under forest in India is about 75 million ha. (Mha) constituting 23% of total Geographical area. This is very less against 33% forest cover according to Indian National Forest In this paper, we represent a forest/non-forest map based on Land sat TM imagery and representing year 2013 forested area extent. The aim of the employed methodology is to guarantee the consistency of the product. With the advent of remote sensing, the scope of effective planning and management of

natural resources has considerably widened. The use of satellite data permits timely and accurate information on very short repetitive cycles needed for monitoring. It is observed that remotely sensed data can meet many of the information needs for proper forest management in short time and at low cost. Methodologies have been developed towards this end by various authors (Franklin and Peddle 1984; Tiwari, 1990; Kandya et al 1992; Kaur et al 1994; Dhaliwal et al 1995, Chaudhary et al 1999 and Babu et al 2002). Satellite images are considered as a very useful tool to study forest since they provide a digital mosaic of the spatial arrangement of land covers. Therefore, attempt will be made in this study to map out the status of forest and non-forest cover land between 2007 and 2013 with a view to detecting the land consumption rate and the changes that has taken place in this status particularly in the forest and non forest cover so as to predict possible changes that might take place in this status in the next 14 years using both Geographic Information System and Remote Sensing data.

Aim:-

The aim of this study is to produce a Forest and non- forest map of Patur taluka at different to

detect the changes that have taken place particularly in the forest and non forest land and subsequently predict likely changes that might take place in the same over a given period from 2007 to 2013 using LISS-III and Land sat TM satellite imageries.

Objectives:-

The following specific objectives will be pursued in order to achieve the aim above.

- To create Forest and non- forest Land classification scheme of 2007 and 2013 year from satellite image.
- To determine the trend, nature, rate, location and magnitude of Forest and non-forest Land changes.
- To forecast the future pattern of Forest and non- forest Land in the area.
- To evaluate the socio – economic implications of predicted change.

Study Area:-

The study area Patur is situated in Akola Districts of Maharashtra which is located between 53°29'17" to 79°67'60" N latitude and 53°33'92" to 79°21'25" E longitude. The study area was covered by Survey of India (SOI) toposheet 55H/6,

55H/7, 55H/1 and on 1:50,000 scale.

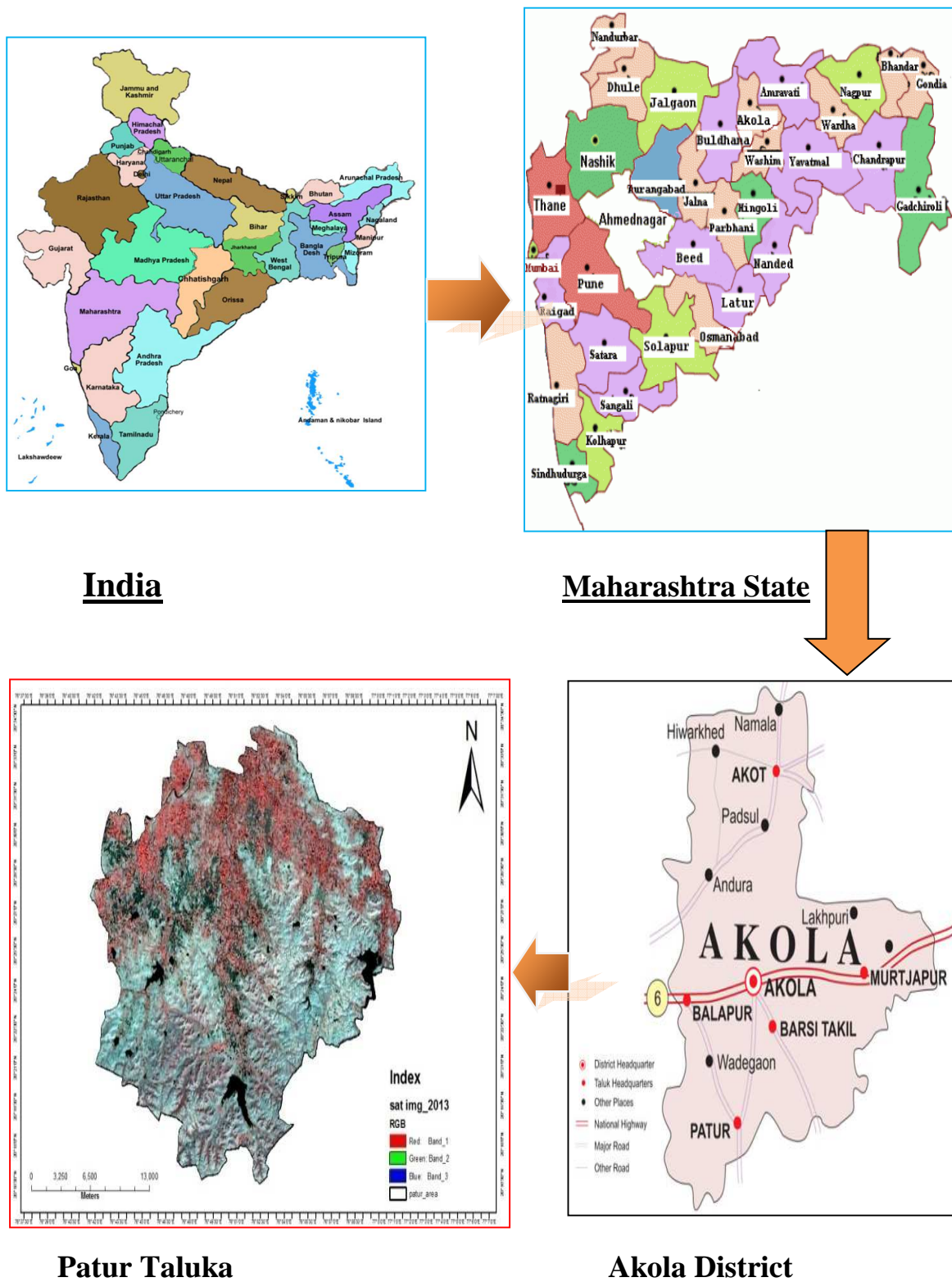


Figure. 1 Location Map of Patur Taluka

Data Used and Methodology:-

Data Used:-

The study has made use of various primary and secondary data. These include Survey of India (SOI) topographic sheets of 1:50,000 scale; and satellite images LISS-III and Land sat TM of 2007 and 2013. These (Land sat) data were visually and

digitally interpreted by using the Arc GIS 9.3 software (for processing, analysis and integration of spatial data) to reach the objectives of the study. Adequate field checks were made before finalization of the thematic maps. The main goal of this study is to extract forest and non forest land changes using multi- temporal satellite data.

Table: 1 Data Used.

S/N	Data Type	Date Of Production	Resolution	Source
1.	Land sat image	2013	30M	NASRDA
2.	LISS-III Image	2007	23.5M	www.nrsa.com
3.	Toposheets	1970/76	1:50,000	GSI

Methodology:-

This process consists of a set of image elements or characteristics like color tone, texture, pattern, size, and shape which help in the recognition of various land use/land cover classes systematically on the enhanced fused satellite imagery during interpretation process. A preliminary image classification key is prepared for classifications of surface features. This is then finalized after the ground truth using the image interpretation key, preliminary interpretation is carried on SIO toposheets available on 1:50,000 scales and a base map are prepared. The methodology involves, the Forest and non-forest pattern

was interpreted from the topographic data LISS-III and Land sat TM of 2007 and 2013 same has been converted as digital databases in GIS environment. Next, the high resolution LISS-III and Land sat TM satellite data for the year 2007 and 2013 was used for interpretation of current Forest and non-forest pattern of the study area and generated GIS data bases. The classes were derived based on LULC classification standards of NRSC during 2013. The change detection was made using GIS overlay techniques. Finally, the derived themes were analyzed and suggested the management plans for degraded and non-reclaimable zones.

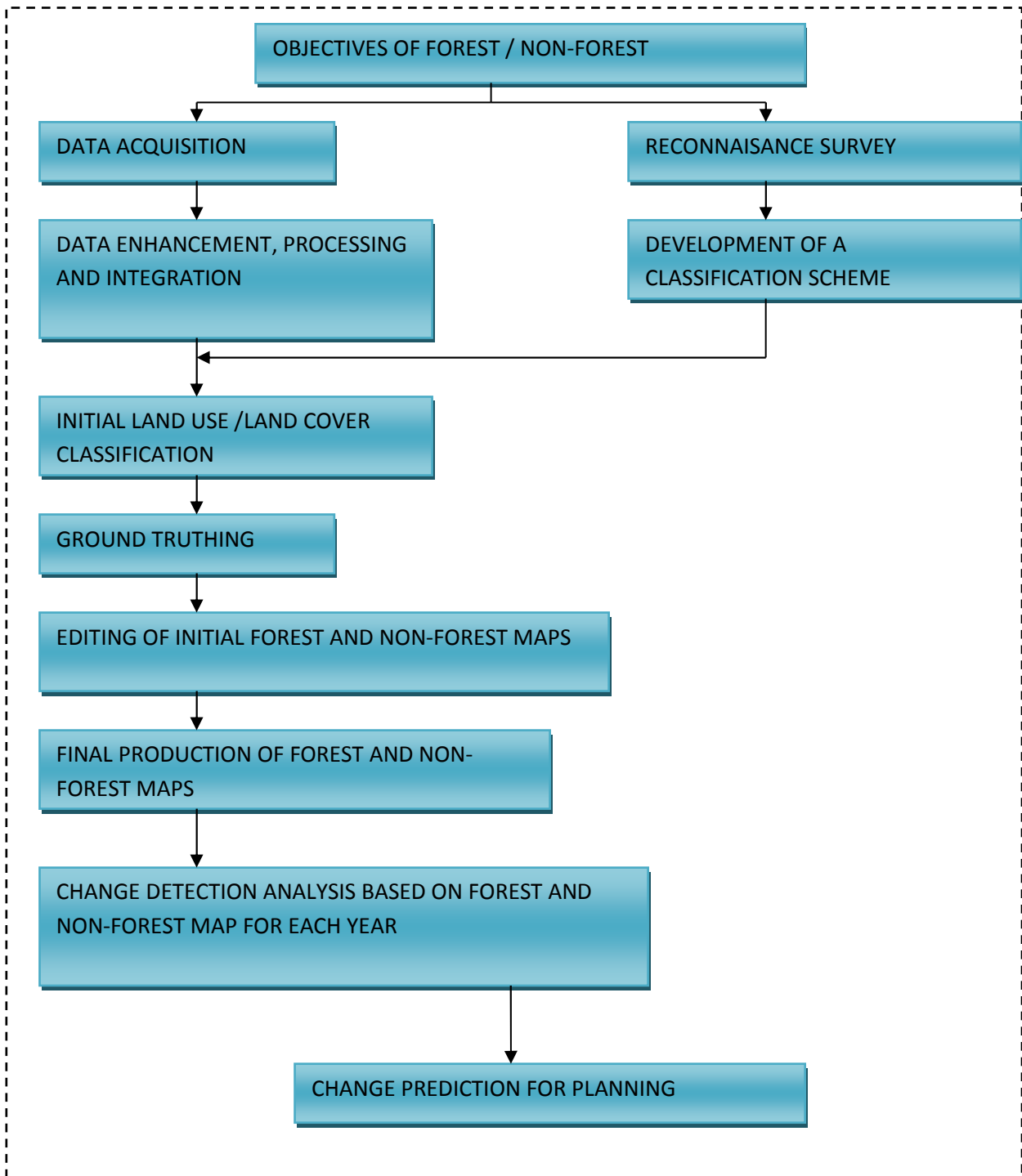


Figure. 2 Flow chart of methodology

Result and Discussion:-

The objective of this study forms the basis of all the analysis carried out in this chapter. The results are presented in the form of maps, charts and statistical tables. They include the static, change and projected land use land cover of each class. Forest & non forest land information is the basic prerequisite for land, water, vegetation resources, utilization, conservation and management. The information on Forest & non forest land available today in the form of thematic maps published statistical figures in records and publications are inadequate, inconsistent and don't provide up-to-date information on the changing land use patterns, process and their spatial distribution in space and time. It is here,

satellite Remote Sensing offers alternate, accurate and faster mode of data collection and updating the Forest & non forest land information and to arrive at a standard classification and explanation of different land use/ land cover classes. It is seen from the area under broad (Level -I) Forest & non forest land map of 2007, the Forest Area - 21063.28 Ha., Non- forest area-49106.74Ha to the total Geographical Area (TGA) of the study area and also It is seen from the area under broad (Level -I) Forest & non forest land map of 2013, the Forest Area - 24754. , Non- forest area-454145.75Ha to the total Geographical Area (TGA) of the study in table 1 and fig3,4.

Table 3 Forest and non-forest Distribution (2007, 2013):-

The figures presented in table three above represent the static area of each Forest and non-forest category for each study year.

Forest and non-forest Categories	2007	2013
	AREA (Ha.)	AREA (Ha.)
Farm Land	35030.92	32364.75
Waste Land	11807.45	9737.05
Built-Up Land	426.71	944.06
Forest Land	21063.28	24754
Water Body	1841.66	2369.89
Total	70170.02	70170.02

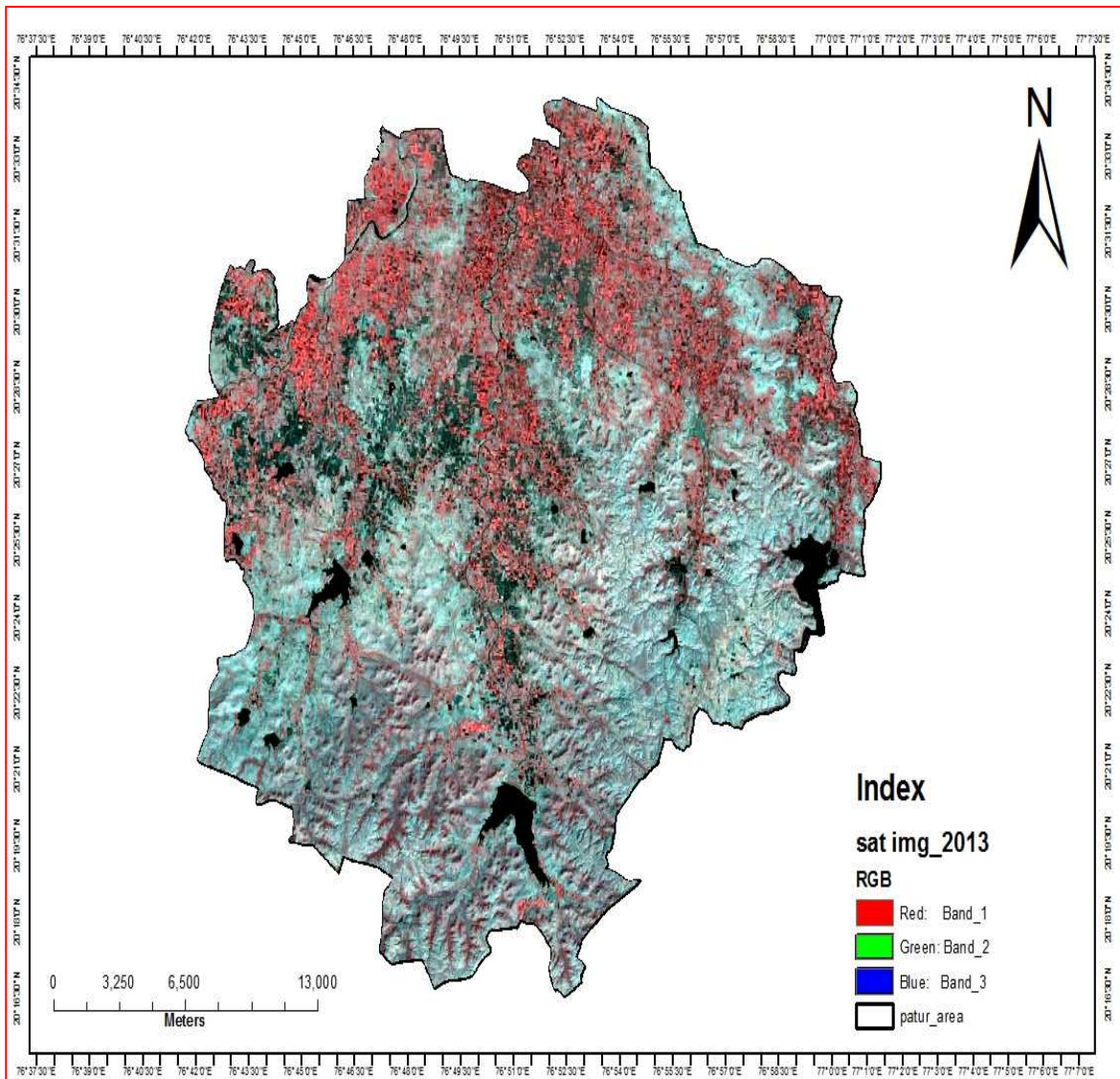


Figure 3. Land sat TM 2013 Image of taluka boundary

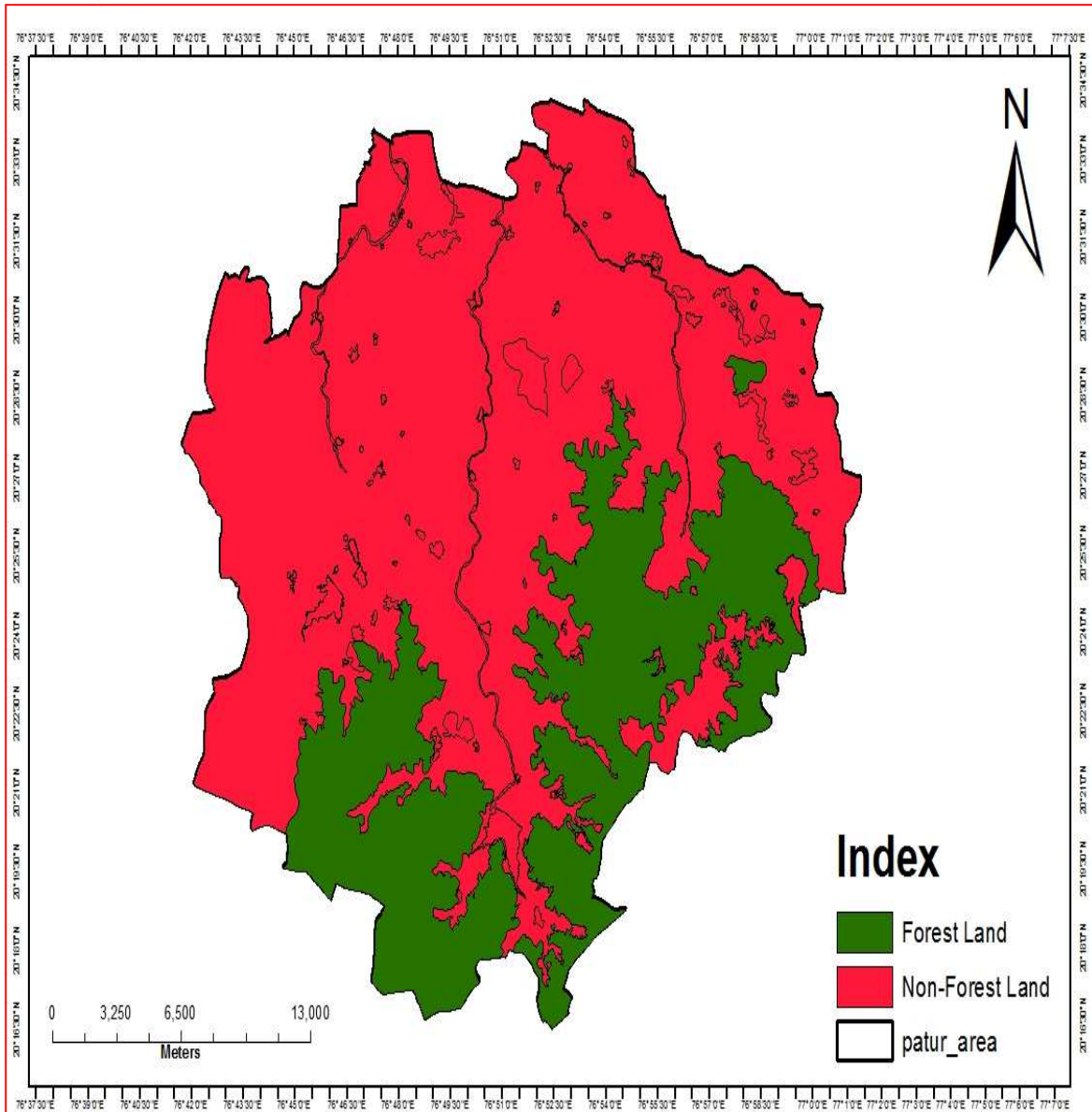


Figure 4. Forest and non-forest Land map of 2007 year.

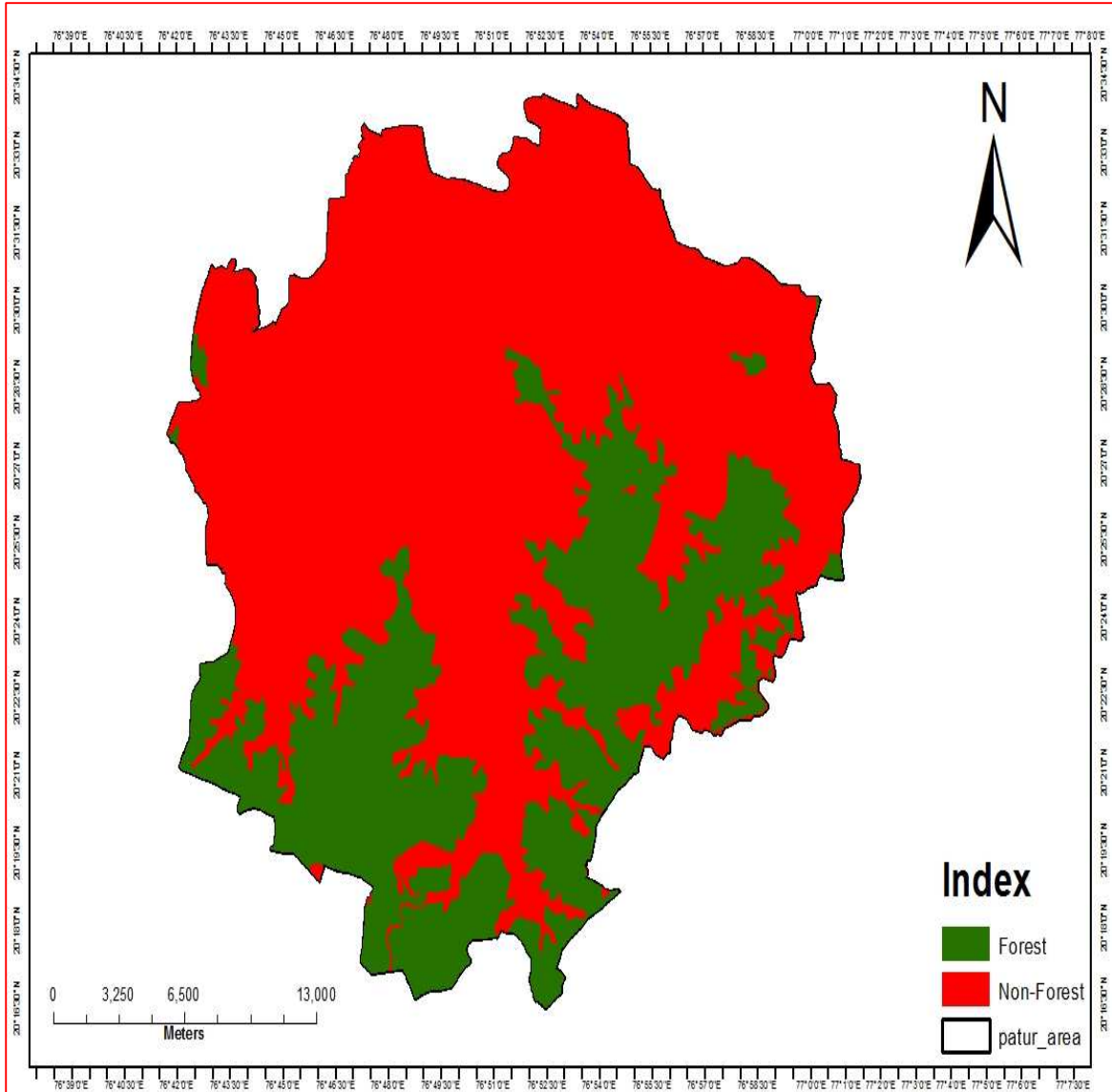


Figure 5. Forest and non-forest Land map of 2013 year.

Conclusion:-

The present study shows that satellite remote sensing based land cover mapping is very effective. The high resolution satellite data such as LISS III data and Land sat TM are good

Source to provide information accurately. Under utilization of potential land, increased population, and land conversion are the major driving forces for the change in land use during the past 14 years. The overall accuracy of the present land cover study is 80%. It is here, satellite Remote Sensing offers alternate, accurate and faster mode of data collection and updating the Forest & non forest land information. It is seen from the area under broad (Level –I) Forest & non forest land cover map of 2007, the Forest Area - 21063.28 Ha., Non- forest area- 49106.74 Ha to the total Geographical Area (TGA) of the study area and also It is seen from the area under broad (Level –I) Forest & non forest land cover map of 2013, the Forest Area – 24754Ha. and Non- forest area- 454145.75Ha to the total Geographical Area (TGA) of the study

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