



**ASSESSMENT OF LAND USE AND LAND COVER CHANGES IN AND AROUND
THE IRON ORE MINES OF THE NORTHEAST BLOCK OF SANDUR SCHIST
BELT, KARNATAKA STATE, INDIA**

Ramesh K¹ and Venkataiah C²

Department of Applied Geology, Vijayanagara Srikrishnadevaraya, University Ballari,
Karnataka

Corresponding Author- Ramesh K

Email- rammigeo@gmail.com

Abstract:

This study investigates LU/LC changes using Remote Sensing and Geographic Information Systems (GIS) in and around Iron ore mines of the Northeast block of Sandur schist belt, Sandur taluk of Bellary District, Karnataka, India, for the years 2010 and 2021. Remote Sensing and Geographical Information System is growing immensely in monitoring environmental issues. The land use/ land cover map has been generated on a 1:50,000 scale using Supervised and unsupervised classification of LISS-IV & LISS-III satellite images on the GIS Platform. The prepared LU/LC maps revealed a significant change in the area of different land use categories during the period from 2010 and 2021. In 2010-11, the agricultural area was 289.194Ha, which increased to 300.91Ha in 2020-2021. This is due to the encroachment of the forestland and because of the population increase. The Built development increased from 1008.82Ha (in 2010) to 1716.28Ha in 2020-21. The mining areas increased from 2220.8Ha (in 2010) to 4632.31Ha in 2020-21. On the other hand, Forest areas have decreased from 13007.7Ha (in 2010) to 10671.42Ha (in 2020-21). Fallow lands have reduced from 3536.16Ha (in 2010) to 2706.62Ha (in 2020-21). Due to excess mining, the soil loses its fertility. Surface water bodies increased from 162.794Ha (in 2010-11) to 199.317Ha (in 2020-21). Land use and cover changes in 2010, 2015-16, and 2020-21 were analysed and shown most agricultural lands have turned into mining pits because of the demand for iron ore. Iron ore (float ores) present in farm fields has also been mined intensively.

Keywords: LU/LC Map, North-East Block of Sandur schist belt,

Introduction

Remote Sensing data has become an increasingly valuable tool for understanding the current land use Land cover pattern. Land cover refers to natural vegetation, water bodies, rock/soil, artificial surface, and others resulting from land transformations, man's activities, and the various uses carried on land. Proper planning, Management, and monitoring of natural resources depend on accurate land use information. Mapping land use/land cover (LU/LC) changes at regional scales is essential for many applications, including landslide, erosion, land planning, global warming, etc. LU/LC alterations (based primarily on human activities) negatively affect climate patterns, natural hazard patterns, and socio-economic dynamics on an international and local scale. This study investigates LU/LC changes using Remote Sensing and Geographic Information

Systems (GIS). Due to the different environmental impacts of mining on the land surface, the land use pattern may undergo significant change. Forests may have to be cut, 'agricultural activities shifted elsewhere away from the mine, roads, and rivers diverted, and human habitations and industries may come up where there used to be none.

Study Area:

The study area falls under parts of Survey of India Toposheets Nos. 57 A/8, A/1 2, A/16, and 57 B/9. It covers the space of about 20226.87 Hectares in the Northeast portion of the Sandur schist belt; structurally, the Sandur hills form a tightly folded synclinorium, plunging gently to NNW, and the mountain ranges broadly delineate the folded limbs of synclines, with close repetition of strata due to minor folds.

Methods and Methodology:

The research on remote sensing has been directed for several decades towards image processing & development of methods for digital map generation, especially on land use/land cover. The primary aims were to produce thematic maps that could be quickly updated. However, maps obtained from automatic digital classification fail to entirely satisfy the purpose for which it is generated. Therefore, a digital classification procedure has been used to create maps of land use/land cover from satellite data. The technique is based on a stratified approach. Image enhancement is one of the critical image processing functions primarily done to improve the appearance of the imagery to assist in visual interpretation and analysis. The image enhancement techniques were used to get the best image for visual interpretation. Histogram equalized stretch enhancement techniques were applied to the imagery of the study area for a better understanding of different features in the satellite imagery.

The LISS-IV & III has been used for

the digital classification of land use categories. The subset area of 10 km radius area has been stratified by generating a forest mask from a topographical map. In the non-forest area, the un-supervised classification has been applied. In this classification type, spectral classes are grouped first, based solely on the numerical information in the data, and then matched by the analyst to information classes. Unsupervised classifiers do not utilize training sets as the basis for classification. ERDAS IMAGINE 2014 Processing Software was used to process spatial data digitally. Digital image processing techniques were applied for mapping the land use/land cover classes of the provided area from the satellite data. Fig 1 shows the methodology adopted for the present study. The land use is classified through supervised area classification and the cultural features of agriculture, Built-up (Rural/Urban), Mining/Industrial, Forest, and water bodies. The description of these land cover classes is presented in table 1.

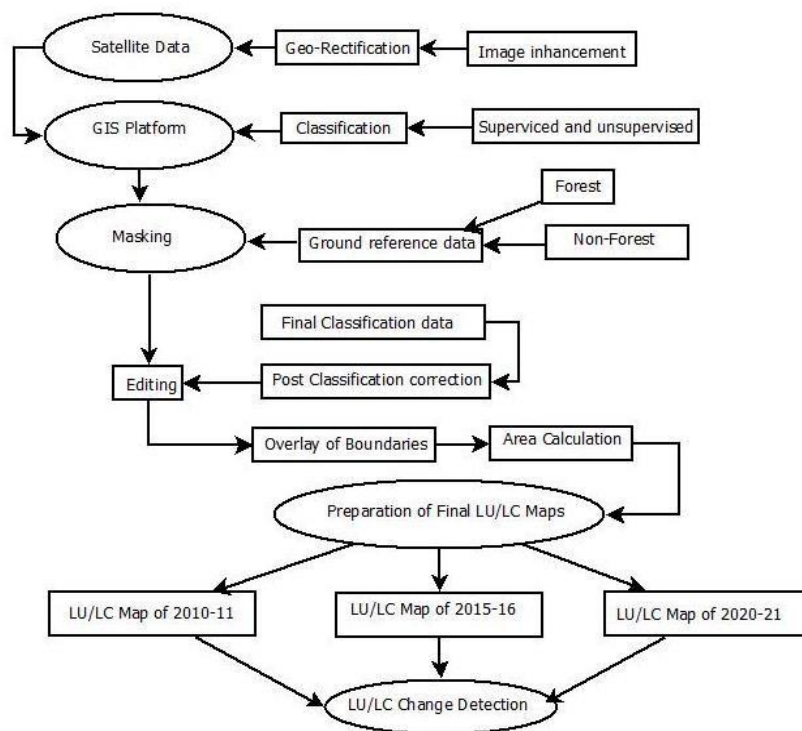


Figure 1: Flow chart showing the methodology adopted for the present study.

Result and Discussion:

The land use/ land cover map has been generated on a 1:50,000 scale using the

digital classification of LISS-IV & LISS-III. Based on the methodology developed for the current land use/ land cover, categories have been grouped under the following major

land use/landcover categories, Forest, Built-up land (settlements), Agricultural land, Mining Area, FallowLand, and Water bodies

Table 1: Land use /Land cover classification Change Detection from 2010-11, 2015-16, and 2020-21.

LU/LC Class	In the year 2010-11 (Area in Ha)	In the year 2015-16 (Area in Ha)	In the year 2020-21 (Area in Ha)
Forest	13007.7	11077.7	10671.42
Agricultural land	289.194	246.427	300.918
Mining Area	2220.8	4067.98	4632.31
Fallow Land	3536.16	3104.74	2706.62
Water bodies	162.794	183.299	199.317
Settlements	1008.82	1546.54	1716.28
Total Area	20225.47	20226.69	20226.87

In 2010-11, the agricultural area was 289.194Ha, whereas it increased to 300.91Ha in the year 2020-2021. This is due to the encroachment of the forest land and also because of the population increase. The Built development increased from 1008.82Ha (in 2010) to 1716.28Ha in 2020-21. The mining areas increased from 2220.8Ha (in 2010) to 4632.31Ha in 2020-21. On the other hand, Forest areas have decreased from 13007.7Ha (in 2010) to 10671.42Ha (in 2020-21). Fallow lands have reduced from 3536.16Ha (in 2010) to 2706.62Ha (in 2020-21). Due to excess mining, the soil loses its fertility. Surface

water bodies increased from 162.794Ha (in 2010-11) to 199.317Ha (in 2020-21). Land use and cover changes in 2010, 2015-16, and 2020-21 are depicted in Fig 2, Fig 3, and Fig 4. Most agricultural lands have been turned into mining pits because of the demand for iron ore. Float iron ore present in agricultural fields has also been mined intensively. The statistical data of land use and land cover has been depicted in the form of pie charts Fig 5, Fig 6, and Fig 7 for the years 2010-11, 2015-16, and 2020-21 respectively.

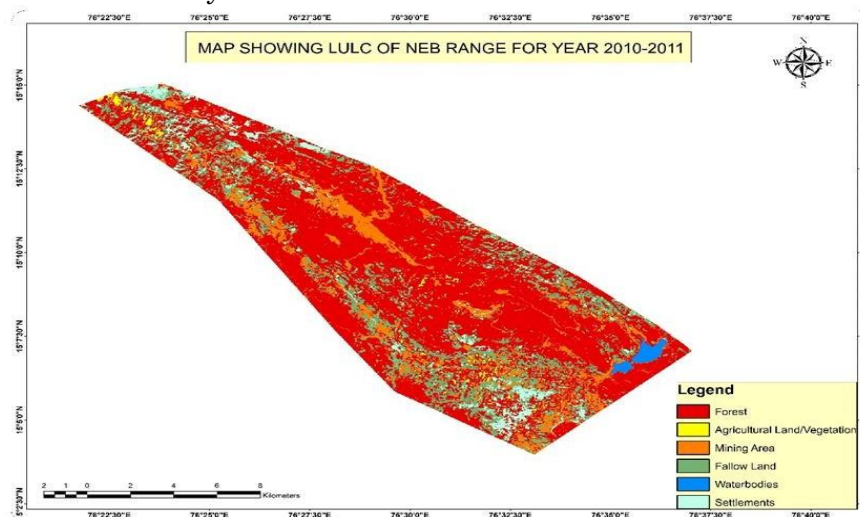


Figure 2: Land use land cover changes in the year 2010-11

Figure 3: Land use land cover changes in the year 2015-16

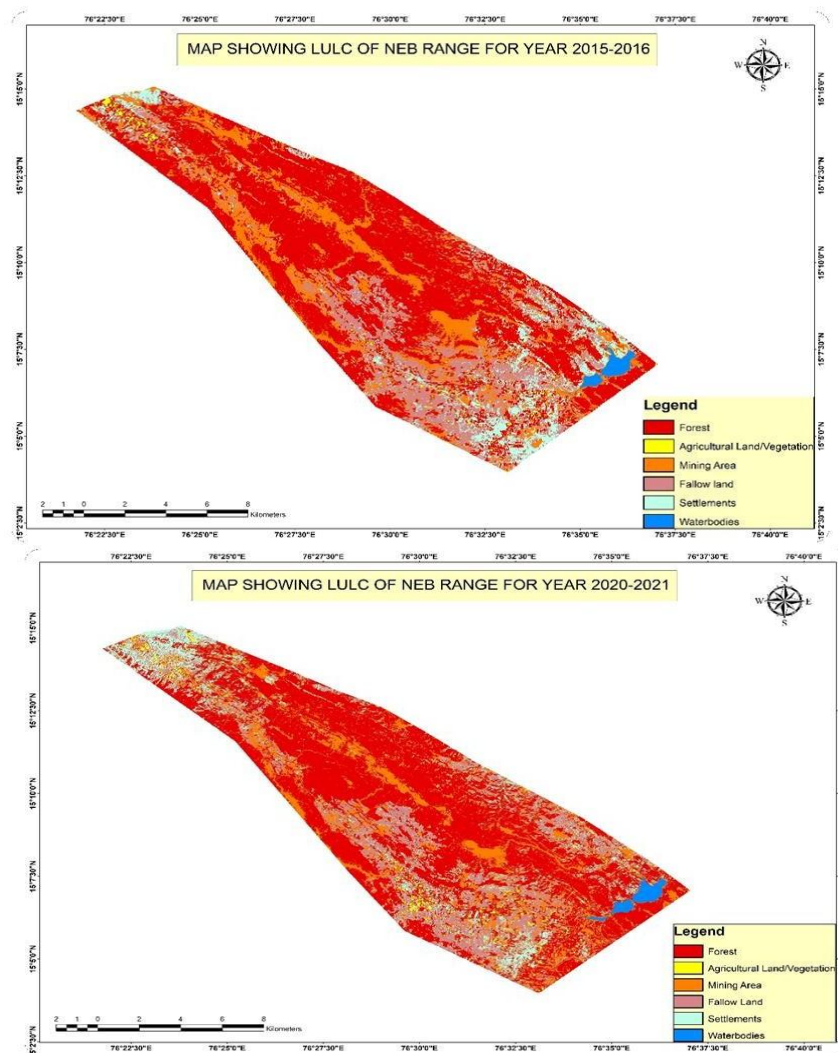


Figure 4: Land use land cover changes in the year 2020-21.

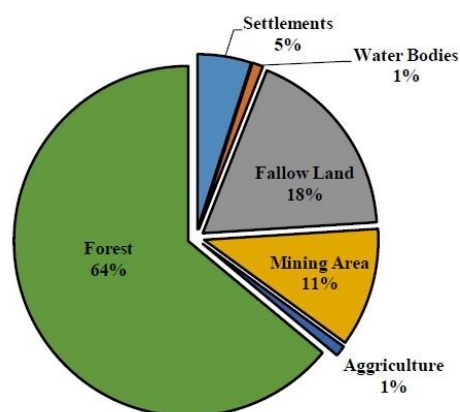


Figure 5: Pie-Chart of area Statistics of LU/LC pattern in 2010-2011.

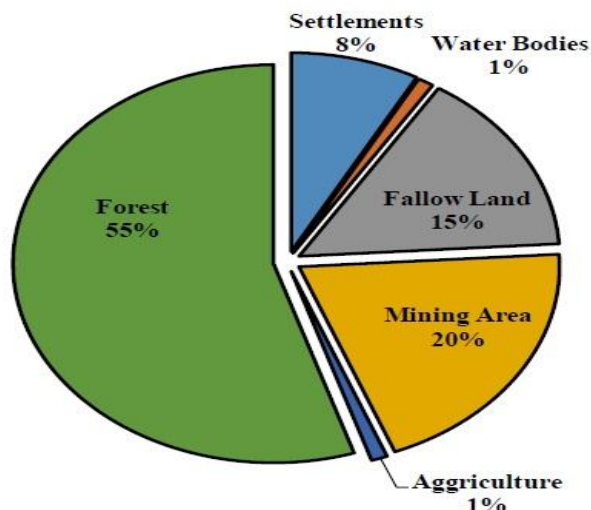


Figure 6: Pie-Chart of area Statistics of LU/LC pattern in 2015-2016.

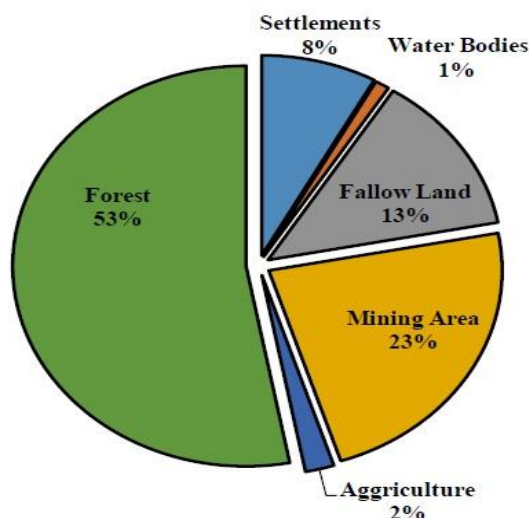


Figure 7: Pie-Chart of area Statistics of LU/LC pattern in 2020-2021.

Conclusion:

This study helps to identify the Land use /Land cover Pattern classification with Change Detection from 2010-11, 2015-16, and 2020-21. The results indicate severe land cover changes have occurred in agricultural, urban, mining, and forest areas. It gives Comprehensive information on land use/cover for land resource evaluation, utilization, and Management. A timely, reliable information base is essential for effective land use management, and the Present study proved that Remote Sensing data had become an increasingly valuable tool for understanding the current land use pattern.

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