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Land Use / Land Cover Mapping Of Giridih District Of Jharkhand by Using Remote Sensing & Gis

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ABSTRACT: *A landuse/land cover (LULC) Map for Giridih District, Jharkhand State, India was prepared in this study. Multi-spectral satellite image from Landsat-7 ETM+, Topo sheet of the study area and high resolution imagery from Google Earth was used in the preparation of LULC map of the study area. The total area of Giridih District was found to be 4968.65 km^2 out of which major area was coved by the agriculture lands (2226.22 km^2). The built area was found to 265.21 km^2. It was also found that about 512.13 km^2 of area was covered by fallow lands. The area covered by forests was 1310.14 km2 (26.37 %). The other landuse in the study area included wasteland (535.85 km2), water bodies (93.34 km2) and mining areas (25.76 km2).*

***Keywords**: Landusse ,Landcover, GIS, Remote Sensing*

I. INTRODUCTION

Land is certainly essentially the most important normal resources, since existence and developmental activities use the it. Land use is the term for any type of utilization to which human has set the land. It also is the term for evaluation in the land with respect to various normal characteristics. Land use is usually a product associated with interactions concerning a society's cultural background, state as well as physical needs of the one hand and the natural potential of land on the other. [1] The actual land use/land cover pattern of a region is an outcome of natural and socio economical factors and their own utilization by human over time. Consequently, information on terrain use / land cover is critical for the selection, planning and implementation of land use and can be used to meet the increasing demands for essential human needs as well as welfare. This information also assists in monitoring the dynamics of land use resulting from changing demands of escalating population. [2] .As human and natural forces modify the actual landscape, resource agencies still find it increasingly important to monitor and analyze these alternations. As an example changes in land cover. These changes, in turn, effect management and policy decisions. Methods for monitoring change consist of extensive analysis involving remotely sensed data .While aerial photography can detect change over relatively tiny areas at responsible cost, satellite imagery has proven less expensive for large areas. Land use/ land cover changes are so dynamic in nature and have to be monitored at typical intervals for environmentally friendly environment development. Remote sensing data is quite useful due to the synoptic view, repetitive coverage and real-time data acquisition. The digital data in form of satellite imageries, therefore, enable to properly compute various land use/ land handle categories and helps in maintaining the actual spatial data infrastructure (SDI) which is very essential intended for monitoring urban growth and change detections scientific studies.[3] .Several changes in land cover, such as long-term changes, are as a result of natural causes , human activity increasingly plays an essential role within changing this land cover and land use across the world. The need for characterizing, quantifying, and observation of these changes through remotely sensed and also geospatial data as an extremely important component of the actual land change science have been widely recognized by global and also environmental change studies. [4].Comprehending the role of land use in global environmental change and over time human–environment nexus needs historical reconstruction regarding past land use and land cover changes. The information on land use changes generally in most developing countries usually are missing, out dated or inconsistent.[5].Remotely sensed techniques has become a valuable way to obtain land-cover and land-use data . As the demand for increased amounts and quality of information rises, and technology continues to improve, remote sensing can be increasingly crucial in the foreseeable future. [6]. GIS provide a flexible environment with regard to displaying, storing and examining digital data essential for change detection. [7]

1.2 Objectives

1. Generate Landuse / LandCover Thematic Map for assessing the land use and availability of other resources in Giridih District.
2. Calculate the area and the area percentage of the landuse/Landcover mapping of the Giridhi District for analyzing the patterns of the study area.

II. MATERIALS AND METHOD

2.1 Study Area

Giridih is located at 24.18°N 86.3°E. With an Average elevation of 289 meters (948 ft) it is bounded by Jamui in the north ,Bokaro and Dhanbad in the south Deghar and Jamtara in the east and Kodarma and Hazaribag in the west. Giridih District is geographically divided into two natural divisions, which are the central plateau and lower plateau. The central plateau touches the western portion of the district near Bagodar block. The lower plateaus have an undulating surface and an average height of 1300 feet. In the north and north-west, the lower plateaus form fairly level tablelands until they reach the ghats when they drop to about 700 feet. Giridih district is divided into two main water heads – Barakar and Usri rivers. Giridih is rich in mineral resources and has several large coal fields with one of the best qualities of metallurgical coal in India. Mica is found in abundance near the blocks Tisri and Gawan. Mica is of importance not only to Jharkhand but to India and other countries as well. [8]

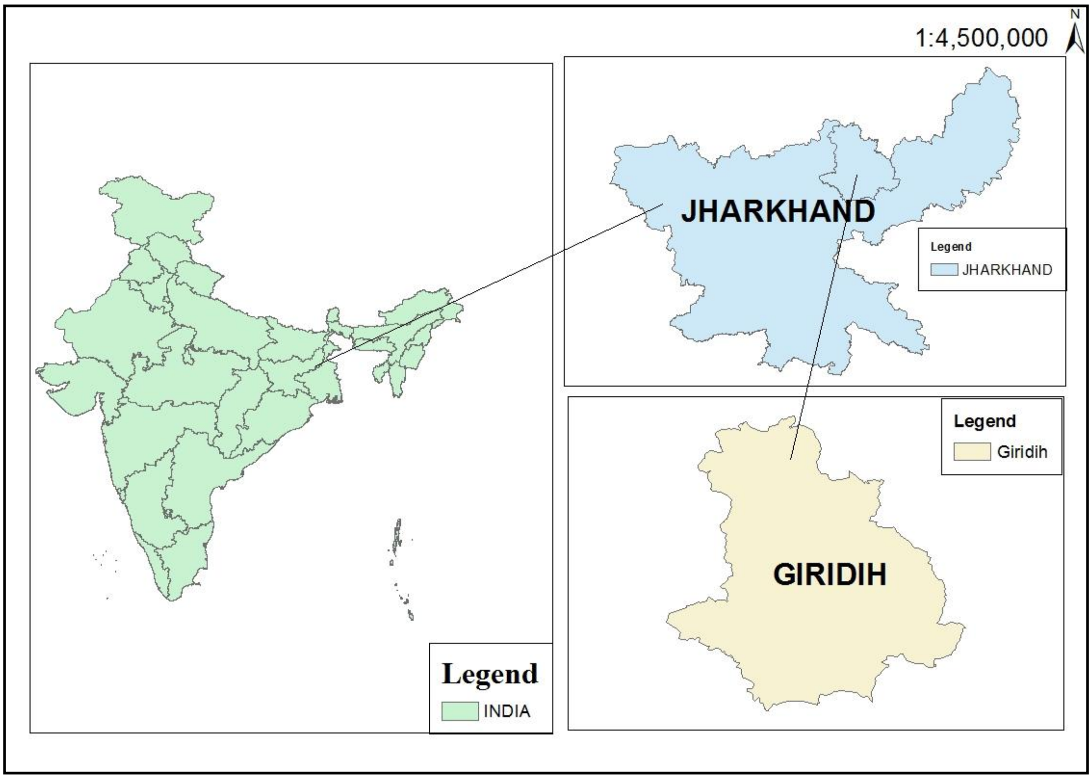

Fig 1: Study Area

2.2 Data Used

In this study high resolution satellite image of Landsat 7 ETM+ was used. The image was downloaded from USGS website, which is having 8 bands, 30m X 30m spatial resolution, 0.45 – 12.5 µm Spectral range, 183km X 170 km image size. A Topo sheet form SOI has been used with scale 1:250,000 were also obtained to extract the study area boundary.

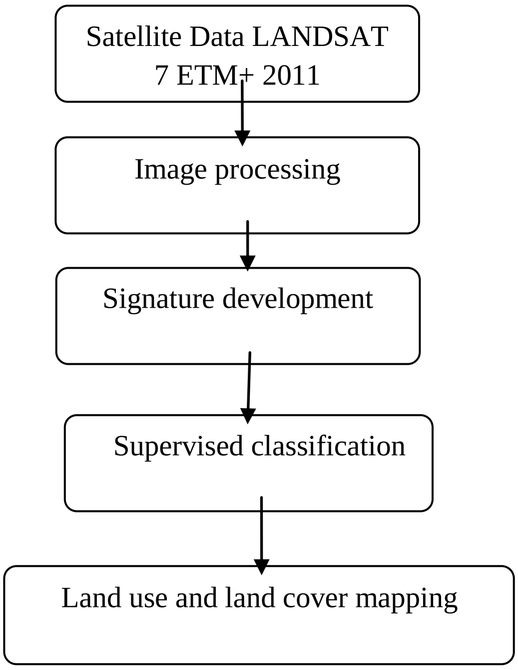

Fig 2: Methodology for LULC Classification

2.3 Methodology

The LULC classification for the Giridhi District, Jharkhand was based primarily on Landsat 7 Enhanced Thematic Mapper (ETM+) data were used for visual assessment of development and land-use trends within the area. All of the Landsat data were geo-registered to a customized Transverse Mercator projection for the Giridih District using a common set of ground control points.. Landsat ETM+ data is captured from USGS website and is rectified using Georeferencing toolbar in ArcGIS Desktop and the re-sampling techniques for the Nearest Neighbourhood has been performed for better visibility of the image. And the Spectral Signatures have been created using Image classification toolbar and the features for the Landuse/Landcover has been captured.

Table.1: table showing the on screen visual interpretation for different land use/land cover classes:

S. No	LU/LC Category	Tone	Size	Shape	Texture	Pattern	Association
1	Built up Land	bluish green	Small to big	Irregular	Coarse & mottled	Clustered to scattered	Surrounded by agricultural lands, forest cover, wastelands, river, road, and rail etc.
2	Rabi Crop	Bright red to red	Small to big	Regular to irregular	Medium to smooth	Contiguous to noncontiguous	Proximity to rivers/canal/streams and settlements
3	Kharif Crop	Bright red dull red	Small to big	Regular to irregular	Medium to smooth	Contiguous to noncontiguous	Proximity to rivers/canal/streams and settlements and lowland areas
4	Fallow land	greenish blue	Small to big	Regular to irregular	Medium to smooth	Contiguous to noncontiguous	Amidst or near to crop land
5	forest	Different tone of red	Varying in size	Irregular	Smooth to medium depending on crown	Contiguous to noncontiguous	With different forest types and species in undulating areas
6	River/Stream	black	Long narrow to wide	Irregular sinuous	Smooth to medium	Contiguous, non-linear to dendritic/ subdendritc	hill slopes, flood plains, uplands etc.,

III. RESULT AND DISCUSSION

3.1 Land use / land cover statistics:

LULC is classified into 6 classes as follows for this area.

1- Build- up :

1- Land (Rural) .
2- Build-up-(Urban)-Mixed build up area .
3- Build-up-(Urban)-Vegetated area.
4- Build-up-mining/industrial Area-Ash/Cooling/Tailing .
5- Built-up-mining /Industrial area-Mine/Quarry.

2- Agriculture land crop :

1 –Kharif crop.
2- Agriculture land crop-land more than two crop.
3- Agriculture land crop land Rabi crop.
4- Agriculture land crop land two crop area.
5- Agriculture land- - Current Fallow.

3- Forest :

1– Scrub forest.
2- Forest deciduous (Dry/Moist/Thorn)- Open.
3- Forest Deciduous(Dry/Most/Thorn-Dense).
4- Tree Clad Area.

4- Wasteland:

1- Barren Rock/Stony waste.
2- Wasteland- Scrub land –open scrub.
3- Wasteland-Gullied/Ravinous land –Shallow ravenous.
4- Wasteland-Scrub land Dense scrub.

5- Water bodies:

1–Lakes/Ponds-Dry- Kharif extent.
2- Water bodies-Lakes/ponds-Dry-Rabi extent.
3- Water bodies-River/Stream-Dry.
4- Water bodies-River/Stream-Perennial .
5- Water bodies-Reservoir/Tanks-Dry Kharif.

6- Industrial area/ Mining Area:

Primarily includes the coal mining industry both underground mining and open cast mining and other industrial sector of area. This also includes land, which provides living space within and around buildings for houses to meet the daily needs of the families of different sizes

Landuse landcover analysis has been done as a part of project for the Giridih District AOI and the area has been calculated for the level -1 classification of LULC analysis.

Table: 2. area statistics of land use / landcover map

Landuse land cover class	Area in (km2)	Area in %
Agriculture land (Kharif)	2013.63	40.53
Agriculture land (Rabi)	724.72	14.58
Buildup area	265.21	5.34
Mining area	25.76	0.52
Forest	1310.14	26.37
Wasteland	535.85	10.78
Water bodies	93.34	1.88
Total	4968.65	100%

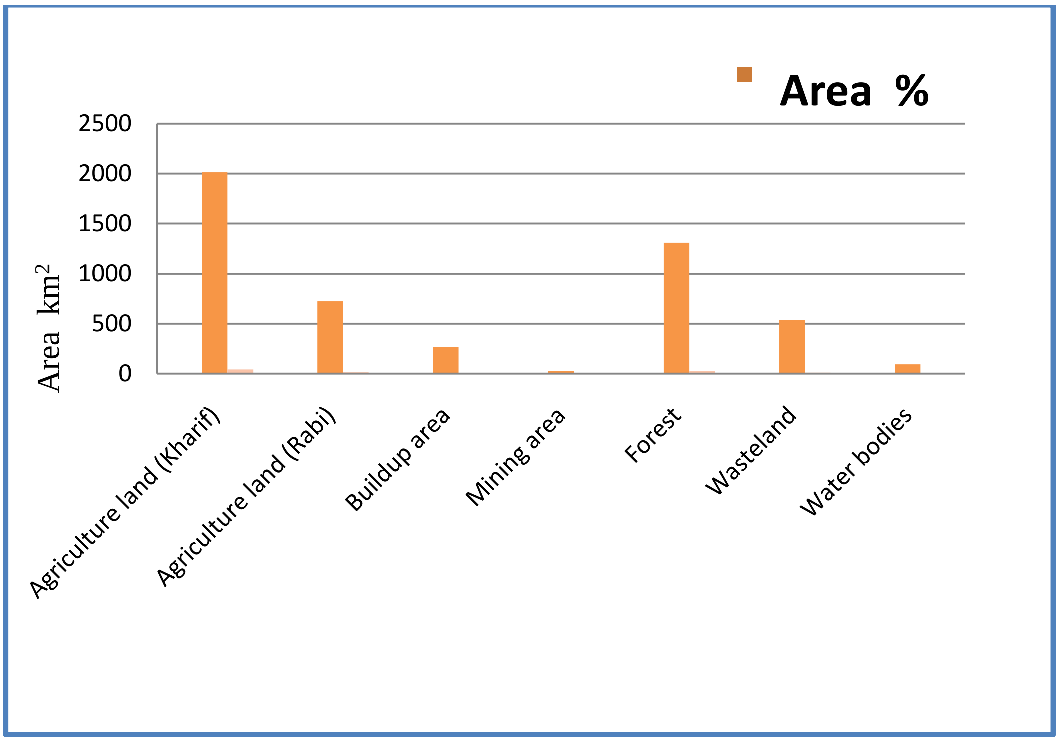

Fig 3: graph representing area statistics of land use / land cover

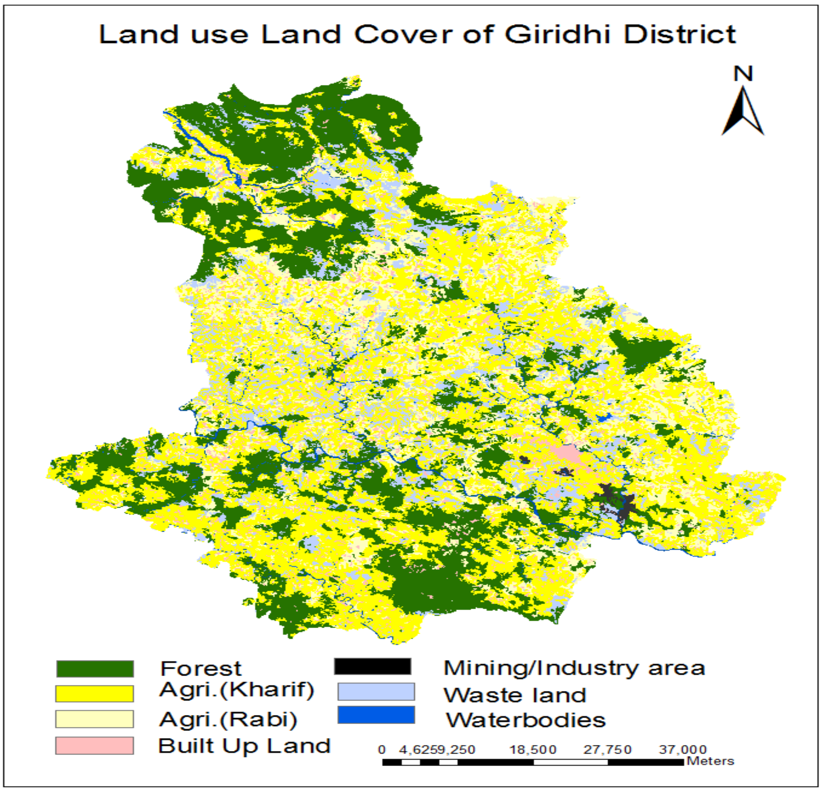

Fig 4: land use / land cover map

IV. CONCLUSION

A landuse map of the study area was developed using information from toposheet of the study area and on screen visual interpretation from high resolution imagery. The following conclusions were been drawn from this study:

1- The total study area was 4968.65 km2 of which almost 45% was found to be under agriculture. Forest was found to be the next largest landuse in the study with 1310.14 km2 (26.37%) under it. Build up areas covered 265.21 km2 (5.34%) while other landuse included Mining area, Wasteland, Water bodies(25.76 km2,535.85 km2,93.34 km2) (0.52%,10.78%,1.88%) respectively.

2- Geo spatial techniques are helpful classifying land use/Land cover associated with almost any unique place.

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