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AN ANALYSIS ON LAND USE/LAND COVER MAPPING USING REMOTE SENSING AND GIS TECHNIQUES – A CASE STUDY

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ABSTRACT Remote Sensing as a direct adjunct to field, recently playing an important role in the study and assess the natural resource in any part of the world. Anthropogenic changes in land use and land cover and land use are often assumed to be identical, they are rather quite different. Land cover may be defined as the biophysical earth surface, while land use is often shaped by human, socio-economic and political influences on the land. The geospatial technology of RS and GIS holds the potential for timely and cost –effective assessment of natural resources. The techniques have been used extensively in the tropics for generating valuable information on forest cover, vegetation type and land use changes. Therefore, we have used RS and GIS to study land use land cover changes in and around. Under this study three thematic maps such as location map, drainage map and land use / land cover maps were prepared. The land use and land cover analysis on the study area has been attempted based on thematic mapping of the area consisting of built-up land, cultivated land, water bodies, forest and uncultivated land using the satellite image. The research concludes that there is a rapid expansion of built-up area. Land use and land cover information, when used along with information on other natural resources, like water, soil, hydro-geomorphology, etc. will help in the optimal land use planning at the macro and micro level.

KEYWORDS : Land use/ Land cover, Remote Sensing and GIS, Telangana.

1. INTRODUCTION

The land use/land cover pattern of a region is an outcome of natural and socio–economic factors and their utilization by man in time and space. Land is becoming a scarce resource due to immense agricultural and demographic pressure. Hence, information on land use / land cover and possibilities for their optimal use is essential for the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs and welfare. This information also assists in monitoring the dynamics of land use resulting out of changing demands of increasing population. Land use and land cover change has become a central component in current strategies for managing natural resources and monitoring environmental changes.

Remote Sensing (RS) and Geographic Information System (GIS) are now providing new tools for advanced ecosystem management. The collection of remotely sensed data facilitates the synoptic analyses of Earth –system function, patterning, and change at local, regional and global scales over time; such data also provide an important link between intensive, localized ecological research and regional, national and international conservation and management of biological diversity. A total of three thematic maps such as location, drainage and land use and land cover maps were prepared based on image interpretation studies with limited checks. The land use-land cover pattern falls under the broad categories of built-up land, cultivated land, forest land, water bodies and uncultivated lands.

In this study area major natural resource is forest. Because of human activities the extent of the land under forest is getting reduced. In the same way land used for cultivation is also decreasing. But at the same time land under built up area is increasing. Recently the functioning of the real estate's people and property promoters are bringing a serious disaster to forest area and agricultural land. This is an unhealthy situation of land management. In this context studies on land use land cover mapping is essential to understand the existing situation and plan for the future.

2. DESCRIPTION OF STUDY AREA:

The Mandal is situated in the South-West part of the Medak District. The mandal lies between North Latitudes 17o 46' 22" and 17o 32' 32" and East Longitudes 77o 26' 42" and 77o 42' 36" and falls in Survey of India Toposheet Nos. 56/G/10/NW, 56/G/10/SW, 56/G/6/NE, 56/G/6/SE, 56/G/10/NE, 56/G/10/SE of scale 1:25,000 published by Survey of India in 1973. The total area of the study area is 392.15 sq. km.

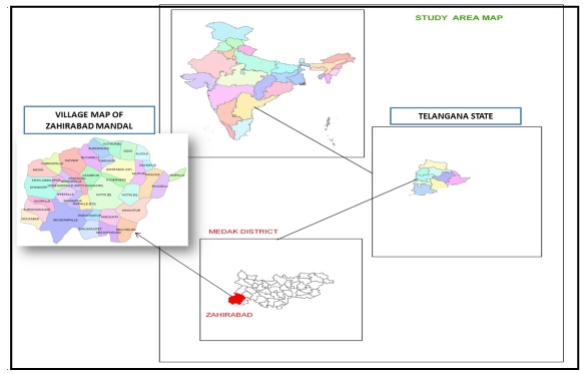

Fig: 1: Location Map Of Zaheerabad Mandal.

3. OBJECTIVES

- To study the present status of water resources, natural resources, land resources, soil productivities, cropping patterns, forest cover etc using satellites data, collateral data and field data.
- To prepare the thematic maps namely location, land use-land cover, and water bodies.
- To prepare action plan for land resources and water resources.

4. MATERIALS AND METHODS

The study has made use of various primary and secondary data. These include Survey of India (SOI) topographic sheets and satellite image IRS P6 geocoded data of 1:50,000 scale. The Indian Remote Sensing Satellite (IRS) data was visually and digitally interpreted by using the image interpretation elements (such as tone, texture, shape, pattern, association etc.) and ArcGIS software was used 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 the land use/land cover changes and categories of the study area.

Preparation of thematic map

These maps are the true representation of earth's phenomena such as spatial distribution of natural resources existing at the time of survey. In the present study satellite image (IRS P6) which is a true record of the various environmental resources information on the base map. These map showing spatial distribution of forest, agriculture, soil, water resources etc., and prepared by visual interpretation of the satellite imagery. Visual interpretation is carried out based on the

image characteristics like tone, size, shape, pattern, texture etc. in conjunction with existing map/literature. These pre-field thematic maps are modified substantiated and confirm after limited field checks.

5. RESULTS AND DISCUSSIONS

a.Analysis of Land use /Land cover by using Remote Sensing Data:

The land use/land cover categories of the study area were mapped using IRS P6 data of 1:50,000 scale. The satellite data was visually interpreted and after making thorough field check, the map was finalized. The various land use and land cover classes interpreted in the study area include, built-up land, cultivated land, forest land, uncultivated lands and water bodies.

b.Forest Plantation:

It is described as openings amidst forests without any tree cover and occupy an area of 10.7 sq km of the total geographical area. It occupies around 2.73% of the total geographical area of the Zaheerabad Mandal.

c.Agricultural Land

The uncropped lands which are temporarily allowed to rest during agriculture season these are mapped using satellite data when the signature of the crops are absent in the cropping area. Double crops are taken in an area of 48.86 sq km of total study area and it occupies around 12.46 % of the Zaheerabad Mandal.

Figure 2: Land use/ Land cover map of the Study area

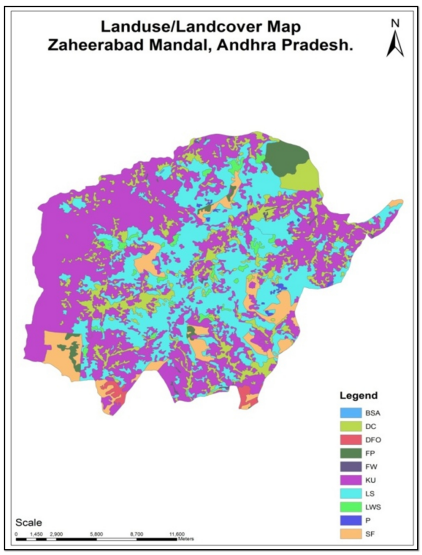

Table 1: Land use land covers classification system

S.No	Land use/Land Cover Category (LULC)	Area in Sq.Km	Area (%)
1	Forest Plantation (FP)	10.7	2.73
2	Kharif Unirrigated (KU)	183.23	46.72
3	Scrub Forest (SF)	24.64	6.28
4	Double Crops (DC)	48.86	12.46
5	Land with Scrub (LS)	111.7	28.48
6	Land Without Scrub (LWS)	7.55	1.93
7	Deciduous Forest (DFO)	2.76	0.70
8	Fuel Wood species (FW)	1.52	0.39
9	Plantation (P)	1.15	0.29
10	Barren rocky & Stony waste	0.04	0.01
	TOTAL	392.15	100

d.Water Bodies :

The streams/rivers, tanks, jheels and reservoirs are included in this category. The river/streams flowing in the study area are Manjira River, Nalla vagu, Nakka Vagu, Pamul vagu, Ganga Ketwa Vagu and Maisamma Vagu. In addition to the four major reservoirs Nizamsagar, Manjira, Singoor, Nallavagu there are a good number of tanks of varying sizes spread over throughout the District. Water Bodies are spread in small pockets and occupy an area of 1.7 sq km of the total geographical area of the Mandal. It occupies around 0.4 % of the total geographical area of the Zaheerabad Mandal.

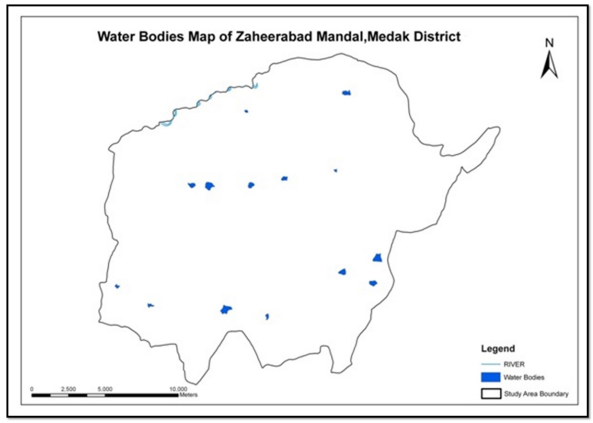

Figure 3:Waterbodies map of the Study area

e.Land With/ Without Scrub:

Land With/ Without Scrub spread in small pockets and occupy an area of 119.25 sq km of the total geographical area. It occupies around 30.41 % of the total geographical area of the Zaheerabad Mandal.

6. CONCLUSION

The study has classified as per the major land use/land cover types**.** The Indian Remote Sensing Satellite (IRS) data, image processing and Geographical Information System techniques were used to identify the land use categories such as built-up lands, cultivated lands, forest lands, water bodies and uncultivated lands. Satellite images in combination with predated topographic sheet of Survey of India were used for analyzing land use and land cover change detection. It is helpful for further macro and micro level planning. With the help of Geographic Information System the various land use and land cover zones are mapped, which in turn helps for decision maker for planning purpose.

7. REFERENCE:

1. Anji Reddy, M., Textbook of Remote sensing and Geographical information systems, B. S. Publications, Hyderabad, 2001
2. Burrough Peter A and Rachael. 1983 A Mc Donnell, Principles of GIS, Oxford University Press, New York,.
3. Handbook of Statistics, 2009-10, RangaReddy District: Chief Planning Officer, Government of Andhra Pradesh.
4. Integrated Mission for Sustainable Development (IMSD) Technical guidelines 1995, Andhra Pradesh State Remote Sensing Application Centre (APSRAC), Government of Andhra Pradesh, December.
5. Lillesand, T.M. and Kiefer, R.W. 1994. Remote Sensing and image Interpretation. Wiley Publication, New York.
6. Manual of Land use / land cover mapping using satellite imagery 1989, Part I and II, National Remote Sensing Agency, Department of Space, Govt. of India.
7. Manual of proceedings for wasteland mapping 1986, National Remote Sensing Agency, Department of Space, Govt. of India.
8. N. Nagarajan et al, Trend In Land Use/Land Cover Change Detection By RS And GIS Application, International Journal Of Engineering And Technology Vol.3 (4), 2011, 263-269
9. Technical guidelines 1998 of Disaster management Information System (DMIS), Maharashtra State Remote Sensing Centre, Nagpur.
10. Technical guidelines 1999 of Rajiv Gandhi drinking water mission, National Remote Sensing Agency, Department of Space, Govt. of India.
11. Watershed atlas of India 1990, Published by All India Soil and Landuse Survey.