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Investigation on Land Cover and Land Use Changes in the Chotrakoot Forest Range, Madhya Pradesh

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***Abstract*: The land use and land caver change analysis has been attempted based on thematic features of the area consisting of forest, agriculture land, water body, shrub land and waste land. Many change detection technique have been developed at the expenses of forest, shrub and waste land. The changes have been described vegetation index and also indicated the increase of land degradation between years 2000 to 2016 of all the major land cover changes in the study area. Various levels of disturbances analyzed with the help of GIS where it observed that spatial pattern of many ecosystem having their own characteristics. While the occurrence of other environmental disturbance at various levels in the forest ranges along a gradient anthropogenic disturbance make interpretation of community.**

***Keywords*: Disturbance, land cover, land use, forest, change detection, GIS.**

1. Introduction

Land use land cover change is a major issue of global environment change in the word. Changes and its consequences present one of the most important threats to biodiversity and the functions of ecosystems. The stress on biodiversity is far beyond the levels imposed by the natural global climatic changes occurring in the recent evolutionary past. It includes temperature increases, shifts of climate zones, melting of snow and ice, sea level rise, droughts, floods, and other extreme weather events. White and Jentsch in 2001, described regarding ecosystem response to disturbance and landscape change may also enormously diverse. Westerterling in 2006 has pointed out that many disturbances in a phase of rapid change. They were effecting higher elevations and latitude than previously observed and leading to novel insect host combination described Raffa et al. in 2008. Odum in 1969 stated that approach of ecosystem helped to set the stage for hypothesized functional dynamics with time since disturbance however although the basic causes of heterogeneity in ecosystem process have been recognized for a long time. Among the ecosystems differences in the physical environment and the biota determining the processes that control ecosystem dynamics may result in wide variation in ecosystem response. Chaturvedi was pointed out in 2005 that the importance to maintain the integrity between the people and ecosystem. He was also characterizing and identifies the various ecologically optimum landscape compartments transformation of natural consistent with the developmental needs of the national economy that effect ecological condition. These factors make discerning generality in disturbance effects difficult. Landscape and land use change detection and process of identifying deference in the state of an object or phenomenon by observing it at different time (Singh 1989). Land used and land cover change has become a central component in current strategies for managing natural resources and monitoring environmental change. The rapid development of the concept of vegetation mapping has lead to increased studies of land use and land change worldwide. To prepare a land use map using satellite data, image classification is powerful method of information extraction (Karteris 1990). Successful use of satellite remote sensing for land use/Land cover change detection depends upon an adequate understanding of landscape features imaging system and information extraction methodology employed with relevant to aim of analysis. The information may be Rao in 1991.

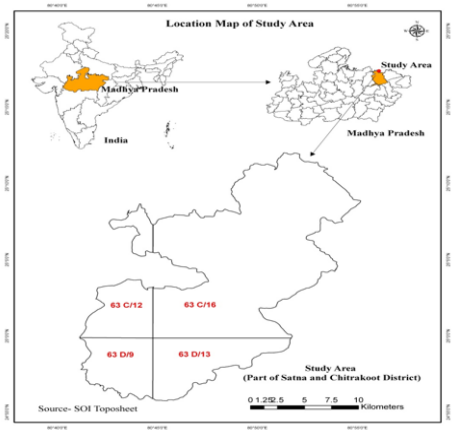

Fig. 1. Location map of study area

Study Area: Chitrakoot is a situated on the border of U.P. and M.P. Chitrakoot is a Hill and places of pilgrimage in the Karwi Tehsil of Chitrakoot District at Banda district. Chitrakoot is also famous for its natural beauty. In Chitrakoot have many natural historical caves, streams, lakes and different types of flora & fauna. The study area of Chitrakoot is located between 80°44'

48.042" to 80°54' 51.53" E latitude and 25°12' 13.0823" to 25°2' 19.952" N longitude. The total area of study site is 32436.45hectare, of which 2591.91 hectare scrub land, 7370.28 hectare waste land, 2969.91 hectare agricultural land, 19024.2 hectare forest and 480.15 hectare was water bodies' area correspondingly. Study site is situated in the north region of Satna district of M.P. and southern part of Chitrakoot district U.P. There are different features, which effect `the life style and culture followed in the particular place like the latitudinal and longitudinal position of the place topography, soil, geology and minerals, climate and vegetation Chitrakoot comprises vast diversity in its topography, climate and vegetation the region present huge varieties of landforms from deep valleys to lofty mountains.

Boundaries: Chitrakoot forest range lies on situated in the border of Chitrakoot District of UP. In North and east partially west; while Majhgawan Range of forest division Santa District of M.P. In South: Barondha Range of Satna District M.P. in West.

Topographical Features: The general topography of the study area is gradually undulating to flat where the area is sloping towards north and south. It is marked by low isolate hill range or hillocks. Most of the area is occupied by agricultural land waste land with bare or with very scant vegetation cover at many places heaps of bare rock boulders can be observed. Forest cover accounts almost three- fourth of the study area.

Toposheet map of the study area; Thetoposheet map (Figure.2) shows an outline of the study area which is prepared by using toposheetNo, 63D-13, 63D-9, 63C-12, 63C-16, fromthe study area has been cut and scanning has done. It shows clear boundaries of the study area. Following images show disturbances in the various levels in the study area through the satellite images.

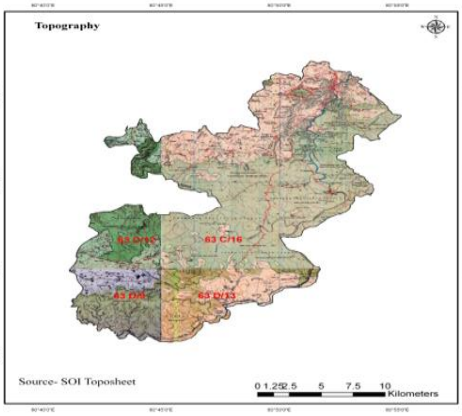

Fig. 2. Topography

2. Materials and Methods

1. *Satellite data product:* Landsat ETM 2000, 2006 and IRS-l C (LISS-III) 2010 digital data were used for the present study of landscape analysis in one-decade seasonal change. Satellite data used for digital interpretations.
2. Ancillary Data:
   a) Survey of India Toposheet (Scale 1:500000),
   b) Relevant literature.
   c) Demographic data from revenue department
   d) Forest working plans, the wildlife management plan and the action plan from the concerned forest departments
   e) Silva ranger compass
   f) Hypsometer etc.
   g) Tape, Rope, Red flag, Altimeter
   h) Global Positioning System
   i) GIS and Image Processing System
   j) Arc GIS, ErdasImagin 8.2, Ilwis 3.7 and Arc View.
   k) PC Core 2 Duo and 4 color monitor.
   l) Windows XP operating system.
   m) MS Office with Word, Excel, PowerPoint and Paint
   n) Other required materials.

A. Result

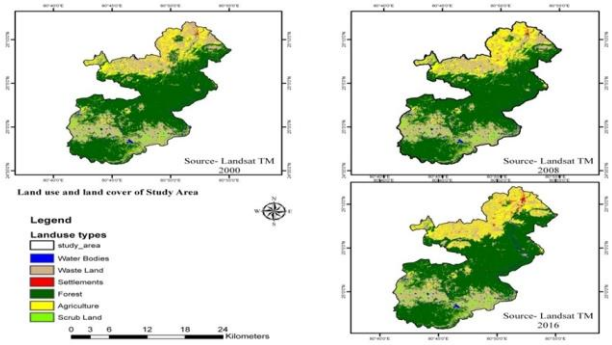

Fig. 3. Land use and land cover of study area

Land use and land cover categories of study area were mapped using landsat TM data year 2000 2008 and 2016 of 150,000 scales. The satellite data was visually interpreted and after making through field check the map was finalized. The various disturbance and land cover classes interpreted in study area include, forest, agriculture land, water bodies, waste land, scrub land and settlement. Agriculture covered 21459 ha which is in 2016.Decreasing trend was observed in waste land from year 2000, 2008, 2016. Water Bodies i.e. River and Ponds covers area of 1282 ha in the year 2000.The comparison is made between the year 2000 & 2008 and the years 2008-2016, what changes occurred in the period of 16th years and in between 8th years. Taking the data from Geological Survey and Images of 2000, 2008 and 2016 it is concluded that in 16th years agriculture has gone through change of 17181ha, 23876ha, 21459 ha in the year 2000, 2008, 2016, area observed High Change and waste land has observes a change of 28571ha, 23061ha, 27733ha in the years 2000, 2008, 2016, Moderately Change. It is estimated that Less and Slight changes occurred in 2000 to 2016 40515 ha to 37326 ha forest and water resources which is estimated as in 2000 is 1282 ha and in 2008 and 2016, 1243ha and 957ha water recourse cover showed change of study area.

From the current study it is evident that the considerable decrease in forest covers for the period of 2000, 2008 and 2016. It is much evidence from the table no, 1 and figure No,3, depicting the overall trend in the land cover and land used change for the period from 2000 to 2016 years.

Table 1
overall trend in the land cover and land used change for the period from 2000 to 2016 years

Regime	Year-2016	Year-2008	Year - 2000
	Area in (Hct.)		
Settlement	658	611	422
Waste land	27733	23061	28571
Agriculture land	21459	23876	17181
Forest	37326	39242	40515
Water Bodies	957	1243	1282
Scrub land	2400	2500	2591

These changes were at the expense of forest, agriculture land, waste land, and scrub land and water body and settlement in the table no- 1 in additional farmers in the area is encroaching and cultivating sloppy and marginal areas which aggravate land degradation.

3. Discussion

Land use land cover changes are complex and interrelated that is the expansion of other (Belay, 2002; Abate, 2011). In relation to this finding recent watershed waste land used studies has showed that land used change is brutal and there has been agriculture land size expansion at the expanse of natural vegetation cover lands and marginal areas with ought any appropriate conservation measure (Woldeamlak, 2002; Amsalu et al.2006; Gessesse and Kleman, 2007). Similarly, Gete and Hurni in 2001 have also documented the expenses of forest land between 1957 and 1982 in Dembecha area, Northwestern Ethiopia. The study reveals the existed land cover change aggravated land degradation. Similarly, Belay in 2002 illustrated that the expansion of agriculture towards the steeper slopes has accelerated soil erosion in Ethiopia. Tilahun et al. 2001 also accounted that declining vegetative cover and increase forming on steep slopes in Ethopian highlands has eroded depleted soil in situ, so that soil degradation is now a widespread environmental problem. Some impacts of poverty and land degradation which are caused changes include increase of poverty and migration, land productivity decline, loss of biodiversity, decline of ground water recharge and carbon storage capacity change in population size, and spatial distribution Abate, 2011. As stated by Abbas et al 2010, more recent significant effects of land use change include urban sprawl, soil erosion, soil and land degradation salinization and desertification, as discussed above the present research has shown complex linkages of land use and land cover change with land degradation.

4. Conclusion

Land use/ cover change degradation using GIS and remote sensing applications in the study area verify that forest shrub and waste land were informed in to cultivated land. This proper proceed from the principles of them with ERDAS software analyzing their result and comparing their advantage and disadvantage. Remote sensing and GIS together can supply timely and accurate information needed for forest planning and management. This research shows that visual element in image interpretation can be used for forest change detection very effectively. It has been found the vast changes occurred due to migration of the people to cities due to endangered species and forest. Furthermore, the land use policy of the country should be effectively implemented to reverse the trend of Land cover change and land degradation and at the same time to enhance the livelihood of farming households. Therefore, it can be observed that the last years of change detection mapping and this impact and place of forest mapping is increasing year by year.

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