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Research Article

LAND USE /LAND COVER CHANGE DETECTION USING REMOTE SENSING &GIS CHITRAKOOTDISTRICTS OF BUNDELKHAND REGION, UTTAR PRADESH, INDIA

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A B S T R A C T

Information on Land use/ Land cover in the form of maps and statistical data is very vital for spatial planning, management and utilization of land. The aim of this study is to detect land use changes between 2006 to 2016 using satellite images of Land set-8. Land use land cover change has become a central component in current strategies for managing natural resources of a region. Urban expansion has brought serious losses of agriculture land, vegetation and water bodies. Remote Sensing and Geographic Information System technology are providing new tools for monitoring these fast land use changes. The present study using Land set-8 data demonstrates the scope, methodology and outcomes of land use/land cover change mapping of Chitrakoot district in Uttar Pradesh which comes under Bundelkhand region. The land use/land cover classes in the study area are divided into eight categories. Agriculture land has decreased between 2006 and 2016. Major changes are seen from 2006 to 2016 for the built-up, agriculture land, water bodies and wasteland.

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INTRODUCTION

Monitoring of land use and land cover change has become an interesting area ofresearch for Geoscientists understand the strategies for managing natural resources and monitoring environmental changes. Quantification of changes such as land use and land cover is viable among GIS procedures level if the subsequent spatial datasets are of dissimilar scales or resolutions. Since land is becoming a short resource due to vast agricultural and demographic factors, the RS and GIS can playan important role in this concern to proper use of the natural resources. Monitoring land use or land cover are vital in countryside and is can provide a complete comprehension of the interface and connection of anthropogenic action with the environment. The change in land use/land cover as well includes the change, also direct or indirect, of a natural environment and their influence on the ecosystem of the area Land use / cover change has got a vital element in the present scheme for management natural resource and detect environmental deviations4. In this present study, it has been shown the changes in the area of the natural resource.

Land use/Land cover (LU/LC) changes are affected by human intervention and natural phenomena such as agriculture, population growth, consumption, patterns, urbanization, economic development etc. As significance, timely and precise information about (LU/LC) change detection of the area of interest is extremely important for understanding relationships and interactions between human and natural resources for better decision making. 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. Remote Sensing (RS) and Geographic Information System (GIS) technology has now become the new tools for monitoring land use changes.

Objective of the Study

- To generate spatial database on land use/land cover for the 2006-2016.
- To generate land use/land cover change database along with change matrix with respect to 2006.

Study Area

The study area of Chitrakoot district in Uttar Pradesh. It is located on latitude 25° 12' North and 80° 54' East with an area about 3,233 square km (Chitrakoot district). There are five Blocks in Chitrakoot district, KARWI, MANIKPUR, MAU, PAHARI, RAMNAGAR. Chitrakoot has a population of 9, 91,730 peoples. (Census-2011)

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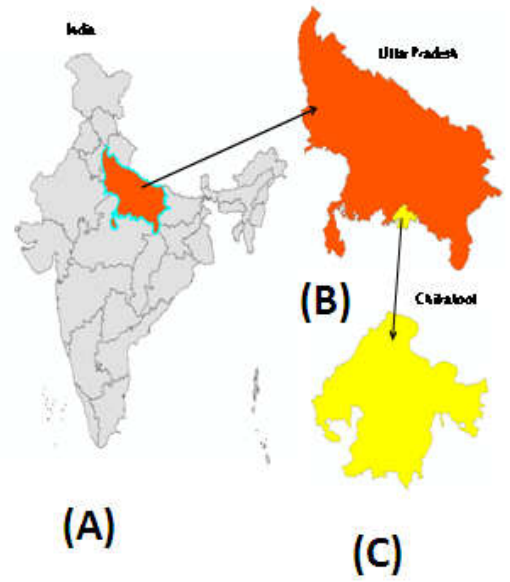
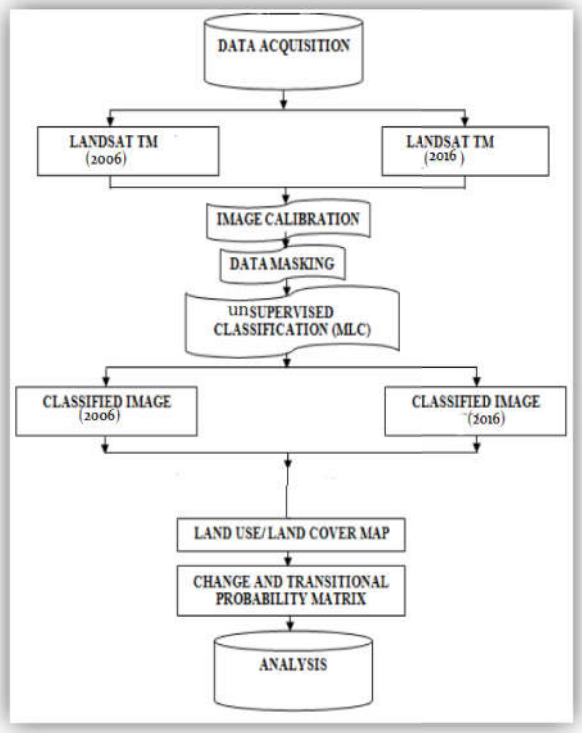


Fig 1 Location Map (A) India (B) Uttar Pradesh (C) Chitrakoot District

METHODOLOGY

ERDAS IMAGINE and Arc GIS software is constructive tools for getting out the land use/land cover layers, satellite imageries. Study land use /land cover class has included urban, village, airport runway, open, agriculture, forest river/watershed etc. Image processing techniques wear practical to make visual explanation of land use/land cover. Geometric correction, radiometric correction, mosaic king and clipping of the images. This cover change methodology (figure-2) is carried out based on the status method. The quality classes stood accepted founded on the visual clarification of the images.



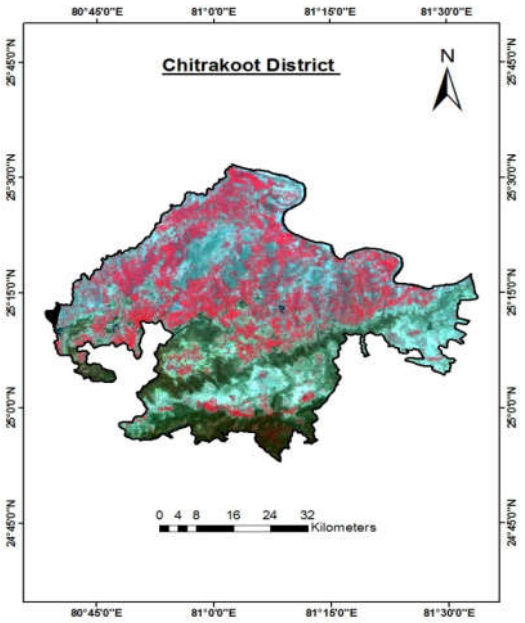


Fig 2 Flow ChartFig.3 Satellite Imagery of Study Area

RESULTS AND DISCUSSION

After applying the classification techniques on both satellite imageries important changes in land use/cover are found. The land use classification map is shown for 2006, 2016 respectively (Figure-4, 5). Land use/cover class zone was estimated on the basis of the pixel identifying process by ERDAS IMAGING software. Land use/ cover class area was assessed on the pixel identify method by ERDAS IMAGING software. The land use /cover static distribution for each study year as resulting from the area are obtainable (table-1) and area distribution bar graph (Figure-6). The result of the work shows a rapid growth in agricultural land 2160.25 to 2446.40 Sq km, built-up 4.94 to 6.27 Sq km. Open/Barren land 1.29 to 1.34 % and decrease in dense forest area 912.26 to 677.12 Sq km, water body 54.93 to 11.61 Sq km.

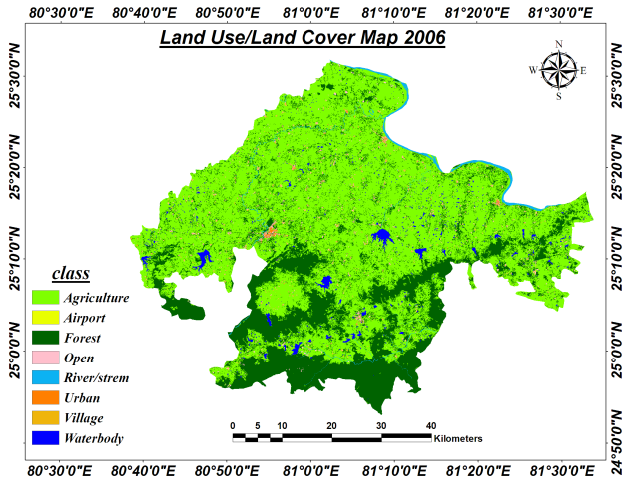


Fig 4 LU/LC Map of Chitrakoot district 2006

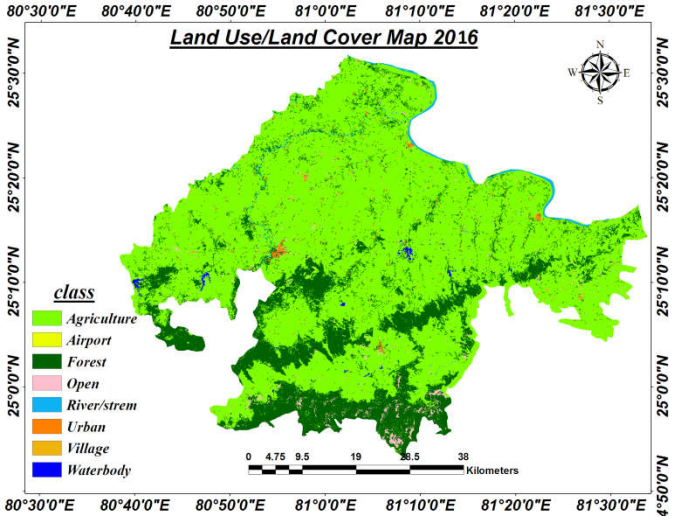


Fig 5 LU/LC Map of Chitrakoot district 2016

Table 1 Area Difference 2006 to 2016

Class Name	Area (Sq.km.2016)	Area (hec_2016)	Area (Sq.km.2006)	Area (hec_2006)	Difference Area(Sq.km)	Difference Area(hec.)
Urban	6.27	626.76	4.94	494.46	1.32	132.30
Village	23.20	2319.84	22.26	2226.15	0.94	93.69
Airport	0.17	17.46	0.10	10.44	0.07	7.02
Open/Barren land	43.38	4338.09	41.97	4197.42	1.41	140.67
Agriculture	2446.40	244640.16	2160.25	216024.75	286.15	28615.41
Forest	677.12	67711.95	912.26	91226.16	-235.14	-23514.21
River/Stream	24.96	2496.15	36.44	3644.19	-11.48	-1148.04
Waterbody	11.61	1161.27	54.93	5492.88	-43.32	-4331.61
Total	3233.12	323311.68	3233.16	323316.45	-0.0477	-4.77

Table 2 Percentage difference 2016 in comparison 2006

Class_Name	Area (%) 2016	Area (%) 2006	Difference Area(%)
Urban	0.194	0.153	1.270
Village	0.718	0.689	1.040
Airport	0.005	0.003	1.670
Open/Barren Land	1.342	1.298	1.030
Agriculture	75.667	66.815	1.130
Forest	20.943	28.216	-0.740
River/stream	0.772	1.127	-0.680
Waterbody	0.359	1.699	-0.210
Total	100.000	100.00	

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 Landsat TM are good source to provide information accurately. Under utilization of potential land, increased land use/land cover, and land conversion are the major driving forces for the change in land use during the past 10 years. The overall accuracy of the present land cover study is 75%. Based on the analysis of changes in land use/ land cover some of the remedial measures are suggested, which are essential for optimum and sustainable utilization of land resources and prevention of further undesirable and deteriorated changes in land use. Agriculture land Change in covering with forest/tree cover and decrease river/stream, water body in 2016. To improve the land potential and to avoid in bare land. Base on the Forest/tree plantation. Be planted to improve the economy of the agriculture and habitation.

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Table 3 LU/LC change matrix

		2016								
	Classes	Urban	Village	Airport	Open/ Barrenland	Agriculture	Forest	River/ stream	Water-body	Total
2006	Urban	2.94	0.06	0	0.74	0.89	0.31	0	0	4.94
	Village	7.48	0.00	3.35	9.53	1.90	0	0.01	0	22.26
	Airport	0	0	0.02	0	0.03	0	0.00	0	0.05
	Open/Barren land	3.09	14.62	0.00	5.73	12.70	5.80	0.02	0.01	41.97
	Agriculture	0.12	0.45	0.05	11.83	2059.01	86.70	1.61	0.47	2160.25
	Forest	0.11	0.59	0.05	21.25	312.37	577.15	0.62	0.08	912.22
	River/Stream	0.01	0	0	0.17	10.91	2.58	22.49	0.27	36.44
	Waterbody	0	0.01	0	0.30	40.95	2.67	0.22	10.77	54.93
	Total	13.74	15.72	3.47	49.56	2438.77	675.23	24.97	11.60	3233.06

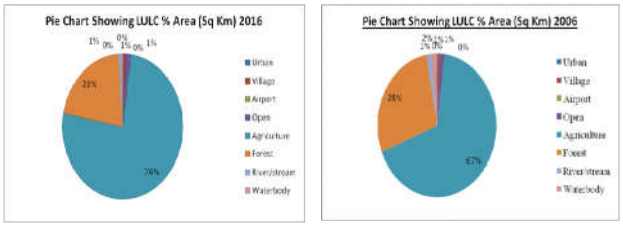

Fig 6 Pie Chart Showing LU/LC Area in %

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