Vol 3 Issue 7 April 2014

ISSN No : 2249-894X

Monthly Multidisciplinary Research Journal

Review Of Research Journal

Chief Editors

Welcome to Review Of Research

RNI MAHMUL/2011/38595 **ISSN No.2249-894X**

Review Of Research Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial Board readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

Advisory Board

More.....

Address:-Ashok Yakkaldevi 258/34, Raviwar Peth, Solapur - 413 005 Maharashtra, India
Cell : 9595 359 435, Ph No: 02172372010 Email: ayisrj@yahoo.in Website: www.isrj.net

Review Of Research
Vol. 3 | Issue. 7 | April. 2014
ISSN:-2249-894X

Available online at www.ror.isrj.net

ORIGINAL ARTICLE

DECADAL CHANGE ANALYSIS OF LANDUSE THROUGH REMOTE SENSING AND GIS OF KENDA VILLAGE, BILASPUR DISTRICT, CHHATTISHGARH

Ahmed Niyaj and Singh Pushpraj

Junior Research Fellow, Deptt. of Botany, GGV, Bilaspur , CG .
Associate Professor, Deptt. of Rural Technology, GGV, Bilaspur CG .

Abstract:

Land use is obviously constrained by environmental factors such as soil characteristics, climate, topography, and vegetation. But it also reflects the importance of land as a key and finite resource for most human activities including agriculture, industry, forestry, energy production, settlement, recreation, and water catchment and storage. For sustainable utilization of the land ecosystems, it is essential to know the natural characteristics, extent and location, its quality, productivity, suitability and limitations of various land uses. Improvements in satellite remote sensing, global positioning systems and geographic information systems techniques in the past decade have greatly assisted the collection of land cover data and the integration of different data types. In the present study decadal change in land use pattern is organised in the Kenda village of Bilaspur district. The study clearly indicate that the changes was found in different categories of land use pattern. The study also suggest to develop the suitable strategies for optimum utilization of land in the Kenda village.

KEYWORDS:

Remote Sensing, Geographical Information System, Global Positioning System, Earth Resource Data Analysis System.

INTRODUCTION:

Geographic information systems (GIS) and remote sensing (RS) data are appropriate tools for monitoring of the landuse distribution area and spatial-temporal dynamic multiplicity. During last two decades a diversity of remotely sensed data and change detection methods have been developed and assessed. Remotely sensed data have been utilized to measure the qualitative and quantitative terrestrial land-cover changes. Satellite remote sensing has many advantages for inventory and monitoring of waterbodies and also provide information on surrounding landuse and their changes over time. Landsat MSS, and Google Earth images are common data type for land use classification and its spatial-temporal dynamic changes. According to Macleod and Congalton (1998) list four aspects of change detection which are important when monitoring natural resources such as: (a) Detecting that changes have occurred, (b) Identify the nature of the change, (c) Measuring the areal extent of the change, (d) Assessing the spatial pattern of the change.

The use of remote sensing data for land cover classification is less costly and less time-consuming than aerial photography for large geographic areas. For landuse studies such as monitoring and inventory use and apply satellite remote sensed data can suitable in developing countries, where the budget are

Title: "DECADAL CHANGE ANALYSIS OF LANDUSE THROUGH REMOTE SENSING AND GIS OF KENDA VILLAGE, BILASPUR DISTRICT, CHHATTISHGARH" , Source: Review of Research [2249-894X] Ahmed Niyaj and Singh Pushpraj yr:2014 | vol:3 | iss:7

restricted and the data about the landuse like water bodies, road network, settlement area, forest area etc.Temporal changes in land cover have become possible in less time, at lower cost and with better accuracy through remote sensing technology (Kachhwaha, 1985). Land use and land cover are distinct yet closely linked characteristics of the earth's surface. The use to which we put land could be grazing, agriculture, urban development, logging, and mining among many others. While land cover categories could be cropland, forest, wetland, pasture, roads, urban areas among others. The term land cover originally referred to the kind and state of vegetation, such as forest or grass cover but it has broadened in subsequent usage to include other things such as human structures, soil type, biodiversity, surface and ground water (Meyer, 1999). The alteration in land cover including tropical deforestation has attracted worldwide attention because of its potential effects on soil erosion, run-off and carbon dioxide level (Joshi et al., 2006). Due to temporal revisit capability of the satellite data, it allows to monitor the changes either seasonally or yearly.

Land use is obviously constrained by environmental factors such as soil characteristics, climate, topography, and vegetation. But it also reflects the importance of land as a key and finite resource for most human activities including agriculture, industry, forestry, energy production, settlement, recreation, and water catchment and storage. For sustainable utilization of the land ecosystems, it is essential to know the natural characteristics, extent and location, its quality, productivity, suitability and limitations of various land uses. Landuse is a product of interactions between a society's cultural background, state, and its physical needs on the one hand, and the natural potential of land on the other (Ram and Kolarkar 1993). In order to improve the economic condition of the area without further deteriorating the bio environment, every bit of the available land has to be used in the most rational way. This requires the present and the past landuse/land cover data of the area (Chaurasia et al., 1996).

In many remote sensing change detection studies, land use and land cover change often are used interchangeably(Greenet al., 1994: Dimyathietal.,1996; Heikkonen and Varfis, 1998). During the last two decades, numerous studieshave been published concerning accuracy assessment ofland cover classifications (Rosenfield and Fitzpatrick Lins, 1986; Foody, 1992; Congalton, 1996). The change in land cover as a result of anthropogenic activities has played a major role in global environmental change and hence has become a hot spot for researchers (Liu et al., 2002). It is the process of identifying variations in an object or phenomenon by observing it at different times (Singh, 1989).

Land use affects land cover and changes in land cover affect land use. Changes in land cover by land use do not necessarily imply degradation of the land. However, many land use patterns driven by a variety of social causes, result in land cover changes that affects biodiversity, water and radiation budgets, trace gas emissions and other processes that come together to affect climate and biosphere (Riebsame, et al.1994).Land-cover refers to the physical characteristics of earth's surface, captured in the distribution of vegetation, water, soil and and/or artificial structures. Land-use refers to the way in which land has been used by humans and their habitat, usually with accent on the functional role of land for economic activities(Butenuth et al., 2007).

The information being in digital form can be brought into a Geographical Information System (GIS) to provide a suitable platform for data analysis, update and retrieval. Improvements in satellite remote sensing, global positioning systems and geographic information systems techniques in the past decade have greatly assisted the collection of land cover data and the integration of different data types (Star et al., 1997). Every parcel of land on the Earth's surface is unique in the cover as per the Meyer, (1999). But now a days with availability of satellite imagery, that are multispectral (that acquire image data at specific frequencies across the electromagnetic spectrum), multi-temporal (images that have been taken over a period of time) and have very high spatial resolution, change detection studies of inaccessible places have also become much more accurate, efficient and can be frequently carried out.

METHODOLOGY:

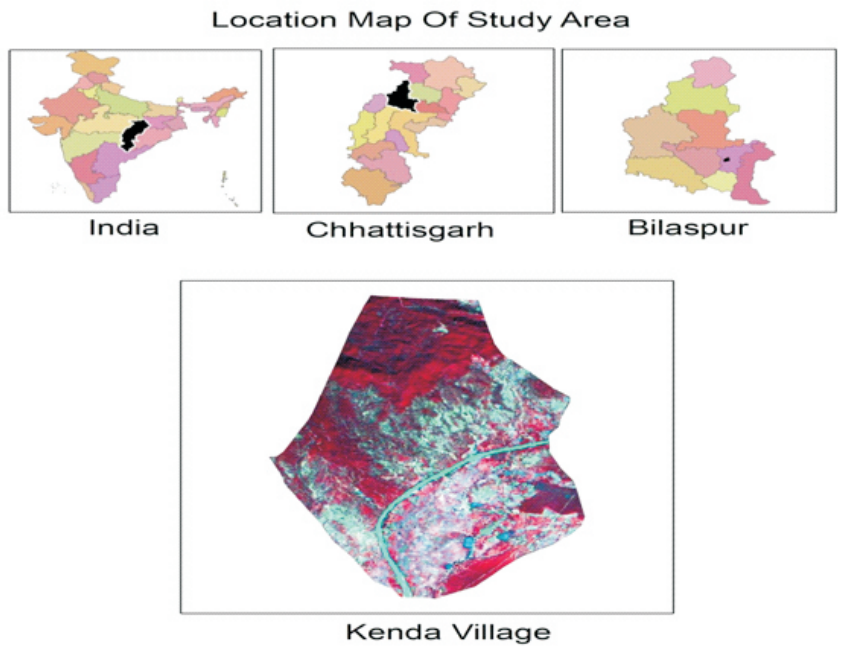
Under this study the settlement area, forest area, water bodies, roads, agricultural field area was taken to assess the change over the time. The whole study consolidated in these steps.

Planning of the study area survey was performed before starting this, activities for proper selection of village and then its parameter.
Planning was done after the preliminary survey of the area under facility consideration after that area already researched, type of village, type of settlement, type of soil , preparation of tools to collect data, need time and money and software for image processing.

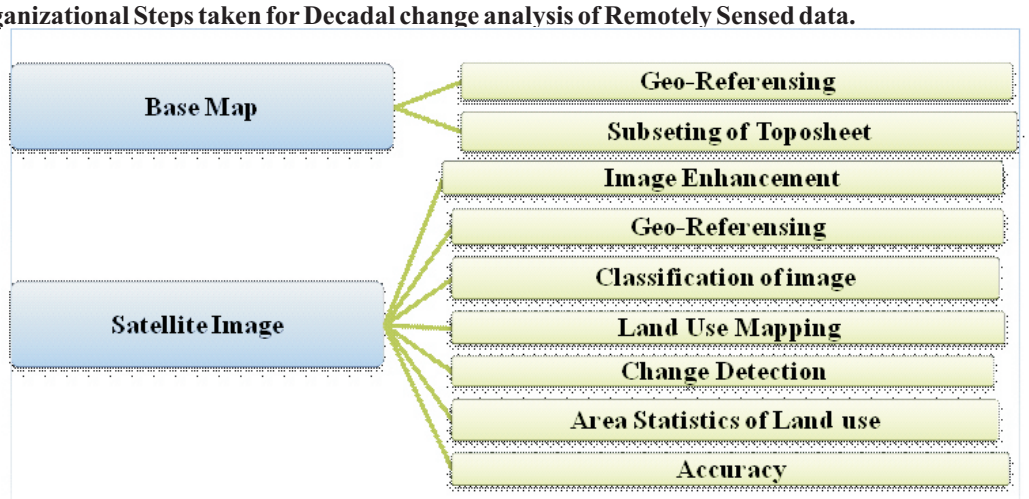
SELECTION OF STUDY AREA

The whole village was taken for the purpose of study. very initial the boundaries of village were identified with the help of available documents and GPS survey. Then the area of interest (AOI) was sorted form the map with the help of ERDAS software. Study site was chosen randomly for change detection analysis of settlement area, water bodies, forest area and agricultural field of the selected village. The study area Kenda Village, Kota block of Bilaspur district is located in between 22° 31' 48" N to 22° 34' 22" N Latitudes and 82° 03' 23" E to 80° 04' 21" E Longitudes, with an aerial extent of 15.75 Km2.Kenda Village is one of the most populated and rapid agricultural developing area in the Kota block of Bilaspur district. Data shows that the total population doubled with in the last twelve year.

In the present study two different satellite images (Landsat image & Google Earth image) of Kenda village belonging to 2001 and 2013 is used to carry out for change detection analysis. The land use and land cover maps for different time periods is created taking into account the various major components that have been affected by the deforestation, settlement expansion activities at Kenda village.

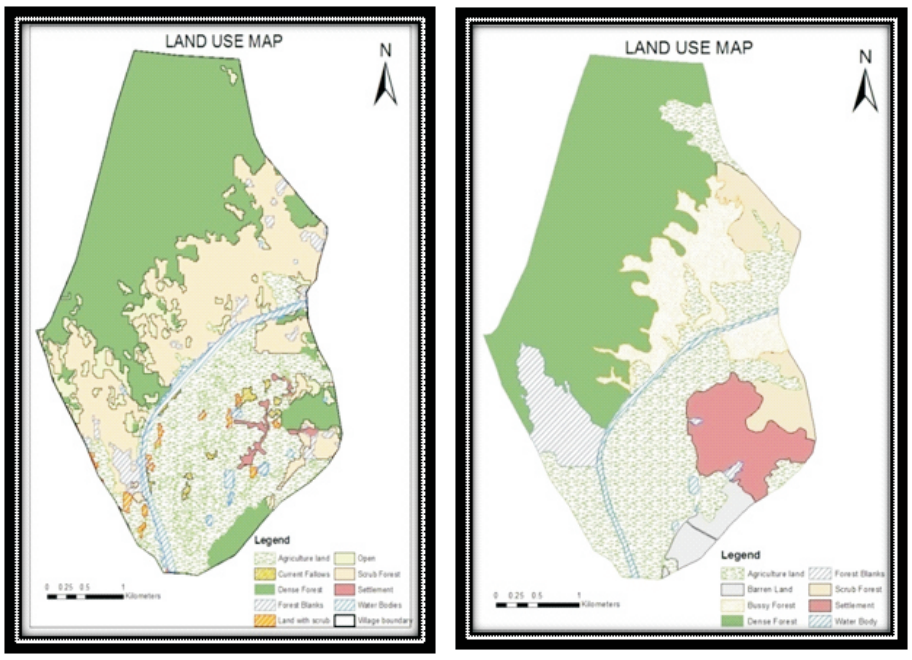


Organizational Steps taken for Decadal change analysis of Remotely Sensed data.



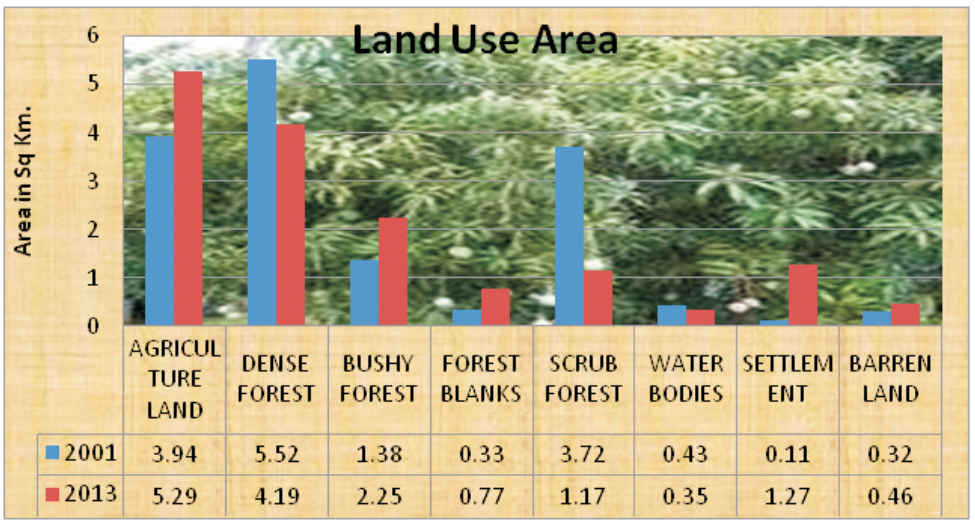
RESULT AND DISCUSSION:

The present investigation was an attempt to deal with the changes occurred with referenced to water bodies, settlements, forest areas, agriculture field area and total land use area in Kenda village, block Kota, district. Bilaspur, Chhattisgarh during 2001- 2013 through the application of remote sensing. The investigation was based on Remote sensing, G.I.S and Ground truthing. Remote sensing and GIS tools, software, images along with workstation is provided by the Department of Rural Technology G.G.V. The observation and result which were obtained during the study are below organised in result and discussion part.



Year2001 Year 2013

Figure 1:-Image showing land use pattern of Kenda village.



	AGRICULTURE LAND	DENSE FOREST	BUSHY FOREST	FOREST BLANKS	SCRUB FOREST	WATER BODIES	SETTLEMENT	BARREN LAND
2001	3.94	5.52	1.38	0.33	3.72	0.43	0.11	0.32
2013	5.29	4.19	2.25	0.77	1.17	0.35	1.27	0.46

Graph:1 Shows the change with the situation of land use area of Kenda Village in the year 2001 to 2013.

The total land area of Kenda village was covered 15.75 Sq. km. Out of which most of the land (3.94 Sq.km.) was under the agriculture field in the year of 2001 but it is significantly increase up to 5.29

Sq.km in the year 2013. The data indicate is clearly shows 8.57 percent increase in the agriculture field area of the Kenda village in last 12 years.

The Forest area of Kenda village is divided into dense, bushy, blanks and scrub in forest categories. The dense forest decrease up to 8.44 percent in last 12 years but the bushy forest, Blank forest had increased up to2.79 percent respectively. However, in case of scrub forest the area declined more than 12.69 percent during last 12 years. As per the above graph areas covered under the water body was decreased up to 0.51 percent when we see the whole scenario of settlement area increases day by day. The haphazard settlement procedure and increasing agriculture field are affect the water bodies of the village.

CONCLUSION:

The total area covered under Kenda village is 15.75 Sq. Km. The Kenda village situated on the district road and well connected with head quarter of Bilaspur district and Gorella block of Bilaspur district. The village having various water bodies, forestland, and agriculture field, as well as some settlement. After the analysis of the image through the use of GIS software calculate the different parameters of changes. For doing this job the specific methodology were adopted. The final results show that the given below.

During last twelve years span of time the water bodies of the study area were decreases up to 0.51 per cent. The area decreased in both river basins and ponds categories. In the last twelve year there are five small ponds was destroyed for agriculture area development and few for settlement purpose. In general view, relate with the distortion of pond is lack of water storage capacity inpond, so the pond area was converting into rice field. The area fall under the agriculture land in Kenda village is covered 25.01 per cent in the year 2001 but this area increase up to 33.58percent in the year 2013. In between 12 years 8.57 per cent agriculture land is increased because of increasing production demand and the prime sector of occupation.

After analyzing of satellite image the area covered under settlement while increasing up to 7.37 percent in last twelve years. After digitizing each and every settlement pocket we conclude the settlement area covered 1.27 Sq.km in the year 2013 in comparison with area 0.11 Sq.km areas in the year 2001. In between, the year 2001 to 2013, the population increases from 2104 to 2509 village persons. The permanent settlement increase in village but migrated village people not much affected the population pressure in the kenda village. Total 10.95 Sq. km area comes under the forest area of Kenda village in the year 2001. In the year 2013, the images show that only 8.38 sq.km areas are fall under category of forest and it cover only 53.25 percent area of whole village. The clear cut difference upto 16.32 per cent area of forest shown by the image in Fig: 1. It show the population pressure are destroy the forest as well as water bodies for their livelihood and settlement purpose. Mostly decrease in the categories of dense forest is converted into blank forest and bushy forest. The scrub forest area is converted into agriculture land the data show the decrease up to 50 percent within last twelve year span of time.

The data also shows that the forest area is converted into barren lands at a very large scale. The data show in the graph-1 is clearly indicating that 0.14 sq. km. is increase in the category of barren land of the Kenda village in last 12 years. The over helming massage from the table is increasing trend in agriculture, bushy forest, forest blanks, settlement and barren land, and decreasing trend in the categories of dense forest, scrub forest and water bodies. The significant change in Agriculture and Settlement shown in the Kenda village and also increasing the population is also affected current land use change.

SUGGESTIONS :

Water bodies of Kenda village had shown shrinkage between the year 2001 to 2013. Therefore, government should develop the strategies for the conservation of these water bodies. A lot of forest had been converted into degraded lands so a forestation and de-forestation program should be initiated by the state forest department as soon as possible. Villagers should be trained for innovative cultivation practices, new technique of production, harvesting, threshing and storage technique with the use of traditional knowledge.

Emphasis also needed for conservation of traditional knowledge regarding to collection of NTFP (non-timber forest product), medicinal plants etc.

REFERENCES:

1.Butenuth M., Gösseln G.V., Tiedge M. (2007), "Integration of heterogeneous geospatial data in a federated database". ISPRS Journal of Photogrammetry and Remote Sensing, 62(5): 328-346
2.Chaurasia, R., Closhali., D.C. Minakshi Sharma., Kudrat M. and Tiwari A.K., (1996), " Land use change

analysis for agricultural management case study of tehsil Talwandi Sabo, Punjab. Journal of Indian Society of Remote Sensing, 24(2): pp115123.
3.Joshi P.K, Kumar M., Midha N., Vijayanand and Paliwal A., (2006),"Assessing areas deforested by coal mining activities through satellite Remote Sensing images and GIS in parts of Korba, Chattisgarh."Journal of the Indian Society of Remote Sensing, Vol. 34, No. 4, pp 415-421.
4.Kachhwala, T.S., (1985)". Temporal monitoring of forest land for change detection and forest cover mapping through satellite remote sensing. In the Proceedings of the 6th Asian Conference on Remote sensing, Hyderabad, pp 7783
5.Liu ZQ, Xie J, Qiu Y, Li Zhy (2002), "Land cover as a result of anthropogenic activities has played a major role in global environmental change" 100(6): 16-19.
6.Meyer, (1999),"Term land cover originally referred to the kind and state of vegetation, such as forest or grass cover but it has broadened in subsequent usage U.S.A." Consequences.p.85-95.
7.Ram, B. and A.S. Kolarkar, (1993). Remote sensing application in monitoring land use changes in arid Rajasthan. International Journal of Remote Sensing,14(17): pp 3191-3200.
8.Riebsame, W.E., Meyer, W.B. and Turner, B.L. (1994)."Modeling Land-use and Cover as Part of Global Environmental Change". Climate Change. Vol. 28. p. 45.
9.Singh A. (1989), "Review Article Digital Change Detection Techniques Using Remotely-Sensed Data". International Journal of Remote Sensing, Vol. 10, No. 6, pp. 989-1003.
10.Green, et al. (1994). Using Remote Sensing to Detect and Monitor LandCover and LandUse Change. Photogrammetric Engineering & Remote Sensing. Vol. 60. No. 3 pp 331337.
11.Heikkonen, J. and VarfisA., (1998). Landcover landuse classification of urban areas: A remote sensing approach, International Journal of Pattern Recognitionand Artificial Intelligence, 12(4):pp 475–489.
12.Rosenfield, G. and FitzpatrickLins, K. (1986). A Coefficient of Agreement as a Measure of Thematic Classification Accuracy. Photogrammetric Engineering & Remote Sensing. Vol. 52. No. 2. pp 223227.
13.Foody, G.M.(1992) , "On the compensation for chance agreement in image classification and accuracy assessment, "Photogrammetric Engineering and Remote Sensing, Vol.58, 10 pp 14591460.
14.Congalton,R.G. (1996)," Accuracy Assessment: A Critical Component of Land Cover Mapping. Gap Analysis. American Society for Photogrammetry and Remote Sensing. 1996. pp 119 – 131.
15.Macleod and Congalton (1998): Quantitative comparison of change- detection Algorithms for Monitoring Eelgrass from Remote Sensed Data". Photogrammetric Engg. Rem. Sens., 64, 207-216.