

Monitoring Land Use and Land Cover Change in Jalgaon District Using Remote Sensing and GIS Techniques

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Abstract

The Digital Change Detection Technique (DCDT) using satellite imagery helps to understand land use and land cover. The area taken under study was Jalgaon district of Maharashtra. LANDSAT Satellite imagery is of two different types i.e., CARTOSAT, and LISS-3. Images taken from these satellites are then processed under ERDAS and GIS software which helps in determining the land use and land cover.

The technique is being used extensively in generating valuable information on forest cover, vegetation, and land use changes. Under this study three Thematic maps are processed i.e. Location map, Drainage map and Land use and Land cover map were prepared. During study it's been observed that the Forest land, Agricultural land, Water body land and other protected areas are mostly dominated by Urbanization (land cover) and other infrastructural purposes. This study is undertaken to find out the present status of the land cover and to find out the issues regarding this. This may help in taking further steps towards the mitigation of any issues found.

Keyword: - Remote sensing; GIS; Digital change detection technique, Urbanization, Migration.

Introduction

“Land use means surface utilization of all developed and vacant lands for a specific point at a given time and space” (Foreman T.W. 1968). Land use study carries a great importance because it can provide a picture about intensively used, under used and unused land of the area. The concept of general land use is related to the use to which land is put in a certain reason at a given period of time. The term land use is virtually self-explanatory, meaning the actual and specific use to which the land surface is put in terms of inherent primary land use namely, land under forest, barren land, water body, cultivation etc. The general land use of

the Jalgaon district is an impact of various types of factors. Spatial variations in land use are related to physical environment and Socio-economic factors are also responsible for shaping the land use in the region. In this research is devoted to the study of spatio-temporal analysis of general land use of Jalgaon district. The general land use pattern has been classified as net sown area, land not available for agriculture land, forest land, and barren land, built up area and water body. The data obtained for the year of and 2006-12. Socio-economic Review and Statistical Abstract and District Census Handbook of Jalgaon District, converted into the percentage to the total geographical area. The analysis gives the proper understanding of the general land use and relevant aspects providing the base for further investigation.

Objective

1. To study the land use land cover map by using sophisticated method and tool.
2. To form the pattern and cape in land use land cover with map and field data and using different Software.

Research Methodology

Data Resource and Techniques Adopt

Primary and secondary source data is most prominent for research. But the secondary data is comparatively more useful than primary because every time It's not possible to bring the primary data for the research.

- The data taken from Bhuvan website, and image were taken from Landsat LISS-III.
- Partly we have taken the data from Zilha Parishad of Jalgaon District and Agricultural Department from Jalgaon Dist.
- Statistical method use for data analysis excels with the help of various techniques in tool bars. Use of Computer Cartographic techniques, we used ERDAS software for our study along with GIS software for preparation of map.

Study Area

The study area of Jalgaon district is one of the important districts of North Maharashtra state is called Khandesh, as well as East Khandesh. The district is bounded on the north by Madhya Pradesh, on the east by Buldhana, on the west by Nasik and Dhule districts and on the south by Aurangabad district Jalgaon district which is located in the north-west region of the Maharashtra between 20°15' and 21°25' North latitudes and 74° 55' to 76°

28' East longitudes. It has an area of 11,765 km² and a population of 4,224,442 as of the 2011 census.

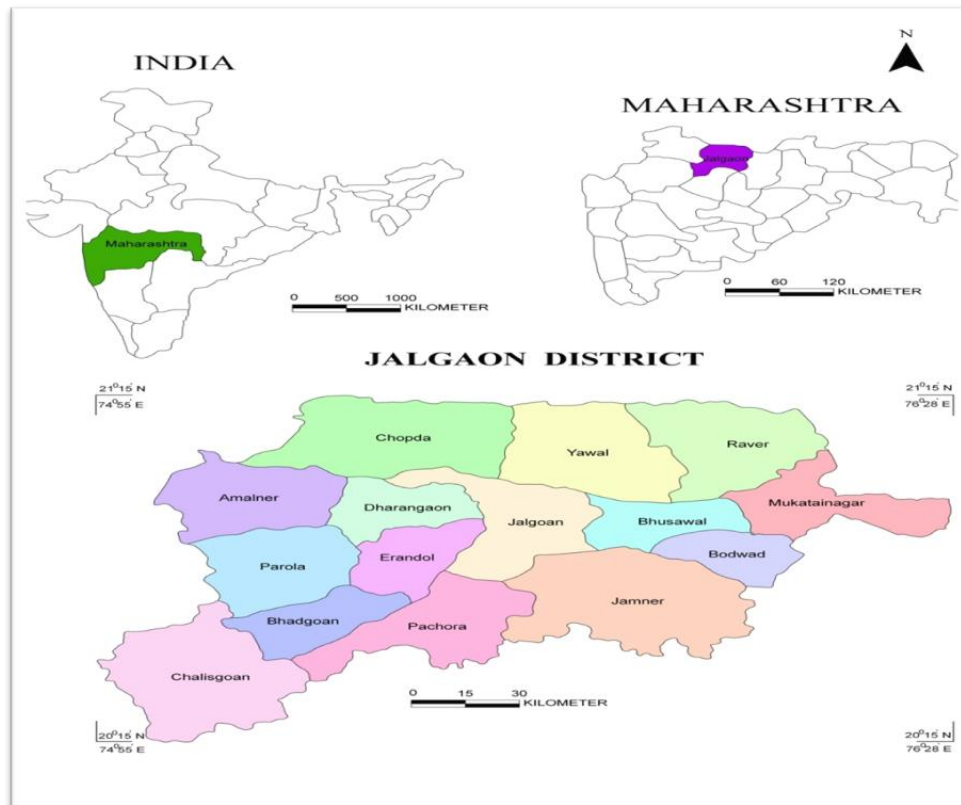


Fig.1: Study Area Map

Table 1: Comparison between Land Use Land Cover data of Jalgaon District 2006-2012

| Sr. No. | LULC Class | Area (Km ²) | Area (%) | Area (Km ²) | Area (%) | Change (%) |
|------------|------------------|-------------------------|----------|-------------------------|----------|------------|
| | | 2006 | | 2012 | | |
| 1 | Built up Area | 175.23 | 1.49 | 278.89 | 2.37 | 0.88 |
| 2 | Agriculture Land | 8860.26 | 75.37 | 8605.64 | 73.14 | -2.23 |
| 3 | Forest Land | 1794.33 | 15.26 | 1816.07 | 15.43 | 0.17 |
| 4 | Barren Land | 579.25 | 4.93 | 633.55 | 5.38 | 0.45 |
| 5 | Water body | 355.92 | 3.02 | 430.86 | 3.66 | 0.64 |
| 6 | Total | 11765 | 100 | 11765 | 100 | 0 |

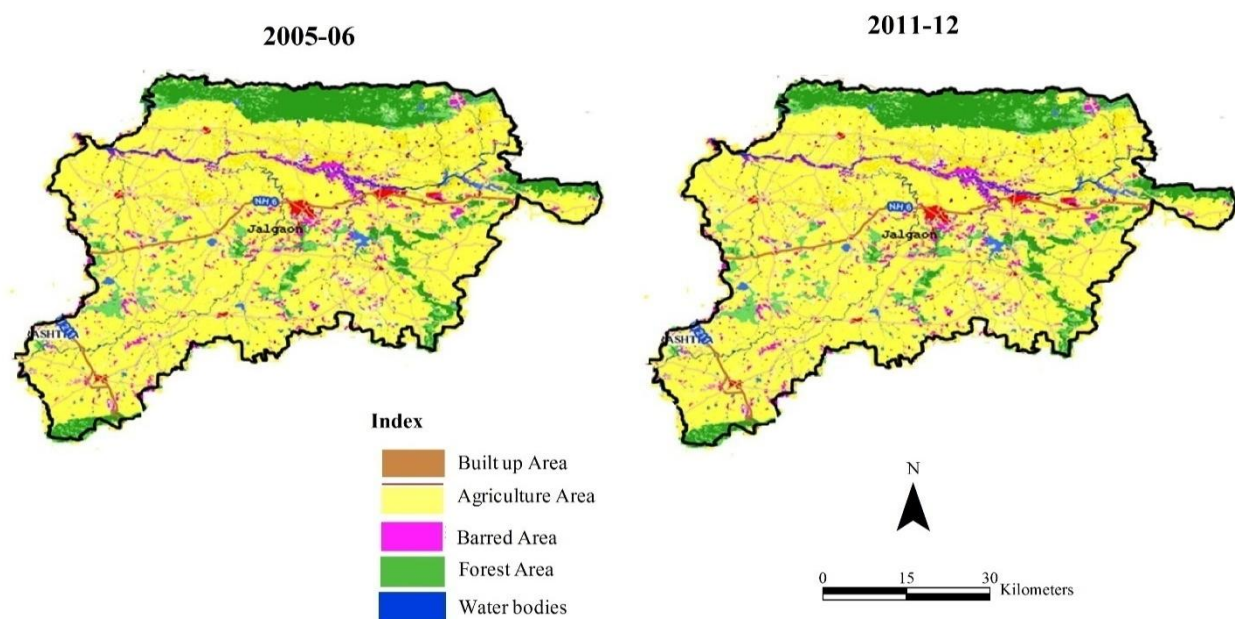
Source: Bhuvan gov.in

Result and Discussion

Land use and Land Cover Change Detection and Analysis

The figures presented in above table represented the static area of each land use land cover category for each study area. The land use and land cover mapping of this area shows a distinctive positive and negative change in terms of some class.

The pattern of this data is very much useful for understanding the concept of land cover and land use. The built-up area which is 175.23 Km² in 2006 and change is seen up to 0.88% in 2012 which is positive change. The agriculture area which is 8860.26 Km² in 2006 and change is seen up to -2.23% in 2012 which is negative change. The Forest area which is 1794.33 Km² in 2006 and change is seen up to 0.17% in 2012 which is positive change. The Barren area which is 579.25 Km² in 2006 and change is seen up to 0.45% in 2012 which is positive change. The Water bodies' area which is 355.92 Km² in 2006 and change is seen up to 0.64% in 2012 which is positive change.



**IMG 2: Land Use & land Cover map with variation
(Image A from 2006 & Image B from 2012)**

The above image which are land use and land cover of prepared by using ERDAS and GIS sophisticated software by taking help of these software I have created the image with 5 classes viz. Built up area, Agriculture area, Forest area, barren area and water bodies' area.

Interpretation of Comparison between Land Use Land Covers Changes of 2006-2012 in Jalgaon District

In 2006 the built up having 175.23 Km² which comes under urban, rural and mining with area having 82.38, 91.96 and 0.89 Km² respectively. The agricultural area in 2006 was 8860 Km² in this particular field plantation having 666.48 Km² and fallow shows 615.95 Km² whereas, cropland has 7577.82 Km². The Forest area in 2006 has 1794.33 Km² in this deciduous forest having 1288.95 Km² and shrub forest 505.38 Km². The barren land area in 2006 has 579.25 Km² in this uncultivable / wasteland having 148.79 Km² and shrub barren land 400.72 Km² whereas barren rocky land area has 29.74 Km². The water body's land area in 2006 has 355.92 Km². In this river / canals having 250.52 Km² and reservoir / lake water land 105.67 Km².

In 2006 the built up having 278.89 Km² which comes under urban, rural and mining with area having 114.8, 160 and 4.09 Km² respectively. The agricultural area in 2006 was 8650.64 Km² in this field plantation having 647.11 Km² and fallow shows 599.84 Km². Whereas, cropland has 7358.69 Km².

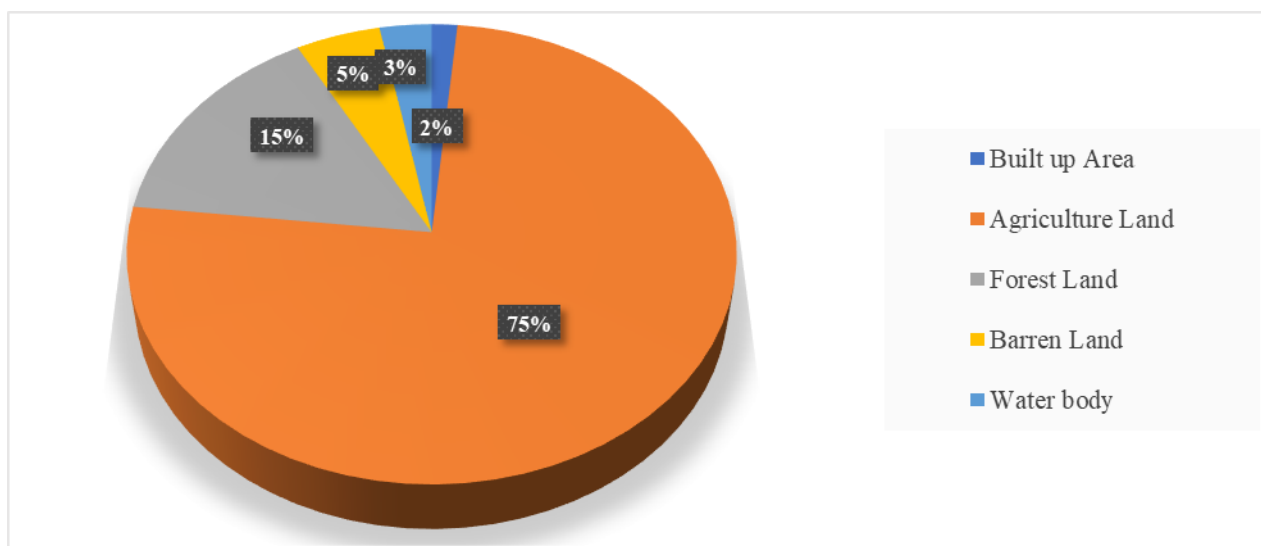


Fig. 3: Chart showing Land use pattern of Jalgaon District in 2006

The Forest area in 2006 has 1816.07 Km² in this deciduous forest having 1101.11 Km² and shrub forest 714.82 Km². The barren land area in 2006 has 633.55 Km² in this uncultivable / wasteland having 159.69 Km² and shrub barren land 462.36 Km² whereas barren rocky land area has 11.5 Km². The water body's land area in 2006 has 430.86 Km². In this river / canals having 258.77 Km² and reservoir / lake water land 172.09 Km². When we talk the term of percentage of land in 2006 by taking a circle with 100% then it shows nearly 75% of agriculture area, built up with 2%, forest land 15%, barren land has 5% and 3% is percentage of water bodies. From this a bar graph, we can compare both data then are realized both extremities regarding all type of land. When we talk the term of percentage of land in 2006 by taking a circle with 100% then it shows nearly 73% of agriculture area, built up with 2%, forest land 16%, barren land has 5% and 4% is percentage of water bodies.

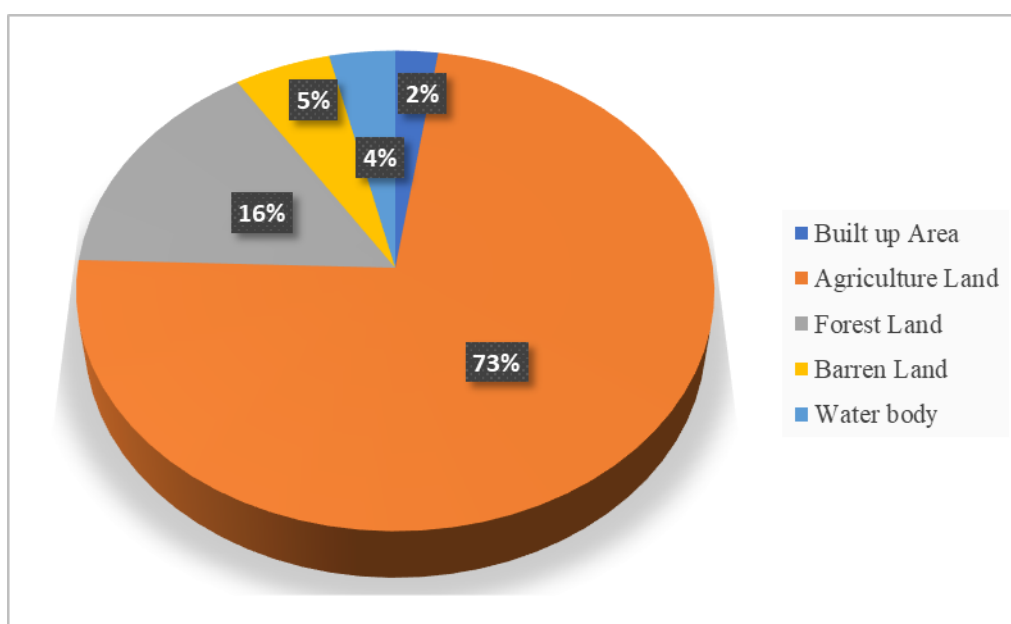


Fig. 4: Chart showing Land use pattern of Jalgaon District in 2012

When we talk term of percentage of land in 2006 by taking a circle with 100% then it show nearly 73% of agricultural area, Built up 2%, Forest land 16%, Barren land has 5% and 4% is of water bodies.

Conclusion

The first is the built-up area which was 1.49 in 2006 and later it shows 2.37 which is nearly a positive change. So, that we can in terms of population geography in which the concept of migration plays a vital role. Built up area is continuously increasing with increasing population. Therefore, the next pattern like forest land and barren land is also falls under this pattern, where it is showing 15.26 % in 2006 and in 2012, it shows 15.43 which is merely very less. This quite change has happened because of seasonal variation and plantation scheme from the government under various agencies and private NGO's. It contains urban built up as well as rural too. But as we know people migrating towards districts or urban areas for employment so that the buildup is automatically slower down in rural sector whereas a continuous positive approach we can see in urban sector. The built up of Ming is also a major problem of this field, continuous Exploitation, and exploration of mineral as well as for other activity. The sector also increasing therefore we can say it's a throughout positive approach.

Agriculture is biggest practice in India therefore it is showing 75.37% area in bar graph in 2006 and 73.14% in 2012. The data shows 2.23 a very good negative anomaly which shows an impact of population geography as well as we can correlate it with agricultural geography. The forest pattern shows 15.26 % in 2006 and 15.43 % in 2012 which means area shows 0.17 as a positive anomaly and it because of monsoonal effect as a *Samajik Vanikaran* scheme of government. In the 2006 barren land shows 4.93 % and in 2012 it shows 5.38 % in 2012, the variation is because of quaternary effect of soil. The water body from surface has values 3.02 % in 2006 and 3.66 in 2012. The difference is because of the construction of various dams and river morphological characters. The geographical conditions which are very important for the above said characters. Therefore, the net data which we are comparing are from 2006 and 2012 means 6 years. Therefore, a characteristic pattern of growth in terms of it may be positive and negative to geography.

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