



Intercontinental Geoinformation Days

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Analysis of forest degradation by using GIS and remote sensing: a case study of Chandoli National Park Kolhapur in Maharashtra State

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Keywords

Remote sensing
GIS
Land use
Land cover
Forest

ABSTRACT

The present study addresses the status of forest land cover mapping and analytical findings of practical conservation for sustainable development of forested area. Remote sensing and GIS technique are known for reminders special analysis. Chandoli forest area presented the biodiversity and it is essential for ecosystem. There is tropical evergreen, moist deciduous forests. It is including in Sahyadri tiger reserve. The study highlighted those forests are degraded in small scale but it is the problem for sustainable ecosystem in this National Park Forest area. There should be some remedies for controlling the degradation by road network and settlement due to human activities. Forest cover in the world is 31%, where as in India have 24.56%, 16.50 % in Maharashtra State, 23.19 % in Kolhapur District and Shahuwadi tehsil is acquired 23.38%.

1. Introduction

Forest ecosystem plays very important role in global ecological balance and natural environment. Forest provides a valuable timber for domestic and commercial use many industries like paper mills, mat making, plywood, sports goods and furniture at directly based on raw materials derived from forest. Forest employment to about 4 million people to earn their livelihood in forest-based applications. Forest as the treasures of earth have as much important as they satisfy needs of the living beings and because of their significant role in the environmental harmony.

Recent decades the problem of deforestation in world had raised considerable international in interest due to the industrial revolution as well as human activities. The rapid development of GIS and remote sensing techniques have provided a reliable effective and practical way to characterized terrestrial ecosystem properties and used in planning for sustainable development as well as conservation of natural resources. According to United Nations study about forest, the total area of the world in 1900 was nearly 7000 million hectares and by 1975 it was reduced to 2890 million hectares. In the context of

India according to recent state of the forest report the forest cover in India is 67.5 million hectares and it constitutes 20.5 percent of geographical area represented by 41.68 million hectares of dense forest and 25.87 million hectares an open forest. The biodiversity is essential for ecosystem that is present in the Chandoli forest. There are most of the floras and fauna recent plays a vital role in the forest ecosystem. Due to the human activities, there are fundamentally attaining the diversity of live and resulted in measure theory of species are currently declining.

2. Method

Satellite imagery of IRS of 1999 and 2015 satellite data have imported in address imagine software and Geo-rectified with image-to-image registration using UTM wgs84 projection the satellite data for land use and land cover are GIS software or have used for processing analysis and integration of spatial data simple statistical methods have used for data analysis cartographic technique used to draw the diagram.

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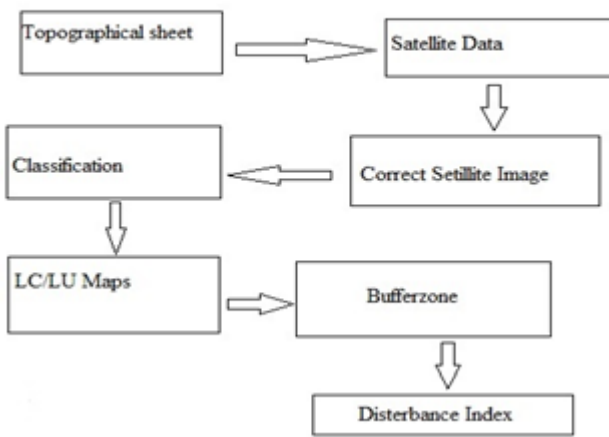
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Cite this study

Patil R & Ubale G (2021). Analysis of forest degradation by using GIS and remote sensing: a case study of Chandoli National Park Kolhapur in Maharashtra State. 3rd Intercontinental Geoinformation Days (IGD), 14-17, Mersin, Turkey

Research Methodology



2.1. Research objectives

1. To assess the land use and land cover pattern of the study region.
2. To assess the changes in forest cover.

2.2. Study area

The study area is northern part of Kolhapur district. It lies between 17° 00' 00" to 17° 17' 00" North latitude and 73° 41' 33" to 73° 53' 30" East longitude. It is located entire in the Western Ghat. The study region covers about 317 square km of geographical area the average height of above mean sea level from 600 to 800 m it comprises Northern Sahyadri mountainous region in Shahuwadi tehsil. It consists a semi evergreen an evergreen vegetation mixed with grassland 50 supporting to the variety of endemic plant and animal species Nearly 23 species of mammals, 122 species of birds, 20 species of amphibians and reptiles are known to be resident in the forest. Chandoli the total population is 1939 according to 2011 census.

Geographical location of the Shahuwadi tehsil lies between 16° 54' 36" North and 73° 56' 46" East longitude. Total area of the Shahuwadi tehsil is 104352 Sq. Hectors covered in 145 villages. According to the census of 2011 population of the Shahuwadi Tehsil was 1,85,661.

3. Discussion and results

The land use, land cover pattern shows that current utilization of land resources. India being one of the important countries for utilization of natural resources like land, soil, water and climatic conditions etc. India has experienced the utilization pattern of natural resources and land use pattern varies from place to place as well as state to state. Chandoli National Park is the most important for the research of forest cover and its current status. After creating the layer and its processing we have analyzed following results. Land-use of a region is a combined result of the natural set up and human dynamism within socio economic set up and technological development. Land-use context in a special context is essential to understand regional zone of the

areas of optimum land-use degraded areas etc. The use of land constitutes a major item in national planning and this is especially in India.

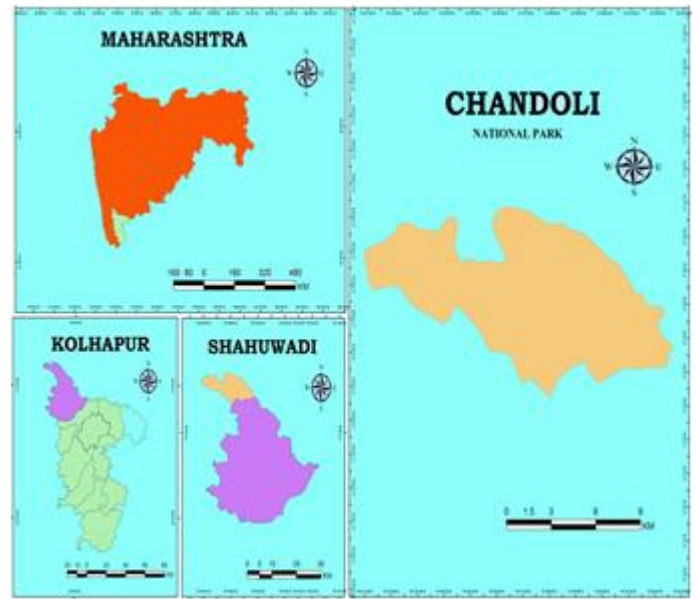


Figure 1. Location of Chandoli National Park (Source: Based on SRTM Data)

Table 1 shows that the land use and land cover pattern of Chandoli National.

Table 1. Chandoli National Park: LU/LC Pattern (1999 - 2015)

Name of Class	Year 1999		Year 2015		Change in Percent
	Area in H.	Area in %	Area in H.	Area in %	
Forest Cover	8479	75.03	7985	70.76	-6.18
Agri. Land	136.37	1.2	175.57	1.55	39.2
Barren Land	731.91	6.47	1200.08	10.62	63.96
Water Body	1858.35	16.44	1816.84	16.07	-2.24
Built up Land	93.96	0.83	122.10	1.08	29.94
Total Area	11299.59	100	11299.59	100	

Figure 2 and 3 reveal that, what type of land use and land cover pattern existing in the study region. The maximum proportion of the land cover presented from forest cover and minimum proportion is represented from the built-up land. Near about 70 per cent of the area occupied by forest during the year 1999 and it is reduced in the year 2015 and presented only 70.66 percent. It is reduced by 6.18 percent during this period. The area under water body has slightly decreased from 16.44 per cent in 1999 to 16.07 per cent in 2015. It is decreased by 2.24 percent. Area under Barren land has increased by 468 hectares, it was 6.47 percent in 1999 and 10.62 percent in the year of 2015. In the year 1999 the area under agriculture was 1.2 percent. It is also increased in

year 2015 (1.5 5 per cent), it is increased by 39 percent. Area under built up land was 93.96 sq. ha (0.83 per cent) and 122.8 sq. ha (1.08 per cent) in the year 2015.

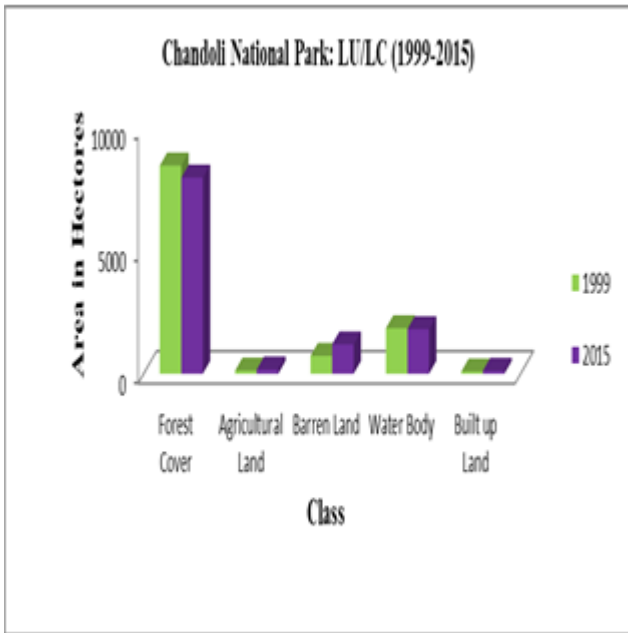
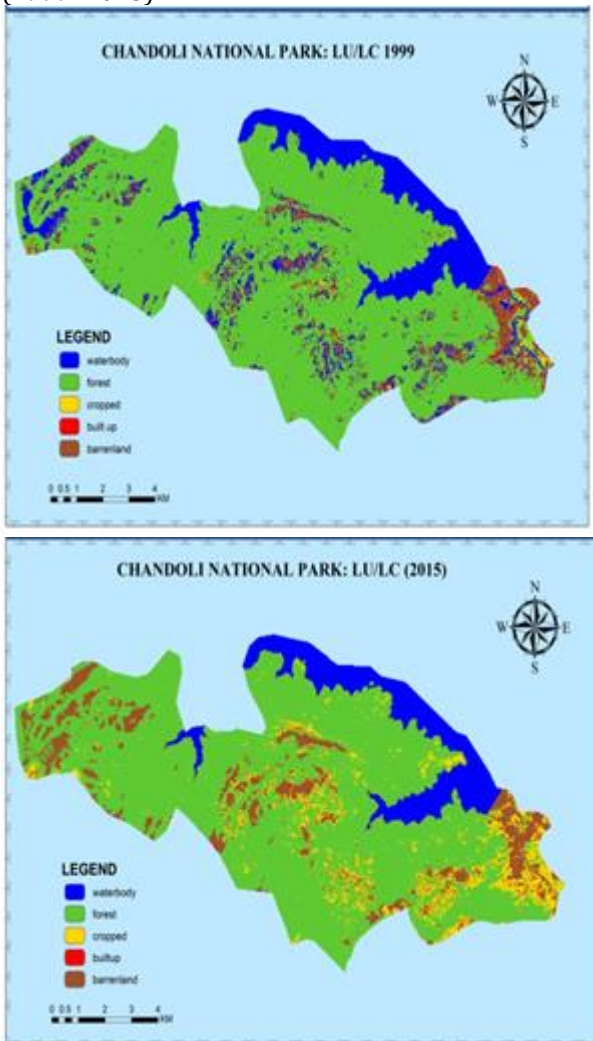


Figure 2. Chandoli National Park: LU/LC Pattern (1999 - 2015)

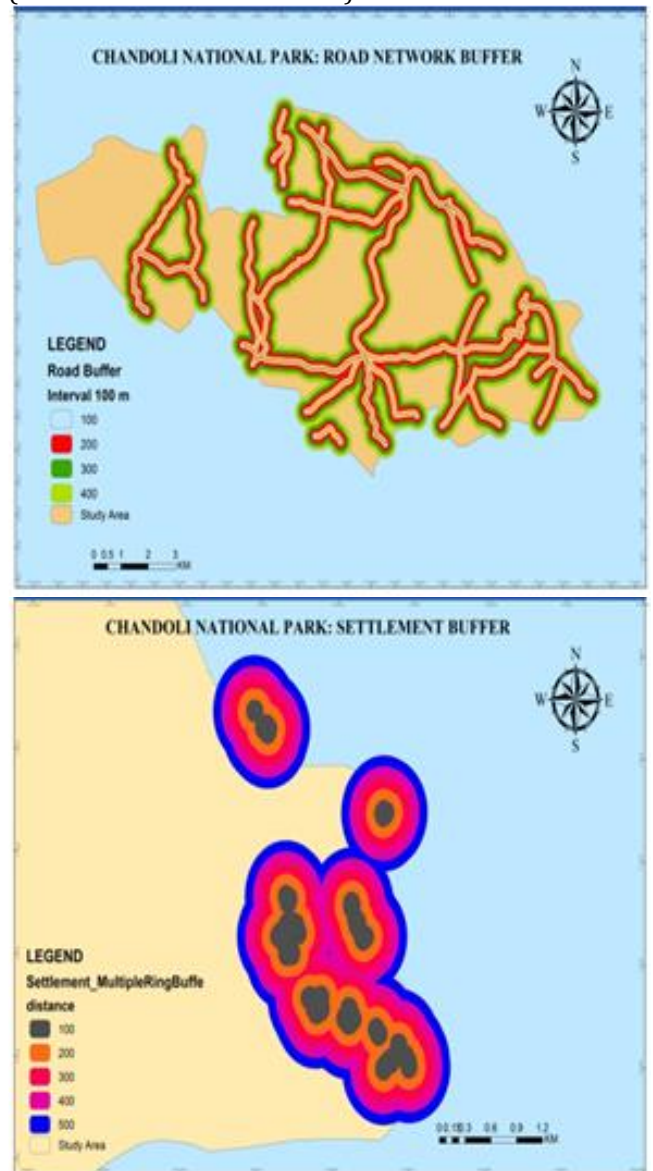
Figure 3. Map of Chandoli National Park: LU/LC Pattern (1999 - 2015)



3.1. Degradation factors analysis

Present study indicates that, there are two factors also affected to degradation of forest area which are settlements and road network. We have prepared the map of buffer zone about settlements and road network which are affects to natural vegetation. There are more road network affects to forest less than settlements. We have created five buffer zones by 100-meter scale. Most of the area covered by cart road with is also affected to the natural vegetation and wildlife; it is the best method for environmental conservation and its management in the ecosystem Eco sensitive zone.

Figure 4. Buffer Zones of Road Network and Settlements (Source: Based on SRTM Data)



4. Conclusion

Chandoli forest are experienced and slightly degradation in the proportion of the forest area. The study has reveals, there are more than 70 percent land is occupied by forest land due to heavy rainfall and physiographic condition. The study area presented the Barren land increased by 63% due to the deforestation

existing in that area. There is agricultural land is increased with less rate, due to the growth of population and people are interested to practice of agricultural in this area. Study area experienced the increasing pattern in built up land due to the increasing population. Water bodies of the area are slightly decreased. Most degradation factors affect the forest land such as road network and settlements. The Chandoli national parks should be establishment of a forestation in a barren land and hill slopes. The human activities such as deforestation, grazing of livestock should be avoided in this area. Present study has highlighted that most advanced technique that is remote sensing and GIS provide a powerful tool for mapping and detecting changes current studies in forest distribution.

5. Recommendations

Following steps should be taken for conservation of forest.

- 1.Regulated and planned cutting of forest.
- 2.Reforestation
- 3.Check over forest clearance for agricultural purposes.
- 4.Proper utilization of forest product.

Acknowledgement

The present study could not have been completed without the support of Prof. Dr. Kanhaiya Sapkota, Central Department of Geography, Tribhuvan University, Nepal, & Prof. Dr. Idoko Ojochenemi, Department of Geography, Kogi State University, Anyigba, Nigera and the infrastructure provided by respective institutions.

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