

## RESEARCH ARTICLE



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# Changes of Land Use Land Cover in Bandipur National Park

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## Abstract

*This study mainly focusses on changes of land use land cover (LULC) in Bandipur National Park in 2001, 2011 and 2019. Methodology have been used for LULC analysis, downloaded satellite imageries of Landsat 8 (OLI) for 2019, Landsat (ETM+) for 2001, and Landsat 4-5 (TM) for 2011. with the help of Geoinformatics tools clipped the area with 5 km buffer in context to our study area and processed it with supervised classification of water, dense forest, open forest, urban, agriculture, current fallow to get LULC map for the study area. In three decades, area-wise changes noticed in LULC analysis revealed the open forest is more than the dense forest as it is getting decreased. The area under water is also getting decreased in the past two decades. The total area under cultivation i.e., areas under agriculture and horticulture have increasing. And the urban is increasing in the Bandipur National Park (BNP) by 1% in all the three decadal period.*

**Keywords:** Land Use Land Cover (LULC); Bandipur National Park (BNP); Landsat

## INTRODUCTION

A land with a wide range of diversity also fits even with the wildlife. Few of the most wonderful animals call India their shelter; the royal Bengal tiger, An Asiatic Lion, Asiatic elephant, The Indian Rhino, the sloth bear are in focus. A country where once the Jungles were prospered with the poaching, national parks, and wildlife sanctuaries brought a warm welcome change to India. The list of national parks is long and diverse as Indian traditions and culture. India has a total number of more than 200 National parks and 540 wildlife sanctuaries spread across nearly in all the states; each holds the most thrilling flora and fauna in its extremity.

Wildlife conservation started with declaring Jim Corbett National Park was the first declared National Park in 1936 in India. In India, there is a large dissimilarity in the national parks and wildlife sanctuaries including Tiger reserves, bird sanctuary, marine parks, desert sanctuary, and a floating national park! The Jim Corbett National Park, India's first national park was established in 1936. Today, India is home to more than 166 authorized national parks. The Kaziranga National Park in Assam is extremely famous for its Rhinos. The forest and wild life sanctuary areas, which fall on the borders of states, are protected for security reasons. The map of the national park can help to identify the wildlife sanctuary in every state.

## STUDY AREA

The Bandipur National Park was initially created as a sanctuary by the Maharaja of Mysore in 1931 and served as his hunting grounds. The original area of 90 sq. kms was later frequently expanded over the years, and now the park is spread over a sprawling 900 sq. kms. Originally known as the Venugopala National Park, the area was later converted to a tiger reserve under Project Tiger in 1973 and renamed the Bandipur Tiger Reserve. It is a part of the Nilgiris Biosphere Reserve, which is India's largest biosphere reserve.

The Bandipur National Park and Tiger Reserve is situated in the contiguous landscape spreads in two revenue districts of southern Karnataka namely the Mysore and Chamarajanagar. Geographically, it is an "ecological confluence" as the western and Eastern Ghats meets and constitute this area as distinctive and extraordinary from the point of its fauna and flora. The notified forests included in the park and the adjoining notified and non-notified forests including the community land areas of all the border villages have become an integral part of the tiger reserve. The areas of the reserve are from the part of Nanjungud and H.D.Kote taluks of Mysore and Gundlupet taluk of Chamarajanagar revenue districts. The geographical location of this tiger reserve, lies between the North Latitudes  $11^{\circ} 35' 34''$  and  $11^{\circ} 55' 02''$  and between the East Longitudes  $76^{\circ} 12' 17''$  and  $76^{\circ} 51' 32''$  of Karnataka state in south India. The altitude of the park can vary between 680 meters (2,230 ft) to 1,454 meters (4,770 ft).

The climate in Bandipur is warm and temperate. In winter, there is much less rainfall than in summer. The Koppen-Geiger climate classification is Cwa. The average annual temperature in Bandipur is  $20.2^{\circ}\text{C}$ . The driest month is November. Most precipitation falls in July. June is the warmest month of the year. The temperature in June averages  $25.2^{\circ}\text{C}$ . In January, the average temperature is  $12.6^{\circ}\text{C}$ .

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Tiger population, for the conservation of which the Tiger reserve came into being, has increased from 58 in 1991 to 105 in both 2010 and 2013. Panther has also shown some good increase, from 51 in 1991 to 88 in 1997. Wild dogs (181 in 1995), wild boar (181 in 1995) and barking deer (131 in 1995) have all shown some improvement in their numbers over the stated years. Apart from the eponymous tiger (numbering 406 at last count) is also home to a wide array of endangered animals such as the four-horned antelope, the Black Panther, tigers, leopards, dholes, chital, the Indian giant squirrel, Gaur, Sambhar, Mouse deer, Wild dogs, Wild boar, Jackal, Sloth bear, Malabar squirrel, Porcupines and the black-knapped

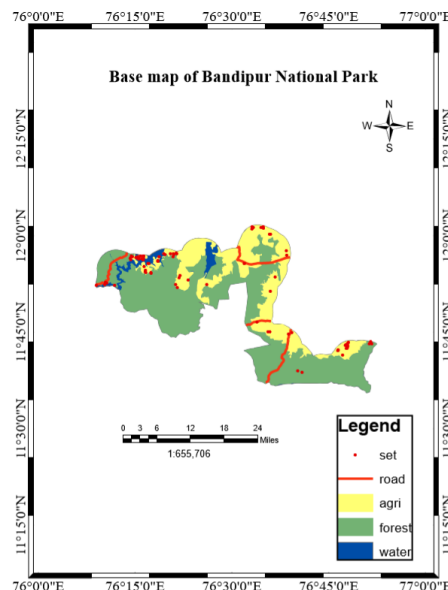


Fig. 1. Base map of Bandipur national Park

hare, the Indian pangolin and the small Indian civet. It also has the largest population of Asian elephants.

The Bandipur national park, one of the most protected reserves, constitutes one of the largest contiguous forests in the country along with neighbouring national parks of Nagarahole in Karnataka, Mudumalai in Tamil Nadu and Wayanad wildlife sanctuary in Kerala. In this forest many villages and majority of population is Schedule Tribe (ST) are live in this forest area. Majority of people in this area is worker person. They usually depend upon forest-based resources or the simple worker.

## OBJECTIVE

- To Analysis the LULC dynamic over the three decades as well as the wet and dry season in Bandipur National Park.

## METHODOLOGY

The methods that have been used in this study are for LULC analysis of downloaded satellite images of the Landsat 8 (OLI) for 2019, Landsat (ETM+) for 2001, and Landsat 4-5(TM) for 2011. After that clipped the area with a 5 km buffer in context to our study area with the help of Arc Gis software and processed it with supervised classification (water, dense forest, open forest, urban, agriculture, current fallow) to get a LULC map for our study area with the help of Erdas software.

## RESULTS AND DISCUSSION

Land is an area of the earth surface, which holds all sensible stable or probably cyclic, attribute of the biosphere counting the atmosphere, soil and original geology. Hydrology, plant and animal population are the results of the past and current human activity to the extent that meaningfully effects on present and future Land Use Land Cover system.

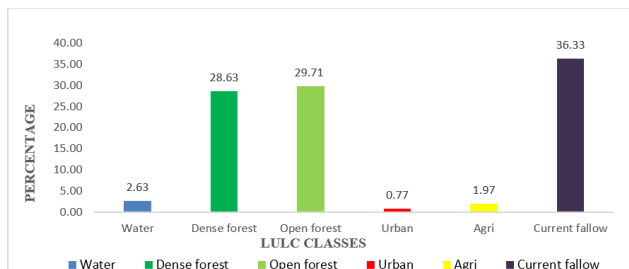


Fig. 2. Land Use Land Cover of Bandipur National Park - 2001

Appropriate management and expansion of these lands should be started to upsurge the land productivity, refurbishment of soil degradation, recovery of wastelands, upsurge the environmental qualities and to meet the needs of rapidly rising population of the country.

### Land Use Land Cover 2001

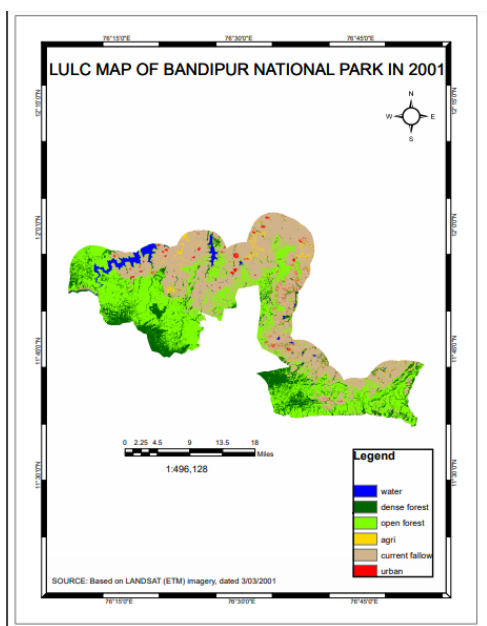


Fig. 3. Land Use Land Cover of Bandipur National Park 2001

Figure 2 shows the land use land cover of Bandipur in 2001. It gives figures for water, dense forest, open forest, agriculture,

current fallow and urban. It clearly shows their percentage, how they all differ from one another.

According to the graph, the highest percentage is covered by- current fallow (36.33), followed by open forest (29.71), dense forest (28.63), water (2.63), agriculture (1.97), and urban (0.77).

### Land Use Land Cover 2011

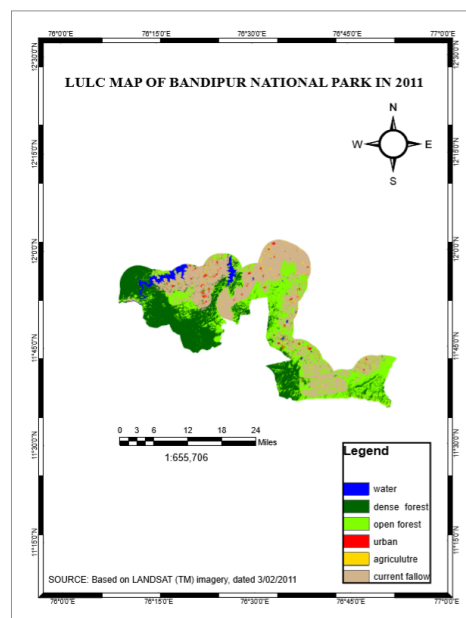


Fig. 4. Land Use Land Cover of Bandipur National Park 2011

Figure 5 shows the information about the land use land cover of Bandipur in 2011. It gives figures for water, dense forest, open forest, agriculture, current fallow and urban. It clearly shows their percentage, how they all differ from one another.

According to the graph, the highest percentage is covered by- current fallow (42.22), followed by open forest (38.97), dense forest (14.16), water (2.11), agriculture (1.46), and urban (1.08).

figure 3 shows information of land use land cover of bandipur national park in 2019. It provides an analysis for water, dense forest, open forest, agriculture, current fallow and urban. It clearly shows their percentage, how they all differ from one another.

According to the graph, the highest percentage is covered by- current fallow (43.15), followed by open forest (29.53), dense forest (20.14), water (2.38), agriculture (3.30), and urban (1.50).

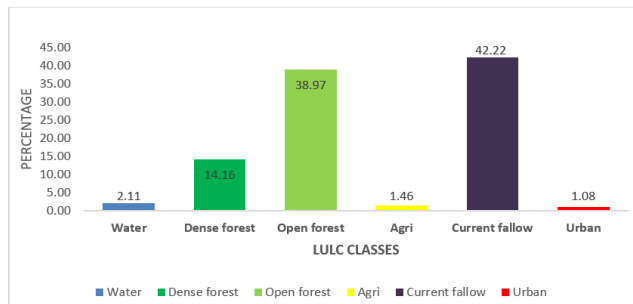


Fig. 5. Land Use Land Cover of Bandipur National Park – 2011

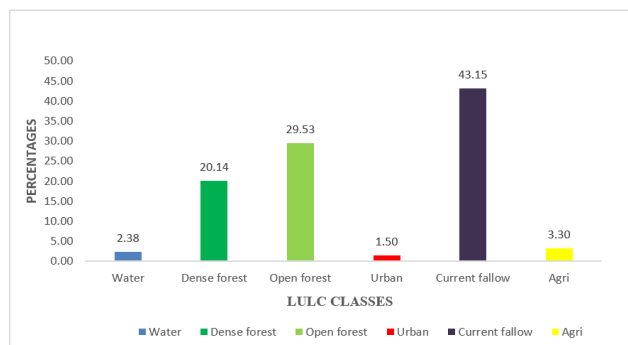


Fig. 6. Land Use Land Cover of Bandipur National Park - 2019

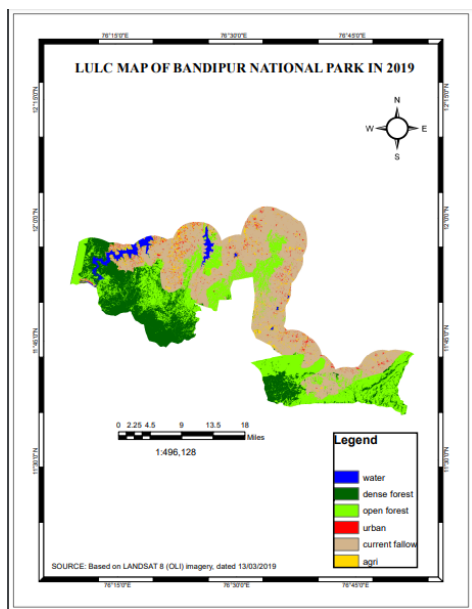


Fig. 7. Land Use Land Cover of Bandipur National Park 2019

## Land Use Land Cover 2019

Figure 8 illustrates the land use land cover (LULC) of Bandipur national park in 2001, 2011 and 2019. It's the combine of all the three years bar graph in which the results are as follows current fallow has the highest occupation followed by open forest, dense forest, water, agriculture and urban.

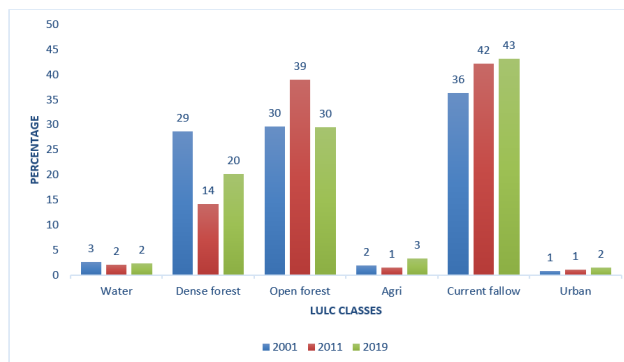


Fig. 8. Land use land cove of Bandipur forest of 2001, 2011 & 2019

According to the data, it seems likely that current fallow has the highest dominance over all the three years i.e., in 2019 it had 43%, 2011 (42%) and in 2001 (36 %). The second most dominance LULC is open forest, in 2011 it reached about 39%, and in 2001 & 2011 had the same percentage of 30%. The third dominated area is the dense forest, in 2001 is had 29% of dense area followed by 2019 (20%) and 2011(14%). The fourth dominated area cover is by water, in 2001 it had the highest water i.e., 3% n got decreased by one percent in the both year of 2011 and 2019. The fifth area is covered by agriculture, in 2001 it was 2 %, then in 2011 it got decreased by 1% and in 2019 it got increased by 3%. The lowest area covered in Bandipur forest is by the urban population, 2001 & 2011 has 1% of urbanization and 2% in 2019, urban did not get much developed in BNP.

## CONCLUSION

In Bandipur National Park the map and figures of the year 2001,2011,2019 showed area-wise changes noticed in LULC analysis revealed the following changes, the current fallow has the highest area occupied area in BNP in all the three years, the open forest is more than the dense forest as it is getting decreased in the three decadal. The area under water is also getting decreased in the past two decades. The total area under cultivation i.e., areas under agriculture and horticulture have increasing. And the urban is increasing in the BNP by 1% in all the three decadal period.

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