



Case Report

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Effect of Mughal Road on Land Use of Catchment Area of Rambiara Nallah (Shopian) Jammu and Kashmir, India



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Abstract

The present study analyzes the effect of Mughal road on dynamics of land use/land cover using geospatial techniques of remote sensing and GIS on catchment area of Rambiara Nallah in Hirpora (Shopian) Jammu and Kashmir. During the 20 years time period, dense forest has shown an unprecedented decrease of about 17.82 percent while scrub land increases about 43.31 percent, have caused a tremendous land use change because of construction of the famous mughal road. This huge deforestation leads to increasing emissions of CO₂ into the atmosphere which in turn leads to climate change. Road effects take place in the contexts of environmental settings, their history, and the state of engineering practices, and must be evaluated in those contexts for best management approaches.

Keywords: Land use; Land cover; Remote sensing; Catchment; Forest; Mughal road

Introduction

Land cover is also used to describe different natural habitats, deserts, forests, woodlands, glaciers and water bodies as well as habitats manipulated by man [1]. Though humans have been modifying land to obtain food and other essentials for thousands of years, current rates extends and intensities of land use and land cover change are far greater than ever in history, driving unprecedented changes in ecosystem and environmental modification at local, regional and global scales [2]. These changes encompass the greatest environmental concerns of human populations today, including climate change, biodiversity loss and the pollution of water, soil and air.

The loss of tropical forests is a global concern because of its impact on biodiversity and climate. Roads are viewed as having precipitated much of this loss by opening forest areas to logging and agricultural conversion. This view poses a dilemma: road construction has traditionally been one of the most important tools for rural development but they also facilitate deforestation. Mughal road is the road between Bafliaz, a town in the Poonch district to Shopian district in the Kashmir valley. The road is 84 km long and passes over the Pir Panjal mountain range, at an altitude of 3505 m that is higher than Banihal pass. The road brings the Poonch and Rajouri district closer to Srinagar in Kashmir valley.

The distance between Srinagar and Poonch will be reduced from 588 km to 126 km. It makes for alternate road route to Kashmir valley from rest of India. Forest roads are the most costly structures in forestry. Inefficiently constructed forest roads can cause severe environmental impacts including road surface erosion and sediment yield [3], pollution of waters, direct loss of habitat by conversion of artificial land cover into an artificial surface [4] and indirect loss of habitat by the fragmentation of an ecosystem into smaller and more isolated patches [5]. Large areas of forest are destroyed during road construction which not only results in economic losses, but changes the conditions of the environment [6]. The anthropogenic activities, such as deforestation, forest degradation, forest fire and burning of fossil fuel are playing a significant role in producing the greenhouse gases [7]. The CO₂ concentration in atmosphere increased from 280 ppm at the beginning of the industrial revolution to present levels of 400 ppm. Road effects take place in the contexts of environmental settings, their history, and the state of engineering practices, and must be evaluated in those contexts for best management approaches.

Remote sensing plays an important role in generating information about the latest land use land cover pattern in an area

and its temporal changes through times. The information being in digital form can be brought under geographical information system (GIS) to provide suitable platform for data analysis, update and retrieval. The study focuses on the effectiveness of satellite data for land use/land cover change of the study area due to the construction of a famous mughal road.

Materials and Methodology

Study area

The study area lies at an altitude of 2546 m above the mean sea level within geographical coordinates of 33° 39'55"N and 74° 39' 40"E (Figure 1). The study area is located at the bank of Rambiarra Nallah, within the heart of Hirpora wildlife sanctuary. The climatic conditions of the study area are somehow different from Kashmir valley. The highest day temperature is about 25°C in summers and the winters are having subzero temperature with heavy snowfall. It is one of the most beautiful and unexplored area of Shopian, Kashmir, Jammu and Kashmir.

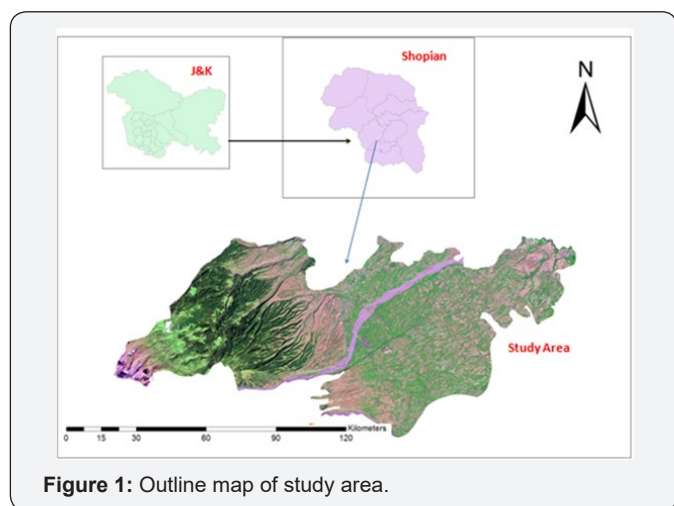


Figure 1: Outline map of study area.

Database and methodology

The procedure adopted for deriving statistics of land use land cover. Two different dates of Satellite imagery i.e. IRS-IC LISS III with 23.5 meter resolution acquired on 25 October 2010 and LAND SAT TM data of 25 October 1990 were used as source data. The scheme adopted for land use/land cover classification is the level I and II of NRSA with local modification. The remotely sensed data was geometrically corrected using topo sheets as references. After the ground truthing and development of interpretation key, the images were visually analyzed on screen and the various classes of land use/land cover were delineated. The study area was accordingly divided into six land use classes. During the computation of change detection of area under Land use/ land cover categories, the percentage change of the total area was calculated, which is the change of area of a particular category divided by total area of catchment multiplied by 100.

Results and Discussion

In the present study, the Study area was classified using on screen digitization technique into 06 land use/ land cover

classes. The composition and distribution of land use/land cover types of images included: dense forest, sparse forest, scrub land, pasture land, waste land, and water bodies. The land use/ land cover map shows the spatial and temporal variation in the area which is shown in Figure 2.

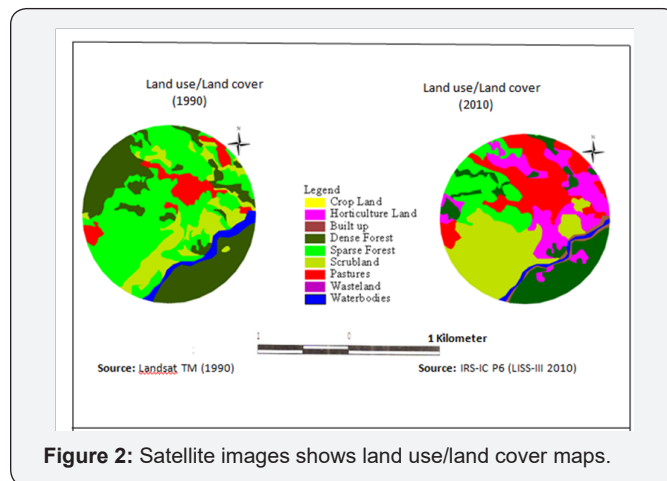


Figure 2: Satellite images shows land use/land cover maps.

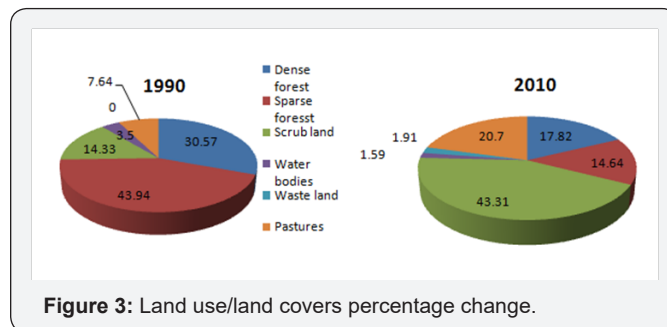


Figure 3: Land use/land covers percentage change.

During the present study it has been found that the dense forests and sparse forests have shown a decreasing trend of about 17.82 percent and 14.94 percent of the total area respectively (figure 3). This decrease in the forest area is mainly due to natural factors, population pressure and increasing demands of people for timber, fuel wood, land for settlement, roads (Mughal road), agriculture etc have lead to declining of the forest area [8-9]. Waste lands as well as pasture lands were showing increasing trend after the construction of mughal road. This increase is due to the conversion of forest land into waste land by the way of deforestation [10]. The present study also reveals that scrub land has shown a noticeable increase from 14.33% in 1990 to 43.31% in 2010 respectively, which contributes about an increase of 28.98% from last two decades. This increase may be at the cost of decrease of forest cover due to construction of mughal road, tourism [11]. Water bodies have also shown an alarming decrease from 11 ha in 1990 to 5 ha in 2010 respectively. This decreasing area of the water bodies may be due to land transformations [12].

Conclusion

The key finding of the present study includes the immense degradation of dense forests, decrease in water bodies, increase in pasture land and scrub land. These changes have clearly depicted

that the negative impacts of mughal road construction along the catchment of Rambiar Nallah- a forest area. Therefore, forest road managers should consider not only the total road cost but also environmental impacts i.e. deforestation, biodiversity loss, soil degradation, water pollution caused by road construction and use. Thus, it becomes imperative that the government should prepare working plans for the effective management.

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