A STRATEGY OF FOREST/ NON-FOREST COVER MAPPING OF ACHANAKMAR-AMARKANTAK BIOSPHERE RESERVE, CENTRAL INDIA: BASED ON REMOTELY SENSED IMAGERY AND GIS DATA

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Abstract

Forest/ Non-forest (LU/LC) mapping is an outcome of natural and socio-economic factors and their relation with man in time. Forest is an important parameter for developmental planning. The present study aims to find out the Forest/ Non-forest mapping year 2010 in Achanakmar-Amarkantak Biosphere Reserve (AABR).The study has made use of Landsat TM satellite imageries for the year 2010 to identify the Forest/ Non-forest mapping categories in AABR. Forest growth has significantly changed the landscape of AABR.

Presently the Achanakmar-Amarkantak biosphere reserve has been divided into core and buffer zones area only. Core zone is totally cover in forest and endangered species, and buffer zone of AABR shows both forest and non-forest area. These studies were employed by using the Survey of India topographic map and the remote sensing data of Landsat TM of 2010. ERDAS image processing and ArcGIS software were used to demarcate the Forest/ Non-forest mapping divisions in AABR. This research exploration of all Forest /non-forest area and development of wildlife information base including inventory data on habitats and species.

Keywords

Forest, Non-forest, Satellite imagery, Biosphere reserve, unsupervised classification technique. Remote sensing and GIS

Introduction

The study of Forest/ Non-forest mapping is very important to have proper planning and utilization of natural resources and their management A forest is more than an area covered by trees because it includes smaller plants, animals, soil and water. In Indian context, forests are traditional abode of holy man: the Rishis, the Acharyas, the Hermits and the Monks, who through the ages, have produced a forest culture by living in huts along rivers, streams and on Himalayan heights. The area under forest in India is about 75 million ha.(Mha) constituting 23% of total Geographical area. This is very less against 33% forest cover according to Indian National Forest

Policy. However, national level forest mapping carried out by Forest Survey of India (FSI) using 1985-87 satellite data shows 64.01 Mha of actual forest. This corresponds to 19.47% of India's total geographical area. Total forest cover in Achanakmar-AmarkantakBiosphere Reserve (AABR) is 63.56%, which is extremely very high and good for conservation.

In this paper, we represent a forest/non-forest map based on Landsat TM imagery and representing year 2010 forested area extent. The aim of the employed methodology is to guarantee the consistency of the product.

With the advent of remote sensing, the scope of effective planning and management of natural resources has considerably widened. The use of satellite data permits timely and accurate information on very short repetitive cycles needed for monitoring. It is observed that remotely sensed data can meet many of the information needs for proper forest management in short time and at low cost. Methodologies have been developed towards this end by various authors (Franklin and Peddle 1984; Tiwari, 1990; Kandya et al 1992; Kaur et al 1994; Dhaliwal et al 1995, chaudhary et al 1999 and Babu et al 2002).

Study area

The Achanakmar Amarkantak biosphere reserve lies between lat. 22 $^{\circ}$ 15' to 22 $^{\circ}$ 58' N and long. 81 $^{\circ}$ 25' to 82 $^{\circ}$ 5' E , having an area 3835.51 sq. km., partly falling in Madhya Pradesh and partly in Chhattisgarh state . The area falls in almost northern part of Biogeographic zone of 6 and Biogeographic province 6a (Deccan peninsula, central highlands). Out of the total area, 68.10 % lies in Bilaspur district followed by Anuppur (16.20 %) and Dindori (15.70 %). The protected area, Achanakmar Sanctuary is located in Bilaspur district, within the area of the Biosphere Reserve. The sanctuary has a total geographical area of 551.15 sq. km.

Presently the Achanakmar-Amarkantak biosphere reserve has been divided into core and buffer zones area only. The entire area of 551.15 sq. km of Achanakmar sanctuary has been designated as core zone and remaining area of 3284.36 sq. km serves as buffer zone. Out of this an area of 1224.98

sq. km. falls in Madhya Pradesh and the rest of the area of 2610.53 sq. km. fall in Chhattisgarh state. Fig-1 shown the details of the study area.

Material Used

The study has made use of various primary and secondary data. These include Survey of India (SOI) topographic sheets (64- F5,6,7,9,10,11,1314,15;64- J1,andJ3) of 1:50,000 scale; and satellite images Landsat Landsat TM (geocoded data (for the year 2010). These (Landsat) data were visually and digitally interpreted by using the ERDAS (for classifying the image) and ArcGIS software (for processing, analysis and integration of spatial data) to reach the objectives of the study. Adequate field checks were made before finalization of the thematic maps. The main goal of this study is to extract land use/land cover changes using multi- temporal satellite data.

Methodology

As follows, there are general processes between multi-temporal observations.

1. Make sure the Geometric corrections of Landsat Tm data using survey of India (SOI) Top sheet at 1:50,000 scales
2. Select data

3. Preprocess data/unsupervised classification of Forest/Non-forest mapping

4. Extract the temporal features of layers

5. Evaluate accuracy

Field Survey

In the present investigation stratified random sampling has been done. Satellite data has been classified through visual interpretation as per the classification scheme based on the reconnaissance survey and Forest/ Non-forest classes in the area. Sampling was done on homogeneous units. Samples plots were laid along the gradient and reference to North direction has been provided. For structural analysis normally 32.5 x 32.5 m plots are laid for woody vegetation and 5 x 5 m for shrubs and 1x1 m for grasslands and same has been followed here. As far as possible representative sites were selected for this purpose and marked on SOI maps. Fig-2 shown the details of plots.

Result and Discussion

The various Forest/ Non-forest classes interpreted in the study area include, forest (dense, moderate and open forest), agricultural land (crop land, open land and agricultural plantation) built-up land, waste lands, (land with scrub, land without scrub and barren rocky areas) and water bodies. Total geographical area of AABR is 3835.51 sq. km with forest cover of 63.56 % and agricultural/open land is 34.32 % and rest of 2.12 % shown other classes of AABR. Table no.1 and figure-3 shown all the details of forest/non-forest classes.

Acknowledgement

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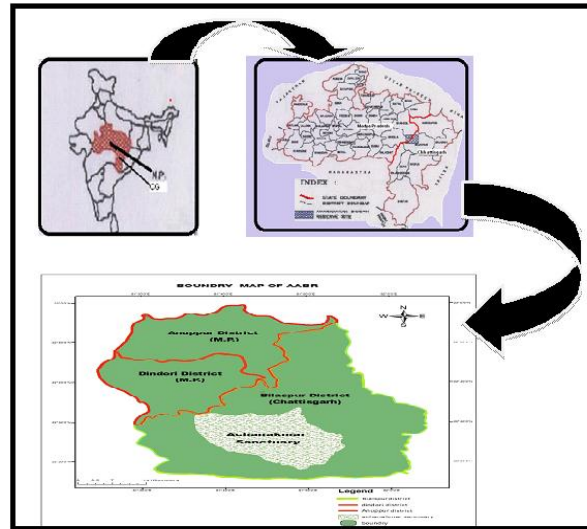.

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Table 1: Shows the details of forest/ Non-forest classes.

Forest/ Non-forest Class	Year-2010	
	Area (km^2)	Area%
A- Forest		
Dense Forest	59.65	1.69
Moderate Forest	1872.15	48.81
Open Forest/Shrubs	199.87	5.21
B-Non-Forest		
Water bodies	59.76	1.56
Wasteland	53.79	1.40
Agriculture/ Open land	1578.89	41.17
Built-up Land	11.39	0.30
Total	3835.51	100

Figure 1: Shows the location Map of study area.
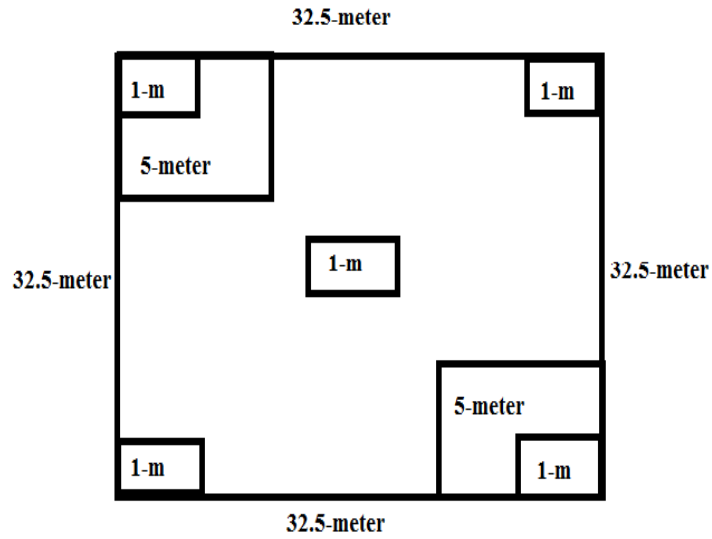
Figure 2: Sample of laying Plots
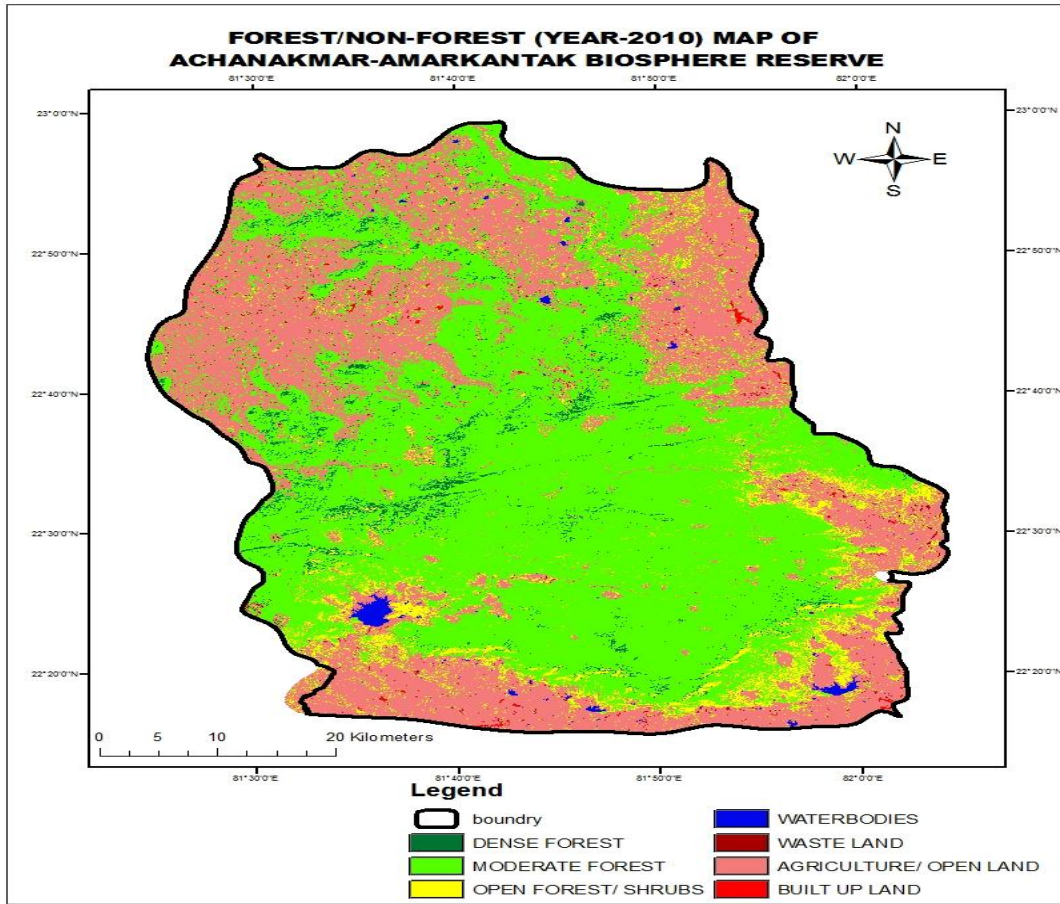
Figure 3: Shows the Forest/Non-forest map in study area.