

TO STUDY THE IMPACT OF GIS AND RS IN NATURAL RESOURCES MANAGEMENT

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ABSTRACT

Natural resources consisting of land, forest, water, mineral deposits etc. are invaluable asset for all living organisms to sustain life. For humans, these natural resources also help to maintain and enhance economic strength and development. Geographic Information Systems (GIS) is capable of capturing and storing data for any kind of analysis and visualization, Remote Sensing (RS) technology on the other hand is an integral part of decision making tool. There are ample examples of application of GIS and RS in assessment of natural resources such as water, forest, snow and ice, rangeland etc., developing management plans for park management, protected area management, rangeland management and many more. In this paper we discuss the impact of Geographic Information System and Remote Sensing system approach in natural resources management.

Keywords: *Geographic Information System, Remote Sensing, Natural Resources Management, Environmental Management*

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INTRODUCTION

For many years, Geographical Information Systems (GIS) has been considered to be too difficult, expensive and proprietary. The development of the user friendly interface, powerful and affordable computer hardware and software, emergence of the Internet technology and public digital data has broadened the range of GIS applications and brought GIS to many disciplines. As a result GIS is becoming more widely used e.g. natural resources management, environmental studies, water resources analyses and planning, regional and urban planning, natural disaster management, traffic studies and transport planning, business planning and management etc. Now, GIS has emerged as an important field of academic study, one of the fastest growing sectors of the computer industry, and, most importantly, an essential component of the information technology (IT) infrastructure of modern society.

OBJECTIVE

Objective includes:

1. To study the Environmental Management, especially natural resources.
2. To study the role of GIS and RS in environmental Management wrt. Forest management.
3. To study the importance of Natural Resources in Human's life.
4. To study GIS and Remote Sensing.

WHAT IS GIS?

A GIS is an information system designed to work with data referenced by spatial/geographical coordinates. In other words, GIS is both a database system with specific capabilities for spatially referenced data as well as a set of operations for working with the data. It may also be considered as a higher order map. GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprises for explaining events, predicting outcomes, and planning strategies.

A Geographic Information System is a computer based system which is used to digitally reproduce and analyze the feature present on earth surface and the events that take place on it. In the light of the fact that almost 70% of the data has geographical reference as its denominator, it becomes imperative to underline the importance of a system which can represent the given data geographically. [3]

WHAT IS REMOTE SENSING?

Remote Sensing is the science and art of obtaining information about an object, area, or phenomenon. This is done through the analysis of data acquired by a device that is not in contact with the object, area, or phenomenon under investigation. Remote sensing now includes photography, radar, lasers, and sonar and thus provides information with unique and valuable characteristics.

When remote sensing was first envisaged and activated in the 1960's it was viewed as the science of obtaining the image of an object in space. The image had a number of uses that were primarily concerned with identification, area estimation etc. The number of usable images was limited by technical processing limitations, resolutions problem and cloud cover.

[1]

INTEGRATION OF GIS AND REMOTE SENSING FOR NATURAL RESOURCES MANAGEMENT

GIS and Remote Sensing have a degree of mutuality; GIS provides a means for increasing the utility of remote sensed data. New information can be regularly updated. GIS makes it possible to improve the interpretation and analysis of remote sensed images. This is achieved by combining reference data from special sources. A GIS, integrated with image processing capabilities is a powerful tool for computer assisted resource mapping.

GIS applications are diverse and include water quality monitoring, modeling narcotic crop sites, waste site assessment, analyzing effects of carbon dioxide etc. Remote sensing provides an opportunity to view or analyze natural resources in inaccessible areas. It can be generated in accurate unbiased form; acquired at minimal costs at a known point in real-time; geographically referenced; prepared in useful and storable format; and produced in volumes never attainable before. [1]

LITERATURE SURVEY

In this paper I have used the integration of GIS and Remote Sensing in the study area of Tadoba Andhari Tiger Reserve of Chandrapur District in Maharashtra State.

Tadoba-andhari Tiger Reserve is the pristine and unique eco-system situated in the Chandrapur district of the Maharashtra State of India. The Reserve contains some of the best of forest tracks and endowed with rich biodiversity. It is famous for its natural heritage. Tadoba-andhari Tiger Reserve is the second Tiger Reserve in the State. Tadoba-andhari Tiger reserve was created in 1995. The area of the Reserve is 625.40 sq. km. This includes Tadoba National Park, created in 1955 with an area of 116.55 sq. km. and andhari Wildlife Sanctuary

created in 1986 with an area of 508.85 sq. km. The Reserve is constituted with 577.96 sq. km. Reserve Forest, 32.51 sq. km. Protected Forest and 14.93 sq. km. other areas.

The quickest possible way for inventory and evaluation of the natural resources is through application of Remote Sensing and Geographic Information System (GIS). These technologies provide vital geoinformation support in terms of relevant, reliable and timely information needed for conservation planning. The advancement in science and technology has revolutionised the process of data gathering and map making and their application in habitat inventory, evaluation and wildlife census. Wildlife habitat mapping is similar to any type of land cover mapping. Both biotic and abiotic surface features including vegetation composition, density and landforms can be mapped. Interspersion of habitat components, the extent of habitat types and the distance to other critical habitat components can be measured. [2]

The NOAA (National Ocean and Atmospheric Administration), IKONOS, SPOT and IRS (India Remote Sensing Satellite) series of satellites have added a temporal dimension to habitat mapping and change detection.

In recent times, advanced technologies of RS and GIS have been widely used to develop spatial database for protected areas. Dubey (1999) developed GIS based spatial database for Tadoba-Andhari Tiger Reserve, Maharashtra using IRS 1B LISS II at the scale of 1: 50,000 to facilitate decision making process. [2]

Using LISS-IV satellite data Landuse/Landcover map has been given and having 10 classes as below:

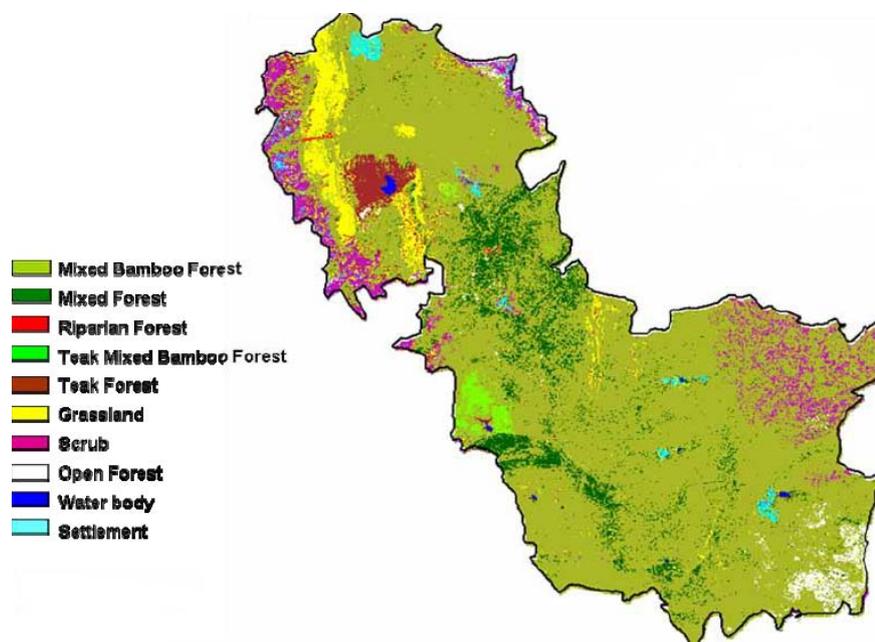


Fig. 1. Landuse/ Landcover Map of TATR (Source WI India, Report 2008)

Landscape characterization using Fragstat software was carried out in TATR given in following table.

Vegetation Types	PLAND (%)	NP	PD (No./100ha)	MPS (ha)	LPI (%)	IJI (%)
Mixed Bamboo Forest (MBF)	77.9	340	0.25	136.1	32.5	68.2
Mixed Forest (MF)	6	671	0.49	5.3	0.6	5.8
Teak forest (TF)	2	182	0.13	6.6	0.6	61.6
Teak Mixed Bamboo Forest (TMB)	1	42	0.03	13.7	0.2	14
Riparian Forest (RF)	0.3	35	0.03	2.3	0.02	62.8
Grassland (GL)	4.1	225	0.16	7.2	0.6	42.8

Table 1. Class level metrics for landscape of TATR (Source WI India, Report 2008)

FINDINGS

The overall study of integrating Remote Sensing (RS) and Geographical Information System (GIS) technologies, in recent times have revolutionized the process of inventory of natural resources, its quality, and pace of surveying and thus collectively have emerged as an ideal tool for database development.

A new generation of satellites with improved temporal frequency of data acquisition, better spatial and spectral resolution has considerably enhanced the potential of remote sensing in the development of spatial database. Improved spatial resolution allows better textural identification of ground features and helps to produce maps at a fine scale with clearly identifiable information on forest type, physical infrastructure, and boundaries.

Hence GIS and RS have overcome the traditional approaches of collecting data and visualizing maps and provide more accuracy and efficiency to environmental developers and planners

CONCLUSION

Geographical Information System has become a widely accepted tool in all fields of life and particularly in natural resource management which in turn helps in monitoring and managing earth resources accurately and efficiently. The integration of GIS and remote sensing developed for the natural resource management will help the geoscientists to analyze the information and providing technological aspects to define and design the structures. Furthermore, different scenarios can be analyzed which helps in better natural resource management, making timely decisions, and thus strengthening the nation

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