ORIGINAL RESEARCH PAPER

GEOGRAPHY

SPATIO-TEMPORAL DISTRIBUTION OF FOREST IN SOMB RIVER MINI WATERSHED

KEY WORDS: Forest-cover, watershed, land use /land cover

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ABSTRACT

Due to anthropogenic activities, the Earth surface is being significantly altered in some manner and man's presence on the Earth and his use of land has a profound effect upon the natural environment thus resulting into an observable pattern in the land use over time. Land Use and Land Cover (LULC) change is a major issue of global environment change. The base map of the study area was prepared using Survey of India Toposheets. Two different time satellite images were used (LISS-III 1998, LISS-III 2010). Unsupervised technique was used to identify the forest in study area. The main objectives of this study are to examine the status of forest in Somb river watershed and to identify areas of major change in time period of 1998-2010. This paper explains about the present status of forest conditions in the study area, which is one of the most striking resources available. The forests in the study area have mainly four types i.e. Siwaliks Chir-pine, Siwaliks Sal, Northern Dry Mixed Deciduous, and Dry Bamboo. Vegetation cover provided by forest, impeded the velocity of runoff on soil surface checks, soil erosion, silting and landslides, thus reducing the drought or flood. Presently, increasing mismanagement as well as stealthily cutting of forest trees is a serious problem in the study area. There is a need to maintain the quality and quantity of trees in the study area. Somb river watershed was found to have experienced rapid changes in Forest Cover particularly in crop land and Forest land. Forest land has decreased by 224.71 Sq. Kms in 1998 to 168.89 Sq. Kms in 2010. Here forest land converted to crop land and Built-up area.

INTRODUCTION

Forest is a large area of land covered with trees. But a forest is much more than just trees. It also includes smaller plants, such as mosses, shrubs, and wildflowers. In addition, many kinds of birds, insects, and other animals make their home in the forest. Millions upon millions of living things that can only be seen under a microscope also live in the forest. Climate, soil, and water determine the kinds of plants and animals that can live in a forest. The living things and their environment together make up the forest ecosystem. An ecosystem consists of all the living and nonliving things in a particular area and the relationships among them. The forest ecosystem is highly complicated. The trees and other green plants use sunlight to make their own food from the air and from water and minerals in the soil. The plants themselves serve as food for certain animals. These animals, in turn, are eaten by other animals. After plants and animals die, their remains are broken down by bacteria and other organisms, such as protozoan and fungi. This process returns minerals to the soil, where they can again be used by plants to make food. Although individual members of the ecosystem die, the forest itself lives on.

If the forest is wisely managed, it provides us with a continuous source of wood and many other products. Before people began to clear the forests for farms and cities, great stretches of forestland covered about 60 per cent of the earth's land area. Today, forests occupy about 30 per cent of the land. The forests differ greatly from one part of the world to another. For example, the steamy, vine-choked rain forests of central Africa are far different from the cool, towering spruce and fir forests of northern Canada.

Study Area

Somb river is a tributary of Yamuna river. It arises from the outer slope of the lower part of Shiwaliks range in the District Sirmaur (Himachal Pradesh, India) and takes a southerly course, which drains in the plain of District Yamunanagar in Haryana. There are two major tributaries of Somb river: The Pathrala (also known as Palasi Khadi), and Boli river.

Somb River combined with Pathrala and Boli River discharge its water into Yamuna river from western side near Meharmajra village of District Yamunanagar. After about a course of 40 Kms from its origin. The extension of Somb river watershed lies between 77°30'0''E to 77°53'5''E longitude and 30°21'02''N to 30°50'1''N latitude. The total calculated area of Somb river watershed is 433 Sq. Kms(figure 1) shows the location of Somb river watershed. The Somb River Watershed falls in Bilaspur Block, Bilaspur Tehsil of District Yamunanagar and drained by seasonal streams namely Somb river and its tributaries.

LOCATION MAP OF STUDY AREA

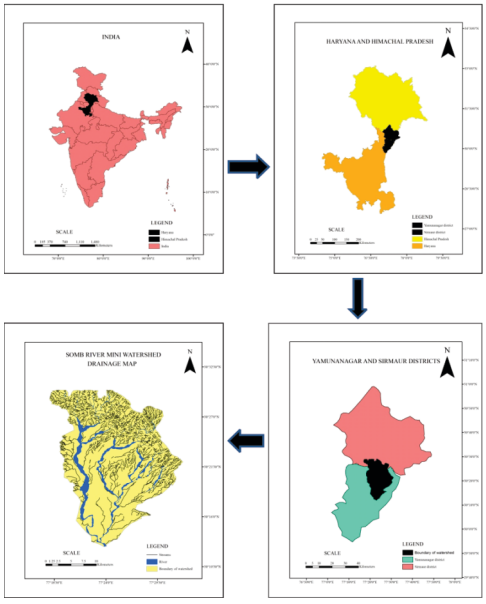

Figure 1

Objectives

The main objectives of the research are to generate Forest Cover map of 1998-2010 for Somb river watershed using two season data. Specific objectives include:

1. To examine the status of forest in Somb river watershed.
2. To identify areas of major change.

Data and Methodology

External secondary data is obtained from outside sources. The sources of secondary data are:

- Scanned and digital paper maps.
- Satellite Image (LISS-III 1998).
- Satellite Image (LISS-III 2010).
- Toposheet No-53 F/7, 53 F/8, 53 F/11 (1:50,000).

Interactive method of display is used for assigning threshold values for each class (Highly Dense, Moderately Dense and Open) on the basis of the ground knowledge to highlight forest/vegetated areas. Density class of forest cover and colour is accordingly allocated. Survey of India (SOI) toposheets are used for delineating boundary of the study area and classified map of Forest cover are generated.

RESULT

Recent development in the area of science and technology has provided powerful tool such as Remote Sensing and GIS. The advent of Remote Sensing has greatly complemented forest change detection and monitoring activities. The state-of-the-art sensors on board NOAA, Landsat, SPOT, IRS, and IKONOS series of satellites provide the opportunity to accomplish this task globally, regionally, nationally or locally. User has the choice to select the data from local to global levels. The techniques of Remote Sensing and GIS have become powerful tools for studying Land Use. Classification of Land Use is one of the important application aspects for Remote Sensing techniques, through computer processing with specific softwares like Erdas, Arc GIS. The result of the classification of Land Use can be auto outputted. For this purpose LISS-III images have been used.

Remote Sensing and GIS are highly capable in resource planning and management. In the present study **"Spatio-Temporal Distribution of Forest in Somb River Mini Watershed"** has been taken up. A description of results and analysis of present study is made in the present chapter. Figures, tables and plates have been used to discuss and demonstrate the results. Land Use is delineated from LISS-III images with the help of Unsupervised Classification. Present study incorporates the following categories of Forest Cover.

Categories of Forest Cover:

- Highly Dense Forest
- Moderately Dense Forest
- Open Forest
- Other Land

Unsupervised Classification:

Unsupervised classification is where the outcomes (grouping of pixels with common characteristics) are based on the software analysis of an image without the user providing sample classes. The computer uses the techniques to determine which pixels are related and groups them into classes but otherwise does not aid in the classification process. Unsupervised classification can be determined as the identification of natural groups, or structures with in multispectral data. The advantages of Unsupervised Classification can be enumerated as follows:

- No extensive prior knowledge of region is required. Or, more accurately, the nature of knowledge required for unsupervised classification.
- To conduct Unsupervised Classification, no detailed prior knowledge is required, but knowledge of the region is required to interpret the meaning of the results produced by the classification process.
- Opportunities of human errors are minimized,
- Unique classes are recognized as distinct units.

Forest Cover of Somb River Mini Watershed (Using Unsupervised Classification):

The total area of forest in the somb river watershed in 1998 was 224.71sq.Kms. It was 52 per cent of the total geographical area of the watershed. The total area of forest in the somb river watershed in 2010 was 167.89 sq. Kms. It was only 39per cent of the total geographical area of the watershed.

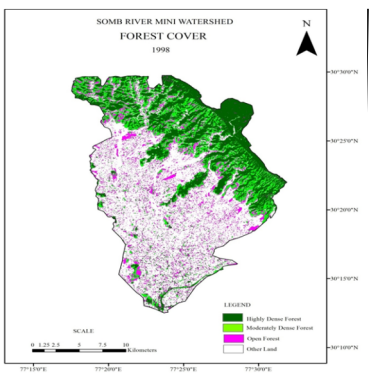

Figure 2

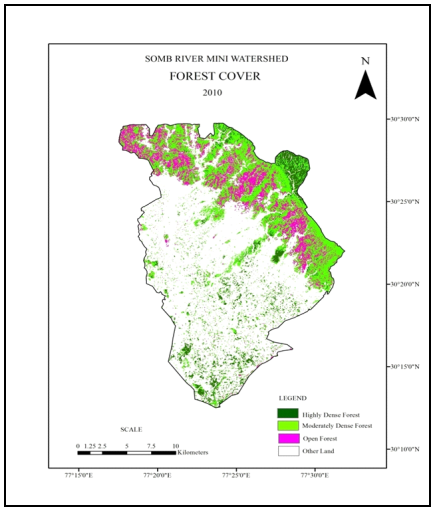

Figure 3

According to output generated using Unsupervised Classification, the area under Highly Dense Forest and Open Forest categories of Forest Cover has decreased in 2010 in comparison to year 1998. Significant change has been observed in Highly Dense Forest category. However there has been significant increase in the area under Moderately Dense Forest category in 2010. It has increased from 15 per cent in 1998 to 23 per cent in 2010.

CONCLUSION

The temporal change in forest cover was detected through preparation of forest cover maps pertaining to 1998 and 2010 using toposheets (SOI), LISS-III images and interpretation of satellite data .The maps were prepared by using GIS to obtain Change Detection maps to know the changes occurred in different land use classes during 1998-2010.The following conclusions are derived from this study:

1. Remotely sensed data especially satellite data can be effectively used in mapping as well as monitoring of temporal changes in forest cover of an area.
2. A considerable change in different forest cover categories was observed during 1998 to 2010 especially in agricultural land. Changes in forest sub-classes were also noticed.
3. The overall increase in river area was 3 per cent, in crop area10 per cent during 1988 to 2010.
4. Croplands also registered an overall increase of 10 per cent in area during 1998-2010.
5. In case of forest, the changes in highly dense, moderately dense and open forests were observed for the period 1998-2010. During this period Highly Dense Forest converted into Moderately Dense Forests.

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