Detection of Forest Cover Change Information in Chandigarh, India using Geo-spatial Technology

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Abstract:

The present paper focuses on role of R.S. and GIS in assessment of changes in forest cover between 2002 to 2010, in Chandigarh, India. The paper showed that the forest cover was 31.93 Sq km. and 24.91 Sq. km. in 2002 and 2010 respectively. It was noticed that all types of forest has reduced between 2002 and 2010, by human activities. It also revealed that the forest cover loss between 2002 and 2010 could be due to illegal encroachments by villagers; and the forest cover drastically decreased on hilly areas due to human population pressure. The study analyses the forest cover change in the Chandigarh, India. It is envisaged that the study would verify the utility of Remote Sensing and GIS in forest re-establishment planning.

Key Words: Change Detection, Remote Sensing and GIS, Forest cover.

Introduction:

Forests are vital and important global resource that needs to be monitored for sustainable management and conservation. In India, there are large and diverse forest resource, which are the result of highly varied climate, soils and topography the forest type include tropical rainforest in north-eastern India, desert and thorn forest in the west, mangrove forest in the West Bengal, Orissa and other coastal areas, and the alpine pastures of Ladakh in the north. Forest are generally used as sources of timber for defence, communications, and industries such as plywood, as well as for fuel and timber by local populations (Negi 1998, Ravinder Virk and Doug King2010). Despite amendments made in forest policy to conserve and manage these resources, Indian forests are still undergoing significant change. The main cause of forest depletion is overgrazing, conversion to non-forestry uses such as infrastructural development (energy, roadways, etc.) (Reddy 1988), unsustainable extraction of fuel and fodder from forest, forest fire, overcutting beyond permitted limits and illegal encroachment into forest land due to land shortages or insecure land tenure (Sekhsaria 1999; Kant 2001). Remote sensing satellite play a crucial role in determining, enhancing and monitoring the overall carrying capacity. The repetitive satellite remote sensing over various spatial and temporal scale offers the most economic means of assessing the environmental parameters and impact of developmental processes and it has played a pivotal role in generating information about forest cover, vegetation type and land use changes (Mazid Frooq and Humayun Rashid 2010)

Study Area:

Chandigarh is famously known as the first planned city of independent India, and planned as a symbol of the aspiration of the new republic. The task of planning the city was first assigned by the American planner Albert Mayer and his partner Mathew Nowicki. Mayer pulled out of the project after the death of his associate and Le Carbusier was brought in the project in 1951. The total area of study is 114 sq km. the elevation ranges from 300 -400 meters. Chandigarh was the capital of Punjab until 1966, when the state was bifurcated in ti Punjab and Haryana, and it was then made the joint capital of both states. At the same time, it was also designated as a union territory to be directly administrated by the central government. The MCC came in to being in 1994 through an extension of the Punjab municipal corporation act, 1976. As per the 2011 census, Chandigarh had a population of 1025682. The city is also one of the most densely populated cities in the country with a population density of 7900 per sq km. Today Chandigarh is emerging a regional hub in areas such as education, health, information technology, food processing and service industries.

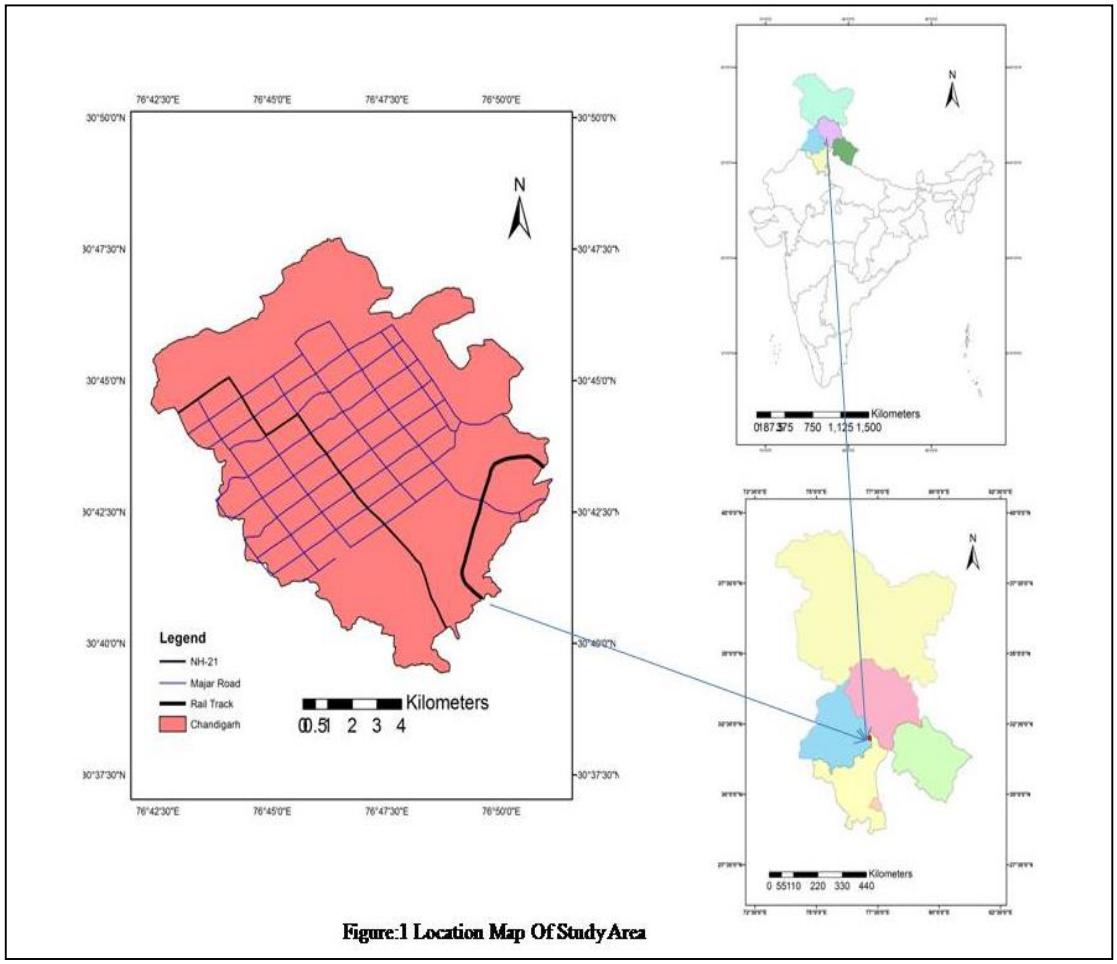


Figure:1 Location Map Of Study Area

Materials and Methods

In the present study two images LISS III (2002) and LISS III (2010) were used for assessing the temporal changes in the forest cover in Chandigarh. Topographical map of Chandigarh and guide maps were also taken into account. I have used Eradas 9.0, Arc Gis 9.3 and MS Office 2007 for statistical calculation and diagram.

Methodology Chart

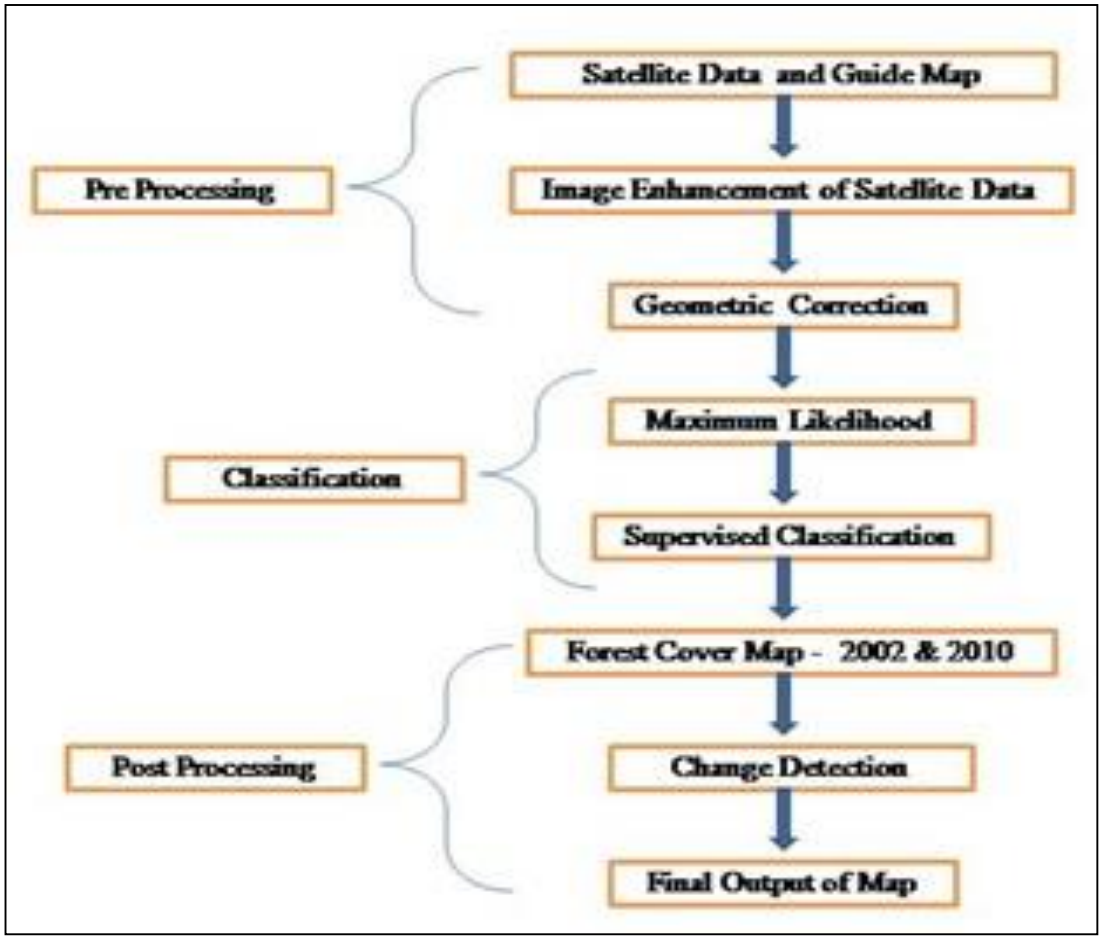


Figure: 2 Forest Cover in Chandigarh during 2002

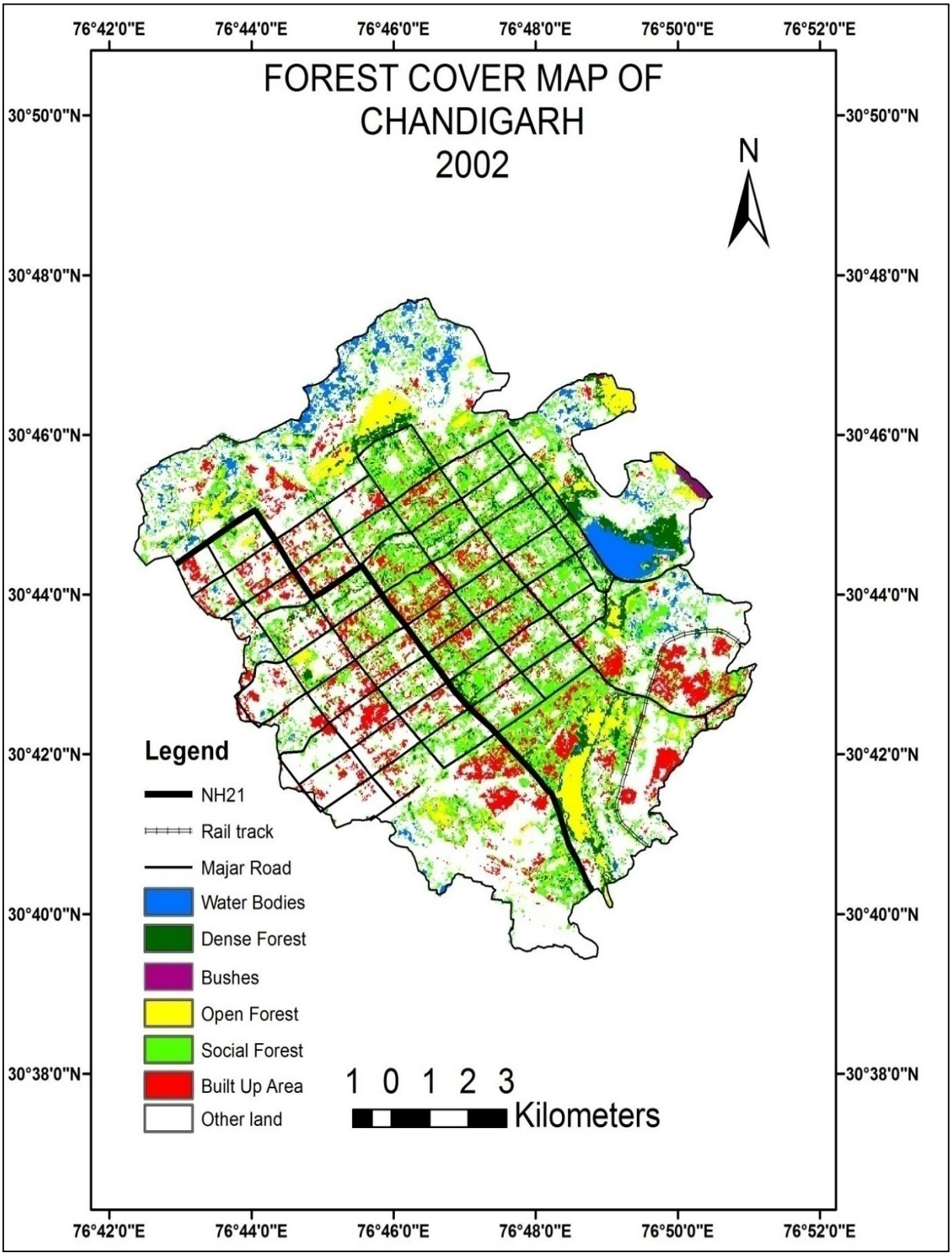


Figure: 3 Forest Cover in Chandigarh during 2010

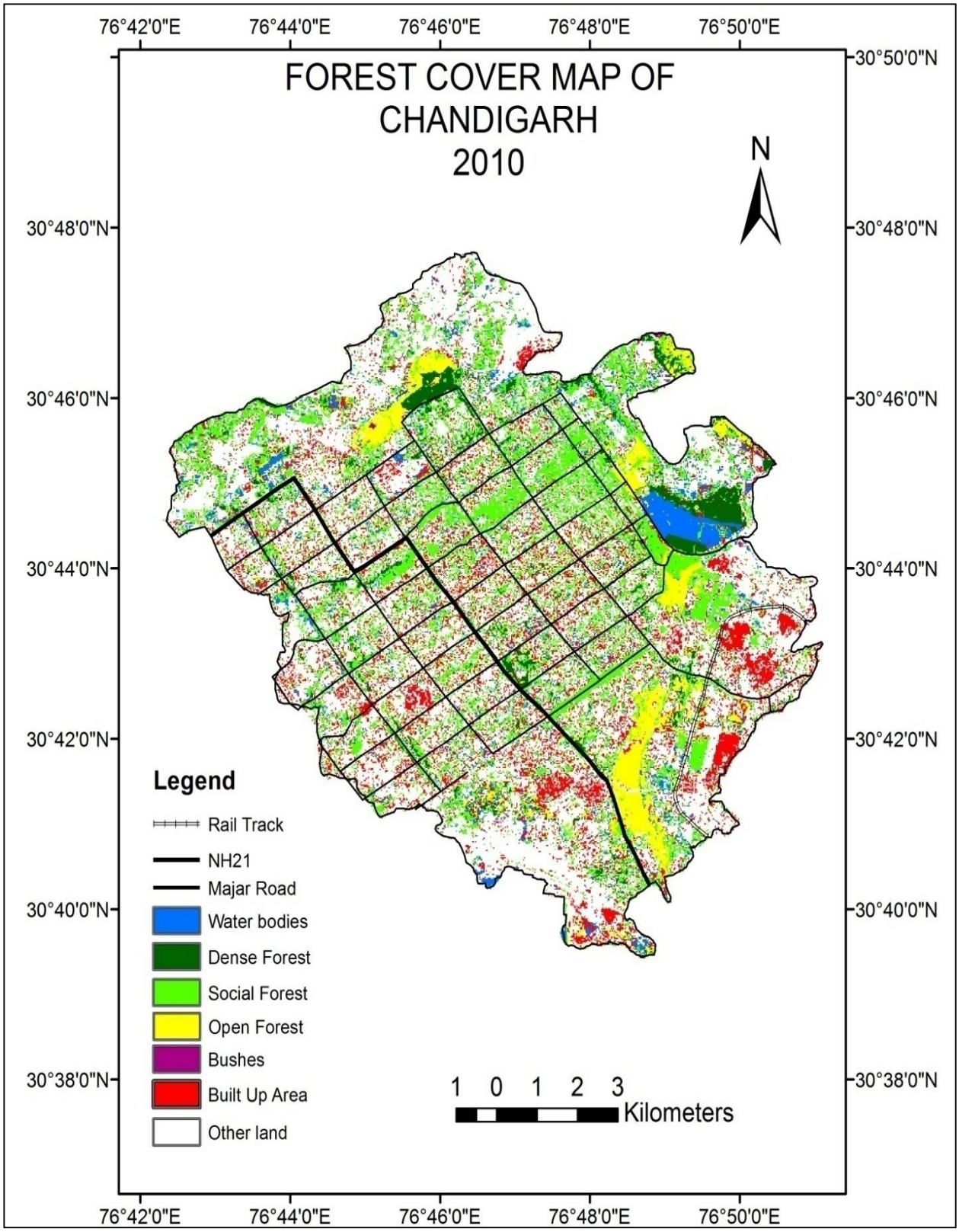
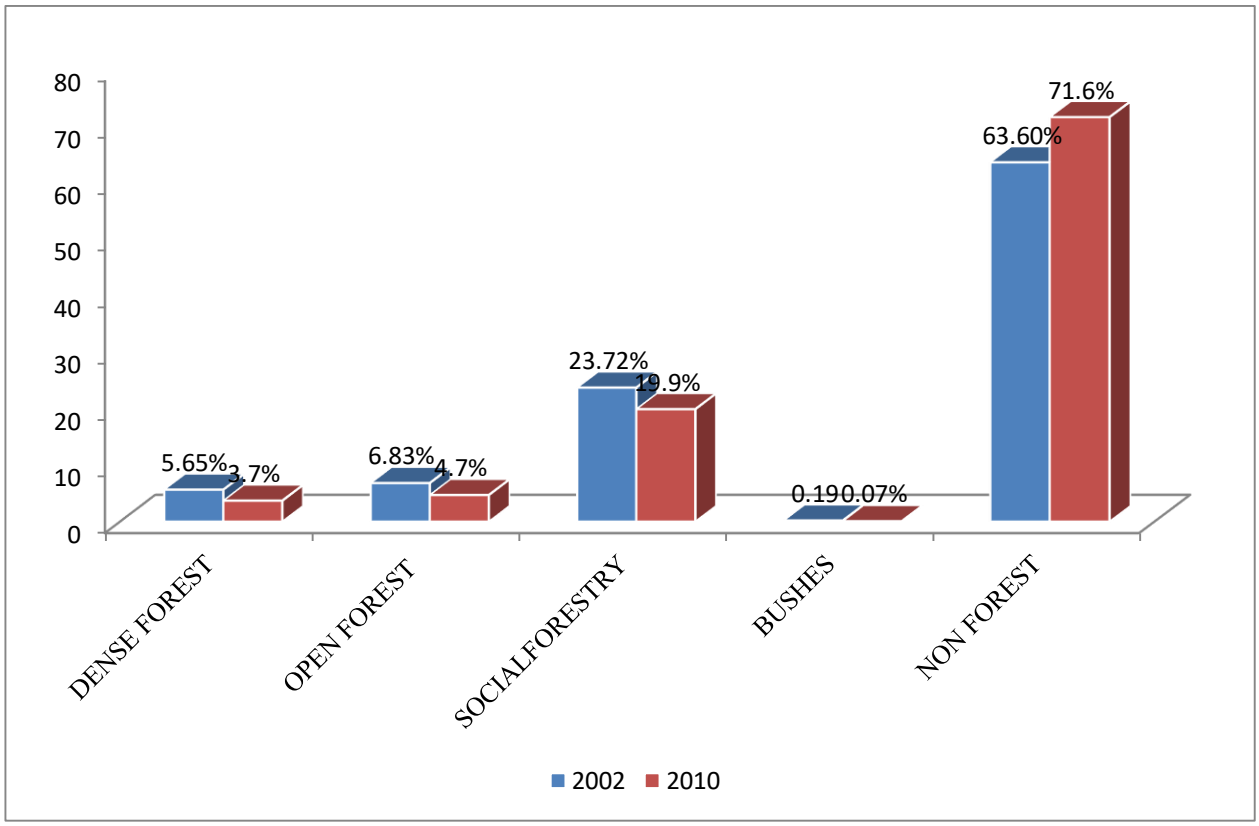

FOREST COVER MAP OF
CHANDIGARH
2010
N
76°42'0"E
76°44'0"E
76°46'0"E
76°48'0"E
76°50'0"E
30°50'0"N
30°48'0"N
30°46'0"N
30°44'0"N
30°42'0"N
30°40'0"N
30°38'0"N
Legend
Rail Track
NH21
Majar Road
Water bodies
Dense Forest
Social Forest
Open Forest
Bushes
Built Up Area
Other land
1 0 1 2 3
Kilometers

Table:1 Net change Forest Area under different categories during 2002-2010.

Forest Class	Year 2002 Area in Sq.km.	Area in %	Year2010 Area in Sq.km.	Area in %	Net Change%
Dense Forest	6.44	5.65	4.12	3.7	-1.95
Open Forest	7.79	6.83	5.36	4.7	-2.13
Social forestry	27.04	23.72	22.69	19.9	-3.82
Bushes	0.22	0.19	0.08	0.07	-0.12
Non Forest/Other Land	72.50	63.6	81.62	71.6	8
Total Area	114	100	114	100	

Source: Calculated from LISS III Images 2002 and 2010

Figure: 4 Net changes Forest Area under different categories during 2002-2010.



Results and Discussion:

As per the forest cover assessment of 2002, it is estimated that 5.6% of the area was under dense category, 6.83% of the area under open forest category, 23.72% under social forest category, 0.19% under bushes and 63.6% under non forest/ other areas comprising of residential, recreational, transports, industrial, etc. However as per the forest cover density assessment of 2010 (Figure 4). It has been estimated that 3.7% the area was under dense forest category, 4.7% of the area under open forest, 19.95% under social forest,

0.07% under bushes and 71.65% under non forest/ other areas comprising of residential, recreational, transports, industrial, etc.

The aim of this paper to identify the changes of forest covers over a time period. This paper also showed the detection of change information of forest on Chandigarh where all type of forest are reduced and non forest/ other land is increased by human activities. This paper successfully showed that change detection techniques can be applied to forest environments. Loss of forest cover can be easily credited to the human interventions. Analysis of the change data provides information to assess countryside level changes in vegetation amount and composition.

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