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Rajesh
Research Scholar, Department
of Geography, MDU, Rohtak,
Haryana, India

Land use land cover thematic mapping using remote sensing & GIS Techniques: A case study of district Hisar

Rajesh

Abstract

Land Use Refers to Man's Activities on Earth, Which Are Directly Related to Land, Whereas Land Cover Denotes the Natural Features and Artificial Constructions Covering the Land Surface. Land Use Practices of A Region Are Influenced By A Number of Parameters Namely Physical and Chemical Environments, Socio-Economic Factors and Needs of the Masses. This study involved secondary data collection. Mainly Indian remote sensing satellite- IRS ID LISS III satellite data of FCC satellite imagery 2001.

Keywords: Remote Sensing, GIS, Land use/Land cover

Introduction

Land use refers to man's activities on earth, which are directly related to land, whereas land cover denotes the natural features and artificial constructions covering the land surface. Land use practices of a region are influenced by a number of parameters namely physical and chemical environments, socio-economic factors and needs of the masses. Ever increasing demand due to rapid growth of population has put heavy pressure on natural resources of the country. The removal of poverty and unemployment through judicious planning and use of available resources is the hallmark of the development process. Since the adoption of the policy of planned economic development, efforts are being continually made to achieve sustainable rates of growth in all key sectors with a view to attain economic self-sufficiency and resource sustainability. To achieve such a major goal, it is imperative to have information on existing natural resource scenario, their physical/ terrain features, climate parameters, ecological conditions, socio-economic profile of the area, current practices of planning and management, and the contemporary technologies to be used for the sustainability of natural resources.

In the view of the pressure exerted by increasing population, need for mitigating increasing demand for land resources, appropriate scientific land use planning and land management strategies could provide the alternate for sustainable development of any region (Saxena *et al.* 1990). Land use and land management practices have a major impact on natural resources including water, soil, plants and animals. Land use mapping helps.

- Assess agricultural productivity and opportunities for diversification.
- Assess environmental impacts and land at risk from land degradation such as flood, drought and soil loss
- Assess the suitability of land use in relation to land capability (climate, soil slope and water constraints).
- Facilitate national, state and regional reporting on natural resource condition and trends

Thus knowledge about land use and land cover has become very important to overcome the problems of uncontrolled development, deteriorating environmental quality, loss of prime agricultural lands.

Difference between land cover and land use

Land cover data documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. Water types include

Correspondence

Rajesh
Research Scholar, Department
of Geography, MDU, Rohtak,
Haryana, India

wetlands or open water. Land use shows how people use the landscape – whether for development, conservation, or mixed uses. The different types of land cover can be managed or used quite differently.

Land cover can be determined by analyzing satellite and aerial imagery. Land use cannot be determined from satellite imagery. Land cover maps provide information to help managers best understand the current landscape. To see change over time, land cover maps for several different years are needed.

Study Area

The present study area district Hisar is one of the most important districts of western Haryana. It situated one hundred sixty four kilometres west to Delhi on national highway ten. Hisar District with total geographical area 3983.00 sq. km is lies between the North latitudes 28° 56' to 29° 38'30" North latitude and East longitude 75° 21'12" to 76° 18'12" East longitudes. The total population of Hisar district is 1,743,931 persons, 9,31,535 Males and 8,11,280 Females, which is 6.87 % of total population of the state. Decadal growth rate of population has decreased from 27.11 % of 1991-2001 to 13.38 % in 2001-2011. Sex-Ratio has increased from 851 of 2001 to 871 in 2011. Population density per sq. km. has increased from 386 of 2001 to 438 in 2011. An average literacy rate of Hisar is 73.2%, 82.8% Males and 62.3% Females. Out of total population, 31.73 % lives in urban areas and 68.27 % lives in rural areas. The District is under control of Hisar division and administratively divided into nine community development blocks namely Agroha, Adampur, Barwala, Bass (Hansi-II), Hansi-I, Hisar-I, Hisar-II, Narnaund, and Uklana Mandi. The district has 05 towns namely Hisar, Hansi, Narnaund, Barwala and Uklana and 269 villages. Administratively the district is divided into 2 sub divisions, Hansi & Hissar. There are 4 Tehsils namely Hansi, Narnaund, Hisar & Adampur. There are 3 sub-tehsils viz. Uklana mandi, Barwala, Baas. There are nine blocks namely Adampur, Barwala, Baas, Hansi, Hisar-I, Hisar-II, Narnund, Agroha and Uklana. There are 275 inhabited villages in the district.

Objective

- To prepare base map, land use/ land cover & geomorphology map of the study area

Data Base & Methodology

Methodology

The present study entitled "Land use/land cover Thematic Mapping of Hisar District Haryana Using Remote Sensing and GIS" has been conducted at HARSAC, Hisar. In the present study image processing and visual interpretation technique were employed to carry out Land use/Land cover classification using digital data and standard False Colour Composite (FCC) paper print of Indian Remote Sensing satellite. The methodology adopted in the present study to carry out the details of the land use/ land cover mapping is given in the flow chart.

Source of data

The data for the present study has been taken from both primary and secondary sources. A brief description of data used in present study is given below: Primary data and Secondary data. This study involved secondary data collection. Mainly Indian Remote Sensing Satellite- IRS ID LISS III satellite data of FCC satellite imagery 2001 year was used for the present study. This satellite data for year (2001) was used to prepare thematic layers.

Analysis and Discussion

The study area covers District Hisar of Haryana state. The total geographical area of District Hisar 3983.00 sq. km. Total Five categories of land use/land cover were identified in the study area. Which are built up land, Vegetation, Forest Land, Water body and Sand dunes.

Analysis and Mapping

The present study area District Hisar is one of the most important districts of western Haryana. It situated one hundred sixty four kilometres west to Delhi on national highway ten. Hisar district with total geographical area 3983.00 sq. km is lies between the North latitudes 28° 56' and 29° 38'30" north latitude and East longitudes 75° 21'12" and 76° 18'12" East longitudes.

Built up land

The built up area is increased with the passage of time due to socio economic development of the area and most of the developing area is converted into developed area in 2001. Fig-1.1 show the built up area of district Hisar using the LISS III image 2001. The highest built up area in centre of Hisar district and southern part of Hisar. The lowest built up area in east and north of Hisar district because have many reasons like mostly this area under the crop land cover area and under the developed area.

Agriculture land

In the past, Hisar district was predominantly agricultural district but gradually tertiary activity is increasing. During 1991 Census 54.9 percent of the main workers were engaged in agricultural activities. Cropping pattern in the district has gone under drastic change in the past half century. Changes in agro-climatic conditions and extension of irrigational facilities have greatly 17 decreased the area under gram, barley and bajra while area under paddy, wheat, cotton and oilseeds has increased. Some crops like maize and jowar and pulses like mash and massar have almost disappeared from the scene in the district. Intensity of cropping has shown an upward trend since the introduction of canal irrigation from Bhakhra Canal.

Fig-1.2 show the crop land cover of Hisar district mostly area cover the western part and northern part because farmer engaged in agricultural activities, climatic condition is suitable for bajra and jowar this belt of cropland converge the Rajasthan boundary. In eastern and southern part cover the lowest range of crop have many reasons like pressure of the industrialisation, physical feature like sand dunes,

people move in urban areas.

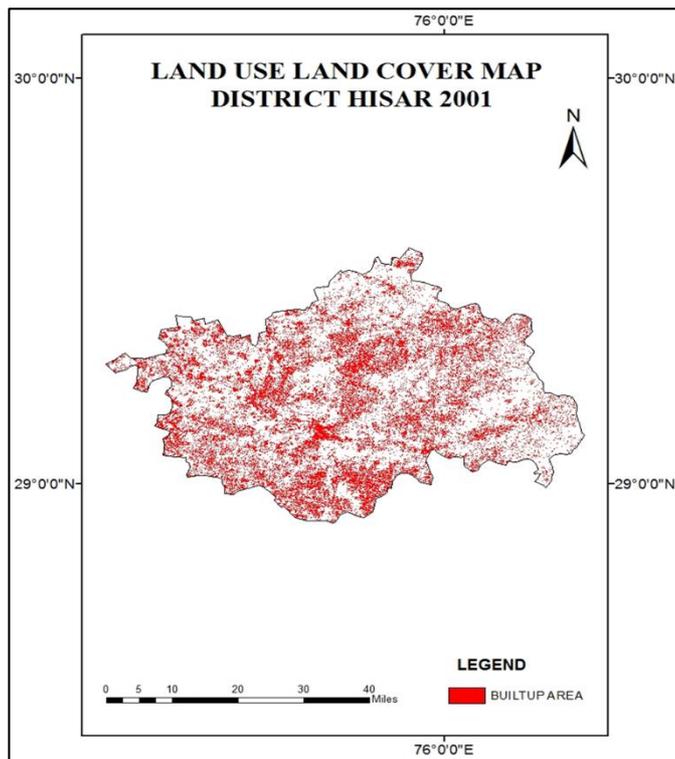


Fig 1.1

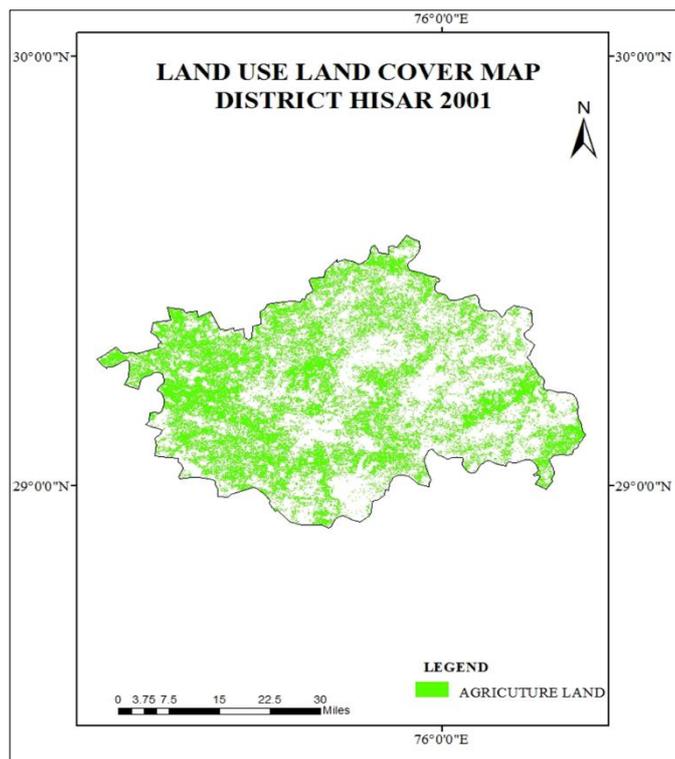


Fig 1.2

Forest

The district covers Hisar, Adampur and Hansi forest ranges which are headed by the Range Forest Officers. These ranges come under Hisar Forest Division headed by the

Deputy Conservator of Forests stationed at Hisar. The district falls in the West Forest Circle with headquarters at Hisar.

Fig.1.3 show the forest cover of District Hisar mostly area cover northren and eastern part. Forests of the district fall under the category of tropical desert thorn species predominantly of Xerophytes. Flora is scanty and sparse. Important tree species of the area are Jand (Prosopis cineraria), Rohera (Tecomella undulata), Khairi (Acacia senegal) Beri (Zizyphus mauritiana), Jal or Van (Salvadora oleoides), Badh (Ficus bengalensis), Peepal (Ficus religiosa), Pahari Kikar (Prosopis juliflora), Kachnar (Bauhinia recemosa), Lasura (Cordia dichotema), Imli (Tamarindus indica), etc. Shisham (Dalbergia sisoo), Neem (Azadirachta indica) Bakain (Melia azedarach) Siris (Albizia lebbeck), Gulmohar (delonix regia), Safeda (Eucalyptus) have been planted along road, rail and canal strips and agricultural fields. Eucalyptus is planted in agricultural and farm forestry scheme. Jand, Farash, Khairi, Castor, Kana and Ruhera have been planted to check soil erosion by high velocity winds. Common shrubs like Hins, Bansa, Panwar, Babool, Mallah, Karir, Phoa, Khip and Akk are found.

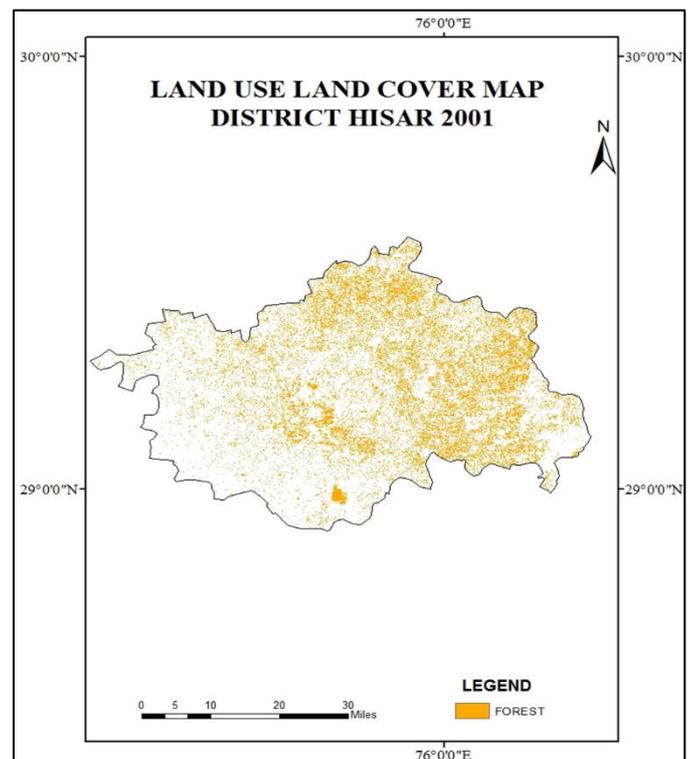


Fig 1.3

Water body

Fig show 1.4 show the water body of District Hisar mostly waterbody in eastern part and central part in Hisar. The ground water quality is very poor in this region. The Hisar city falls in raised highly and area in and out of city suffers from seasonal floods. District Hisar is aggravated due to extensive canal network adding surface water to saline ground water and non-exploitation of ground water due to its saline quality. This has resulted in rise of water table and water logging.

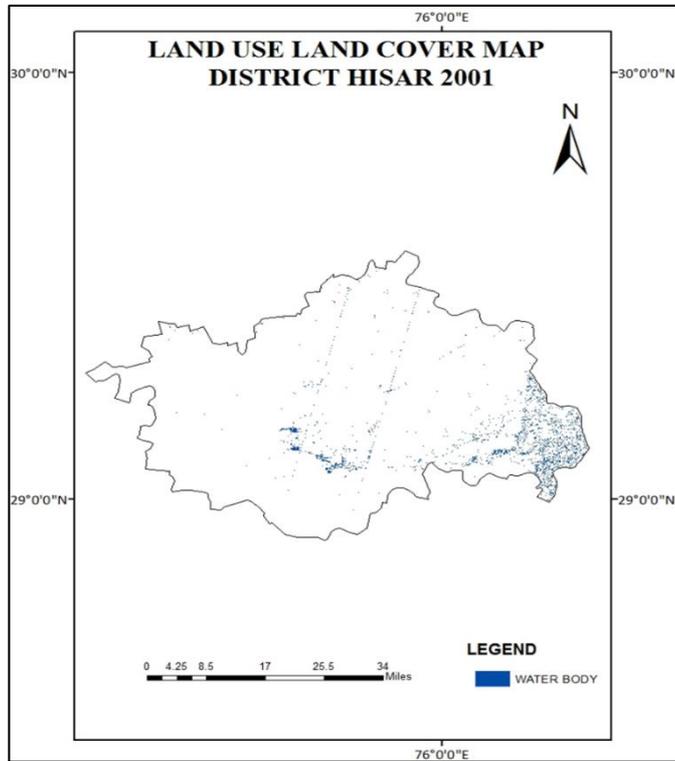


Fig 1.4

Sand dunes

Fig 1.5 shows the Sand Dunes is located in a strip in the southwestern part of the district. This region differs from the Hisar Bagar, due to heavy concentration of sand dunes, sand flats, undulating surface and different directions of the sand dunes. Sub-divide the District as Hisar Plain, Hisar Bagar and Balsmand Undulating Plain with Sand dunes.

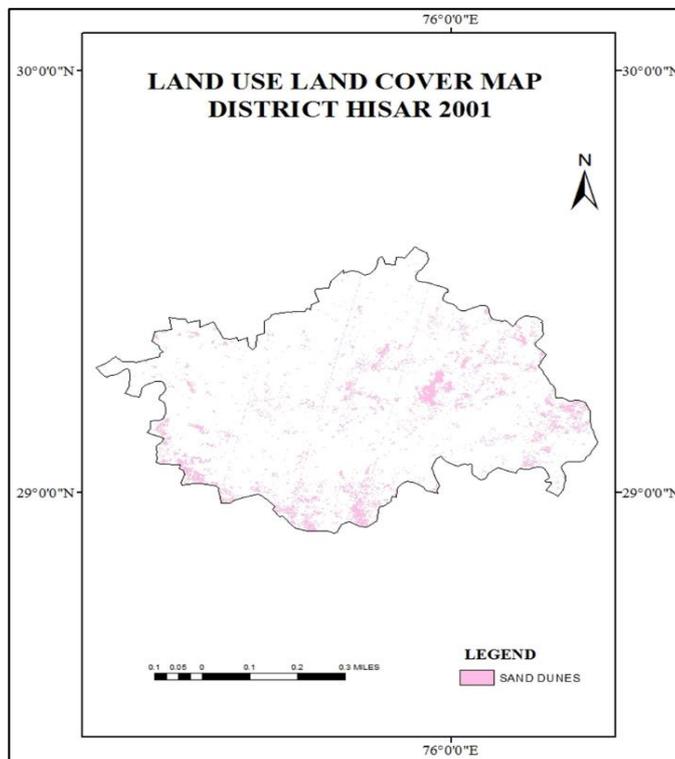


Fig 1.5

Land use Land cover of Hisar

The study area covers District Hisar of Haryana state. The

total geographical area of Hisar 3983.00 sq. km. Total Five categories of land use/land cover were identified in the study area. Which are Build up land, Vegetation, Forest Land, Water body and sand dunes. The description of the land use/land covers categories.

Fig-1.6 show the built up area of district Hisar using the LISS III image 2001. The highest built up area in centre of Hisar district and southern part of Hisar. The lowest built up area in east and north of Hisar district because have many reasons like mostly this area under the crop land cover area and under the developed area. Agriculture land of Hisar district mostly area cover the western part and northern part because farmer engaged in agricultural activities, climatic condition is suitable for bajra and jowar this belt of cropland converge the Rajasthan boundary. In eastern and southern part cover the lowest range of crop have many reasons like pressure of the industrialisation, physical feature like sand dunes, people move in urban area. Water body of District Hisar mostly waterbody in eastern part and central part in Hisar. The ground water quality is very poor in this region. The Hisar city falls in raised highly and area in and out of city suffers from seasonal floods. District Hisar is aggravated due to extensive canal network adding surface water to saline ground water and non-exploitation of ground water due to its saline quality. This has resulted in rise of water table and water logging. the forest cover of District Hisar mostly area cover northren and eastern part.

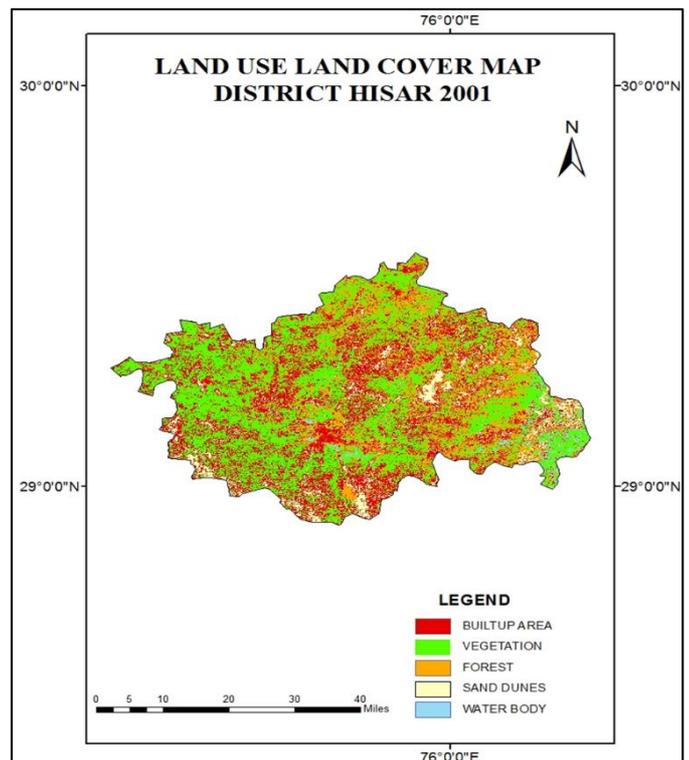


Fig 1.6

Conclusion

Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods. Land cover is physical material at the surface of the earth. Land cover includes grass, asphalts, tress, bare ground, water etc. There are two primary methods for capturing information on land cover field survey and analysis of remotely sensed imagery.

Located in the western bulge of the State, almost compact shaped Hisar district is bounded by Fatehabad district in the northwest, by Jind district in the north east, a small portion is touched by Rohtak district in the south eastern part. In the south Bhiwani district makes boundary with the district. To its south west lies Rajasthan State. The study demonstrates the potentiality of satellite remote sensing technique for preparation of more consistent and accurate baseline information on land use/land cover. Interpretation of IRS 1C/1D, LISS-III data supported by ground truth information revealed that there are five types of categories of land use/land cover in the study area.

The study area cover total five categories of land use/land cover were identified in the study area. Which are Build up land, Vegetation, Forest Land, Water body and Sand dunes. The description of the land use/land cover categories. The built up area is increased with the passage of time due to socio economic development of the area and most of the developing area is converted into developed area in 2001. Fig-1.6 show the built up area of district Hisar using the LISS III image 2001. The highest built up area in centre of Hisar district and southern part of Hisar. The lowest built up area in east and north of Hisar district because have many reasons like mostly this area under the crop land cover area and under the developed area.

The Hisar city falls in raised highly and area in and out of city suffers from seasonal floods. Hisar is aggravated due to extensive canal network adding surface water to saline ground water and non-exploitation of ground water due to its saline quality. This has resulted in rise of water table and water logging. The forest cover of district Hisar mostly area cover northren and eastern part. Sand Dunes is located in a strip in the southwestern part of the district.

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