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Study of Land Use and Land Cover of Chaksu block, Jaipur through Remote Sensing and GIS

Ruchi Middha*, Sonal Jain* and Shelja K.Juneja**
*RESEARCH SCHOLAR, ENVIRONMENTAL SCIENCE, THE IIS UNIVERSITY, JAIPUR
** HEAD AND ASSOCIATE PROFESSOR, ENVIRONMENTAL SCIENCE, THE IIS UNIVERSITY, JAIPUR

ABSTRACT
Humans have been using land to meet their various needs and have constantly modified it in various ways leading to unfavourable changes in the environment. Natural forest areas are being converted to agricultural land, built up-land, industrial areas, recreational sites. Over exploitation of the land cover leads to its degradation. In the present study, use of remote sensing and Geographical Information System (GIS) have been made to study the Land Use Land Cover (LULC) of the Chaksu block of Jaipur district, Rajasthan. Studying LULC is important to understand the proper land use planning for sustainable development of the Chaksu block.
Key words: land use, land cover, remote sensing, GIS

Introduction
Turner et al; 1995 has defined land cover as "the biophysical state of earth's surface and immediate subsurface". Land Cover (LC) is defined as the natural and physical condition of the ground surface e.g.- forest, grassland ,rivers whereas land use is the purpose given to the land to be served by the humans e.g.-residential area, industrial area, agricultural land etc. Land use refers to as how the land is being used by the man.

One of the most significant applications of remote sensing is the land cover mapping through which land use information can be inferred. Land cover mapping is important for identification and delineation of the land resources by which change detection can be performed and thematic maps can be prepared based on ground cover information. Land cover monitoring is important as it provides us with the knowledge of our natural resources with changing times. Long term changes in LC leads to a shift in local climatic conditions which forms the basis of climatic monitoring.

Land use applications involve time-to-time mapping and monitoring of the present land quantity, its status and the changes occurring in it. This helps in framing policies for land conservation and its management. Land use studies also help in dealing with issues related to deforestation, urbanization and other developmental activities. For sustainable development of the land, LCLU information is important for planning, monitoring and developmental status.LU applications of remote sensing include the following:-

- ✓ Natural resource management
- ✓ Protection of wildlife habitat
- ✓ Mapping of the GIS input data
- ✓ Urbanization
- ✓ Damage depiction (floods, volcanoes, hurricanes, fires etc)

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LAND USE LAND COVER (LULC) CHANGE

Increase in population leads the people to infringe upon the productive land for living. Urbanization is a clear indicator of development, leading to detrimental effects on the environment. The changes in land use from rural to urban are estimated to monitor population change, to predict the direction of urbanization and to infer hazards. It is important to analyse the agricultural and urban land areas for ensuring that sustainable development is taking place, to make sure that urbanization does not encroach upon agricultural land and is being done mostly on suitable land. Remotely sensed images can be used in identifying building code violations and permits for construction. Aerial photography or very high resolution satellite images along with available records can be used for verification of the permit issued for any project. This kind of application requires imagery of scale 1:5000. With the help of remote sensing, types of LU in large areas can be identified in a more practical, economical and repetitive manner. Remote sensing technology aids in locating public and private institutions like hospitals and schools etc. The images are put to use in examining sites suitable for project implementation. They also help in performing avoidance screening whereby areas where there is no scope for development are identified e.g.- buffer zone, steep slopes, ecologically sensitive areas, etc.

According to USPEA, 1999 changes in land cover have an impending effect on biodiversity, hydrological cycle, radiation emissions and other phenomenon which influence the total biosphere. Increase in the population along with urbanization, industrial and agricultural development has led to inflow of large amount of effluents into the water bodies and has degraded the natural environment (Yang & Liu, 2005). The most important component of change in environment is the land cover change which poses a serious threat to the ecosystems (Foody, 2003). Land use change is a major constituent in framing policies for management and examination of natural resources and environmental changes (Brandon and Bottomley, 1998). For the sustainable management of natural resources, analysis of the LULC changes with time is essential to identify factors responsible for it (Giri et al; 2003). Data acquisition by satellites have become a major source for studying change detections as it provides synoptic view and is cost effective. Moreover, the digital data can be processed and analysed more easily in comparison to manual data (Coppin et al;2002;Deer 1995;Lu et al;2004).

With the advancement in the air and space remote sensing technology, acquisition of LULC data of pre and post conditions has been made possible. The integration of data from multiple sources and multi- date in GIS have provided us with vast information on the rate, trend, nature, location and magnitude of the changes occurred.

Study area

Chaksu was selected for the present study. It is a town and municipality in Jaipur district in the state of Rajasthan, India. Its ancient name was Chatsu/ Champa. The town is situated at a distance of 40kms from Jaipur on National Highway No.12(NH 12).Chaksu is also one of the 13 tehsil headquarters of Jaipur district.

Chaksu is located at 26.60˚N 75.95˚E and has an average elevation of 297 m (974 ft). The study area falls in Survey of India (SOI) Toposheet no.45 N 14 and 54 B2 in 1:50,000 scale .Thematic maps of aspects like hydrology and LULC were prepared from CARTOSAT image of the study area using GIS.

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LOCATION MAP

In the present study, the authors have assessed the LULC by means of pie chart prepared using GIS. This will be helpful in the land management for the future. The LU patterns have been differentiated into categories like agricultural land, waste land, built -up land, gullied land etc.

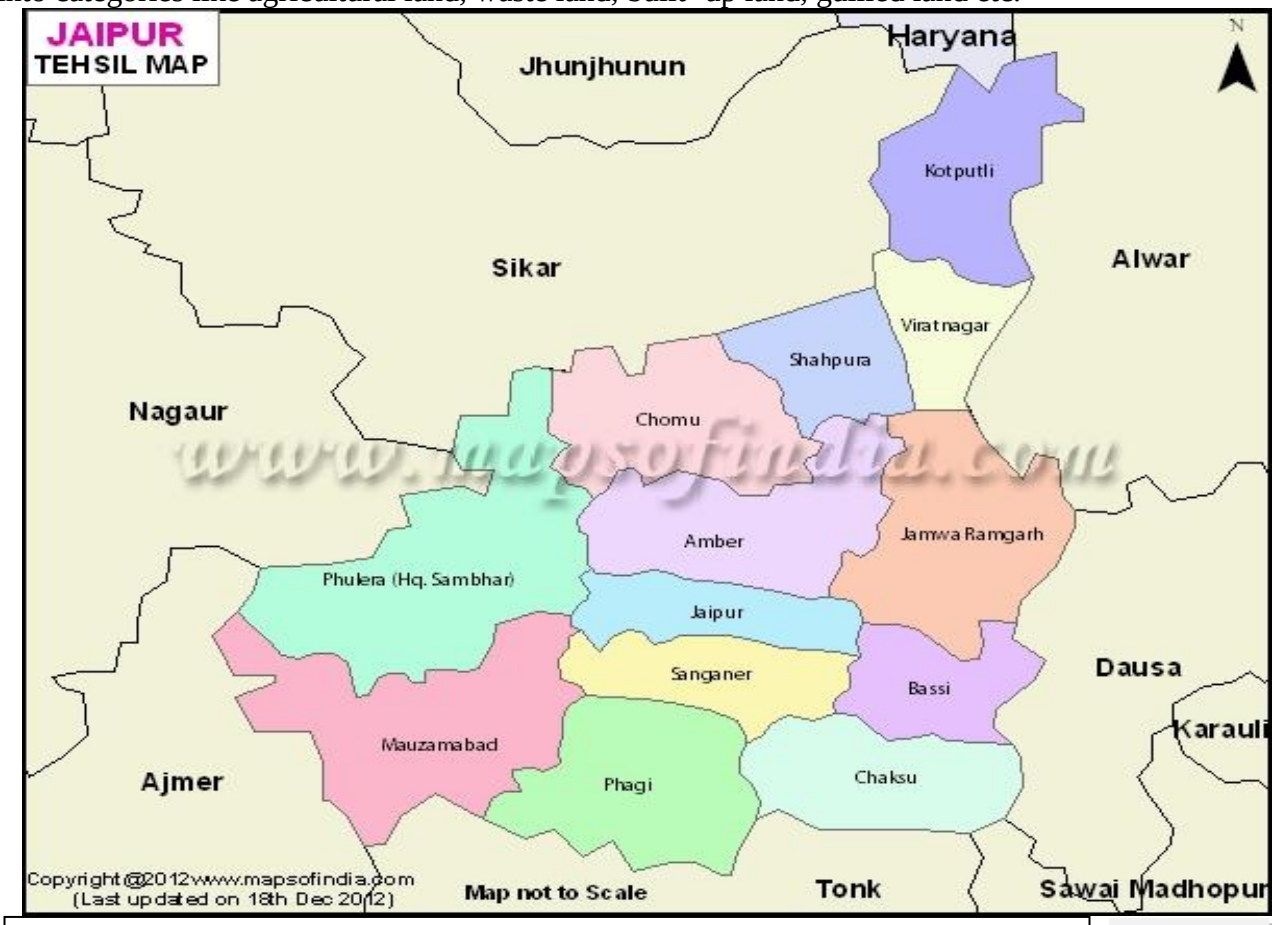

FIGURE 1: LOCATION OF THE STUDY AREA

CHAKSU

Methodology

Data Used

❖ Satellite Data: Digital data of CARTOSAT with a resolution of 2.5m of path 147 and row 42 was used for the study.

Data Interpretation/Analysis

❖ The satellite data is interpreted based on elements of interpretation like tone, texture, size, shape, pattern, aspect, association, etc and classified into different land use/land cover classes like agricultural land, waste land, scrub land, water body etc.

❖ Digitization technique was employed by ARC GIS for the prediction of LULC of the study area. The area was put in pie chart to estimate the total area occupied by each class in the LULC map.

Results

The following table shows the different LULC categories with their calculated area:

S no.	Land Use/Land Cover class	Area calculated (in sq km)	Area in percentage
1.	Agricultural land	696.970	86%
2.	Built upland	14.071	2%
3.	Gullied land	1.987	0%
4.	Industrial land	1.216	0%
5.	Mining	0.206	0%
6.	River course	20.507	3%
7.	Scrub land	70.665	9%
8.	Waste land	3.091	0%
9.	Water bodies	2.416	0%
10.	Total area	811.130	100%

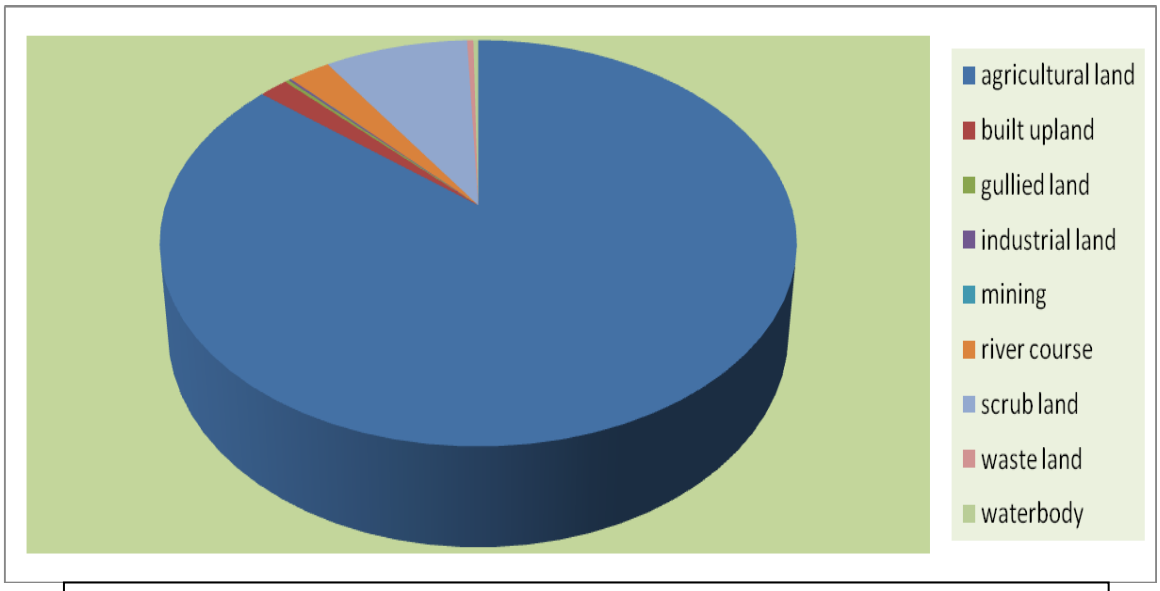

FIGURE 2. PIE CHART REPRESENTING DIFFERENT

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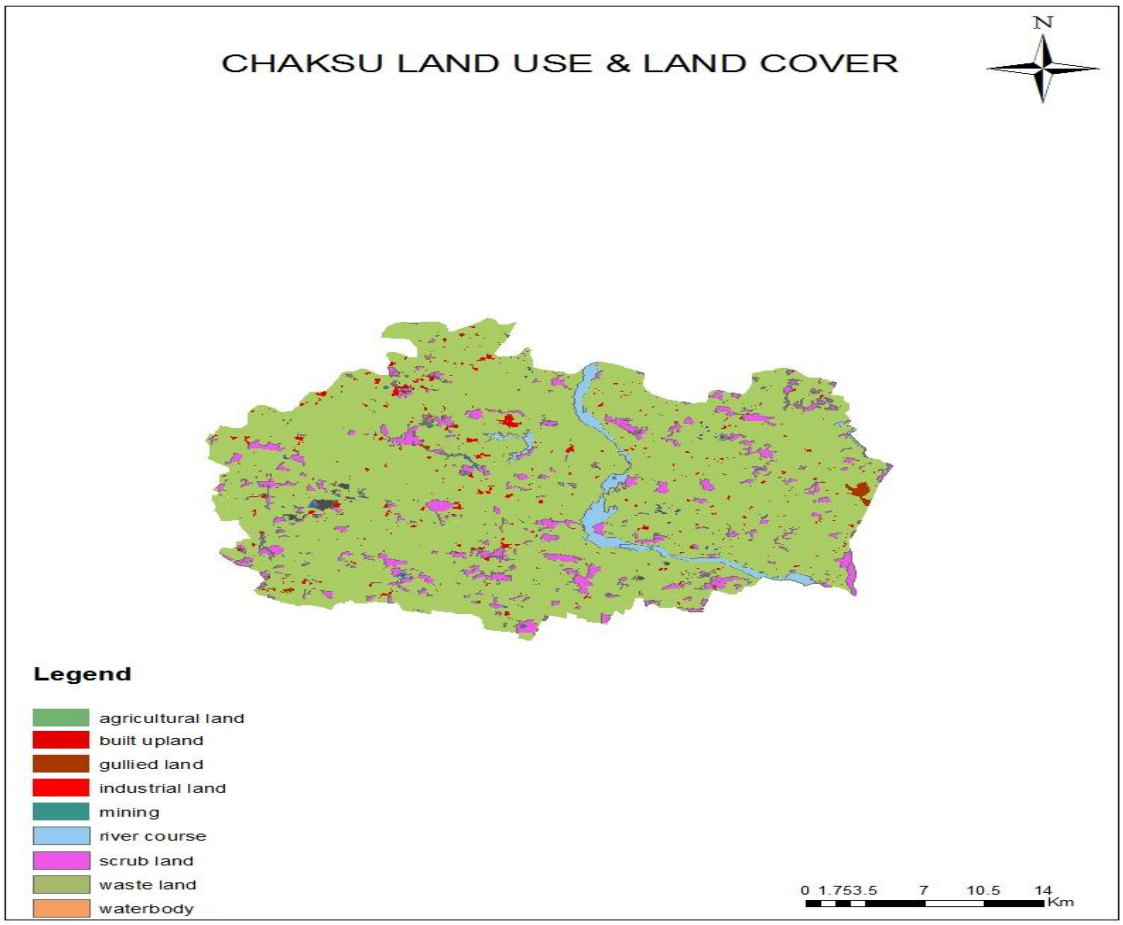

CONCLUSIONS

This study provides an overview of the LULC pattern of the Chaksu block of Jaipur district, Rajasthan with the help of remote sensing. The information on LULC is of utmost importance for the land management. The application and integration of remote sensing and GIS technique is of great value in providing data for sustainable management of resources and in policy framing and decision making. Agriculture is the dominant land use, covering 696.97 sq km of the total area. Area under water bodies is not significant which implies there is a need for water resources in the area. 9% of the land is uncultivated or dominated by shrubs. Waste land can be put to use for urbanization as these are degraded lands and can be brought under vegetative cover with special efforts.

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