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# Impact of Urbanization and Industrialization on Agricultural Land in HosurTaluk using Remote Sensing and GIS Technique

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## Abstract

Human influences strongly affect the Earth Surface, environment and impact natural resources. To reduce the disadvantages, we have to monitor the human activities as well as the environment. Considering the rapid increase of population the loss of agricultural land is a very dangerous situation for the future of the country. Multi temporal Remote Sensing data is the most powerful tool for mapping and monitoring the land use changes and GIS is the best way to store and reproduce various kinds of integrated data. The aim of this study is to determine agricultural land loss and environmental changes caused by urban sprawl and industrialization using the Multi temporal Remote Sensing (RS) and Geographical Information System (GIS). A major problem of rapid urban growth is changing land use patterns. Agricultural lands are most affected by rapid urbanization and its functions of demand. In this study, a database will create the parameters of land loss and environmental changes by means of field observation, interpretation of satellite images like Landsat-ETM+, LISS IV .Through this study, which aimed to reveal the characteristics of the areas of land already lost as well as the types of land use in the hosur city and to determine geographically the remaining areas in need of protection, local authorities were provided with the required data support.
**Keywords: Urban Sprawl, industrialization, Agricultural land, Environmental changes, GIS**

## I. Introduction

Nowadays urban areas experience fast growth due to and suburban areas for diverse purposes such as urban enormous population growth, rapid industrialization, planning, water and land resource allocation, etc. Urban economic development and specific economic policies authorities and municipal management, marketing adopted by governments and immigration of people from analysis, service corporations are required to devote more villages to cities. Accelerated urban growth is usually time, attention and effort to manage the use of land and associated with and driven by the population other resources in order to accommodate the expanding concentration in an area .The extent of urbanization or its population or other urban land uses. Growth drives the change in land use/cover pattern. Land use, land cover and agricultural fields' changes globally, the world's population is becoming more in urban areas are the most environmental effects of urbanized.

### A. *Geospatial Approach*

Geomatics is the other name for geospatial technology is the discipline of gathering, storing, processing and delivering geographic information, or spatially referenced information. Geomatics is a relatively new scientific term, coined by Pollock and Wright in 1969, with the intention of combining the terms geodesy and geo informatics. It includes the tools and techniques used in land surveying, remote sensing, cartography, geographic information systems (GIS), photogrammetry, geography and related forms of earth mapping.

*1) GIS Technology*

It can be integrated for achieving a wider base of climatic application to the agriculture. Hence, a GIS deployment developed for an application, jurisdiction, enterprise, or purpose may not be necessarily interoperable or compatible with a GIS that has been developed for some other application, jurisdiction, enterprise, or purpose. What goes beyond a GIS is a spatial data infrastructure, a concept that has no such restrictive boundaries. GIS was recommended because of its capability to combine, analyse and displays spatial data and because of the flexibility of its output.

*2) Remote Sensing*

Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to in situ observation. In modern usage, the term generally refers to the use of aerial sensor technologies to detect and classify objects on Earth both on the surface, and in the atmosphere and oceans by means of propagated signals, example-electromagnetic radiation. It may be split into active remote sensing, when a signal is first emitted from aircraft or satellites or passive when information is merely recorded.

*3) Image Processing*

Image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Image processing usually refers to digital image processing, but optical and analog image processing also are possible. This article is about general techniques that apply to all of them. The acquisition of images is referred to as imaging. Image processing refers to processing of a 2D picture by a computer. Modern digital technology has made it possible to manipulate multi-dimensional signals with systems that range from simple digital circuits to advanced parallel computers.

### *B. Objective*

1) To develop the Thematic layers of the study area.
2) To Identify the Urban expansion of the study area by using Satellite images.
3) To Identify the Land use Land cover changes and identifying the Industrial developmental activities.
4) Assessing the Agricultural land loss in the study area.

## II. STUDY AREA

Hosur block is geographically located in the Northern part of Tamil Nadu State.

It is located about 40 kilometres South-East of Bangalore. It forms a part of the Survey of India (SOI) topographic sheets (57 H/10, 13,14) on 1:50000 scale. The study area covers a total area of about 275 square kilometres and is situated at an altitude of 950 m above mean sea level.The area lies between

Latitude: 12°38'52.4" N and 12°52'7" N
Longitude: 77°44'11" E and 77°55'11" E

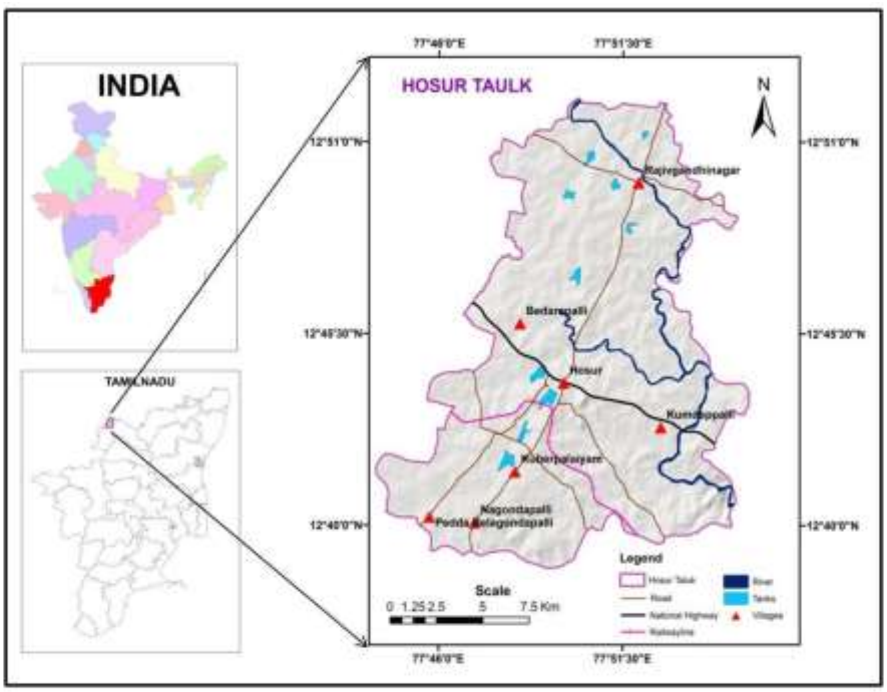



Fig. 1: Study Area of Map

### *A. Description*

The collected Toposheets of study area were scanned, registered and mosaicked using ERDAS Imagine software. Satellite data were collected preprocessed & geo-corrected with respect to registered Toposheet. Secondary data were collected & geo-corrected with respect to registered Toposheet. Thematic layers on geology, NDVI, drainage, soil and landuselandcover maps are developed for the study area.

### *B. Software Used:*

- ERDAS Imagine 9.2
- Arc gis 10

### *C. Flow of work*

*1) Data Processing*
The satellite data were geo-referenced and suitable Image enhancements are applied to facilitate the delineation and interpretation of different thematic information.
*2) Data Interpretation*
Visual and digital interpretation methods were used to prepare pre-field interpreted map. The satellite data is interpreted based on photo elements like tone, texture, size, shape, pattern, aspect, association etc. These pre-field interpreted maps and digitally enhanced satellite data are used on the ground to identify different elements of various thems.
*3) Finalization of Maps*
Based on the pre-field interpretation, ground truth verification and available secondary information final maps were prepared in 1: 25000 scales. Towards this both visual and digital approaches are conjunctively used.

## III. METHODOLOGY

This method section describes the activities that were carried out to detect single tree felling using remotely sensed data. The first step was pre-processing of the liss image.

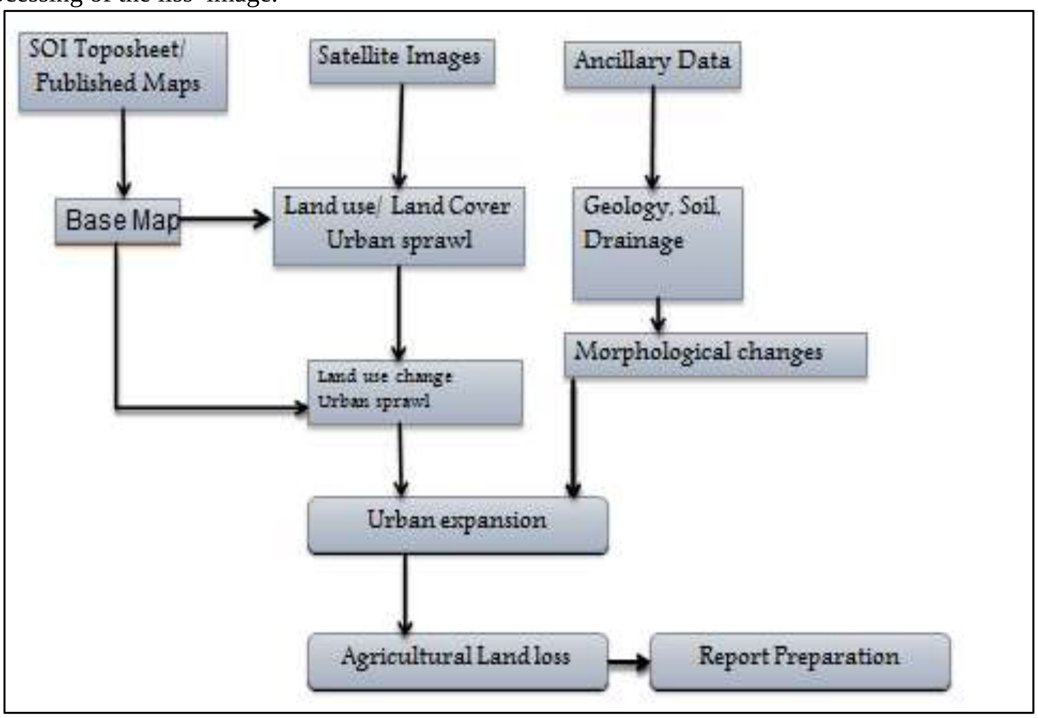



Fig. 2: Methodology

## IV. RESULT

Remotely sensed image raw-data gathered by a satellite or aircraft needs to be corrected. Even images of seemingly flat areas are distorted by both the curvature of the Earth and the sensor being used. Hence there is a need for geometrically correcting an image. Errors due to earth surface: While covering larger distance of earth's surface (swath width) causes error in pixel size.

### *A. Physiography*

The entire area is a vast stretch of rolling plain. In general, the altitude varies from more than 900 m in the South-West to less than 750 m on the East. This region consists of small hill ranges and ridges. There is no perennial river in Hosur block except the river Chinnar and Dakshinapinakini which are non-perennial rivers. It holds water only during the monsoon seasons. Tanks found in the study area not much used, due to water contaminated with domestic and industrial sewage. The general topography is sloping from South to North and East to West.

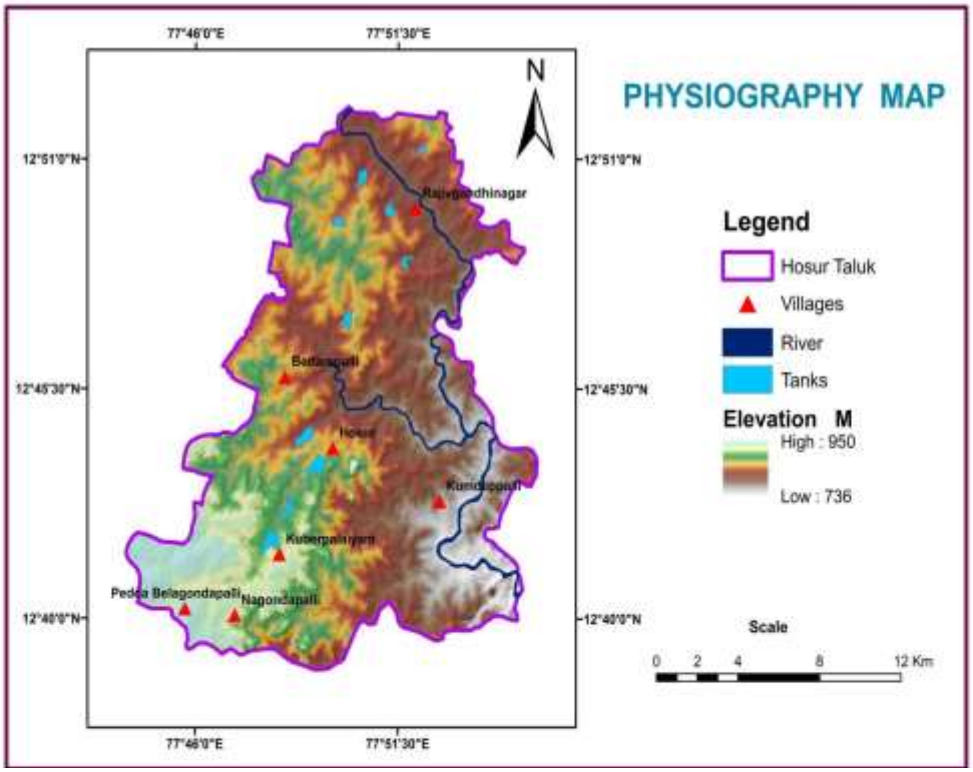



Fig. 3: Physiographic map for study area

### *B. Geology and drainage*

The geology of the study area is Archaean period-Bhavani groups of Gneiss. The most common rocks are the Granitoid Gneiss. Besides this there also occurs in the southern part with basic dykes and in the northern part with shear zone. The geomorphological characteristics of the block are broadly classified into pediplain, pediments, structural hill, flood plain, shallow pediments, upper undulating alluvial plains and water body mask.

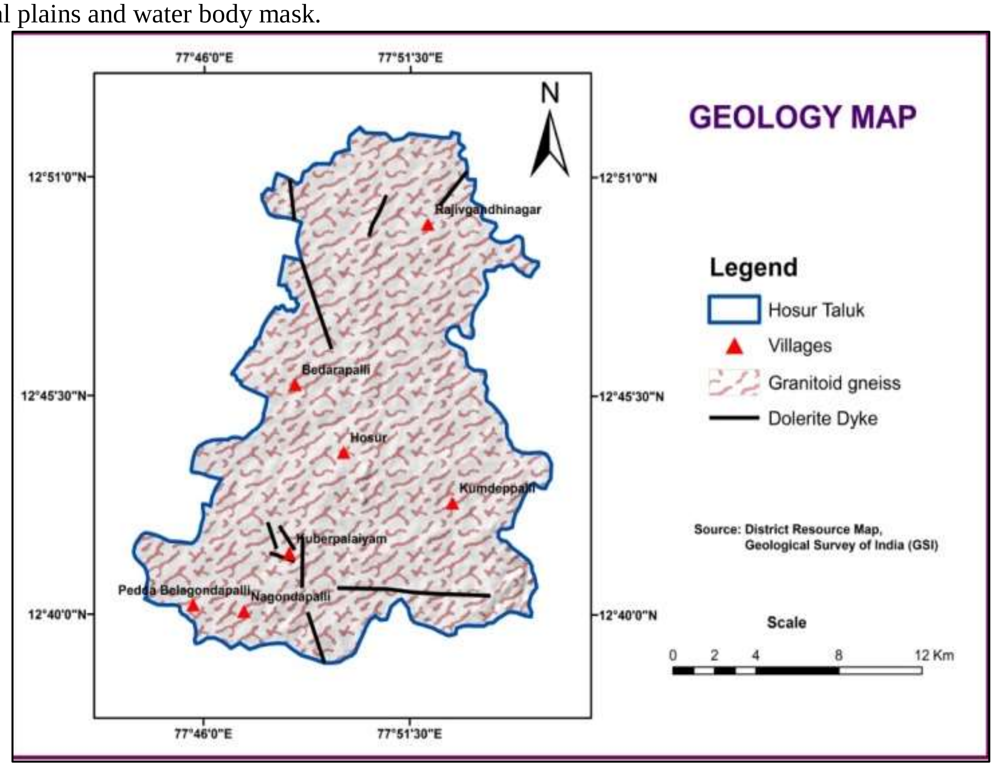



Fig. 4: Geology map for study area

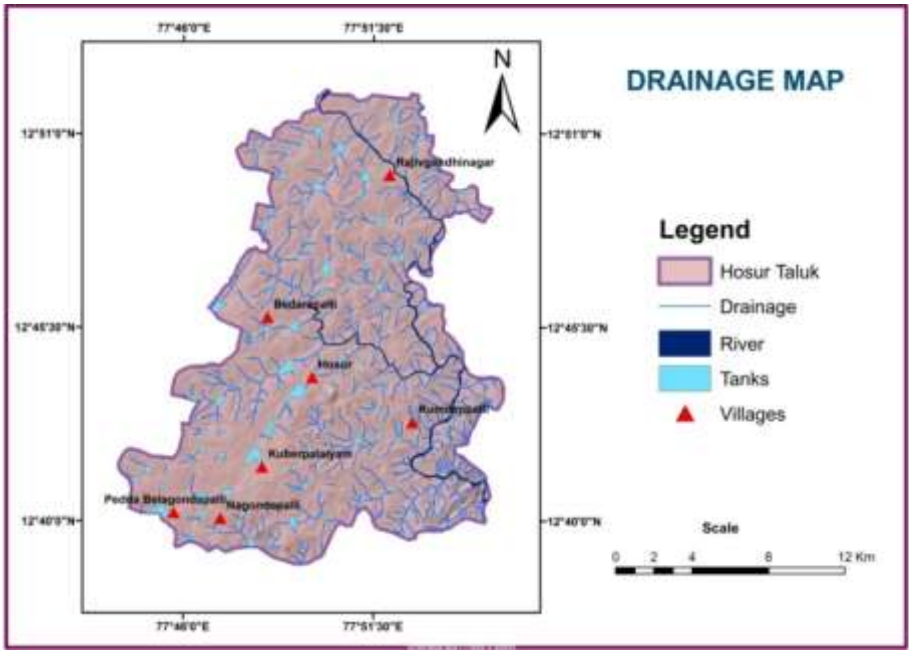



Fig. 5: Drainage map for study area

### C. *Soil details*

Soil is the upper weathered part of the earth¡¦s surface. Soil is formed due to combined action of rocks, topography and climate and it comprises of different mineral particles, water, air and humus. Soils of India are classified based on their colour, structure and place where they are found. Interface between the surface and groundwater is mainly influenced by soil. The hydrological soil map was classified as clayey,fine loamy and Loamy soils.It was observed that the clayey soil cover an area of 93.14 square kilometre of the total area, fine loamy covers an area of 172.01 square kilometre which occupies the major share and loamy soil covers an area 10.14 square kilometre respectively. Fine loamy soils do not allow the water to percolate into the ground surface are more prominent in the study area. Depressions allow the accumulation of water, minerals and organic matter and in the extreme. The resulting soils will be saline marshes or peat bogs. Intermediate topography affords the best conditions for the formation of an agriculturally productive soil. Steep slopes encourage rapid soil loss by erosion and allow less rainfall to enter the soil before running off and hence, little mineral deposition in lower profiles. There are four different types of landforms present in the study area. It involes identification and characterization of various landforms.

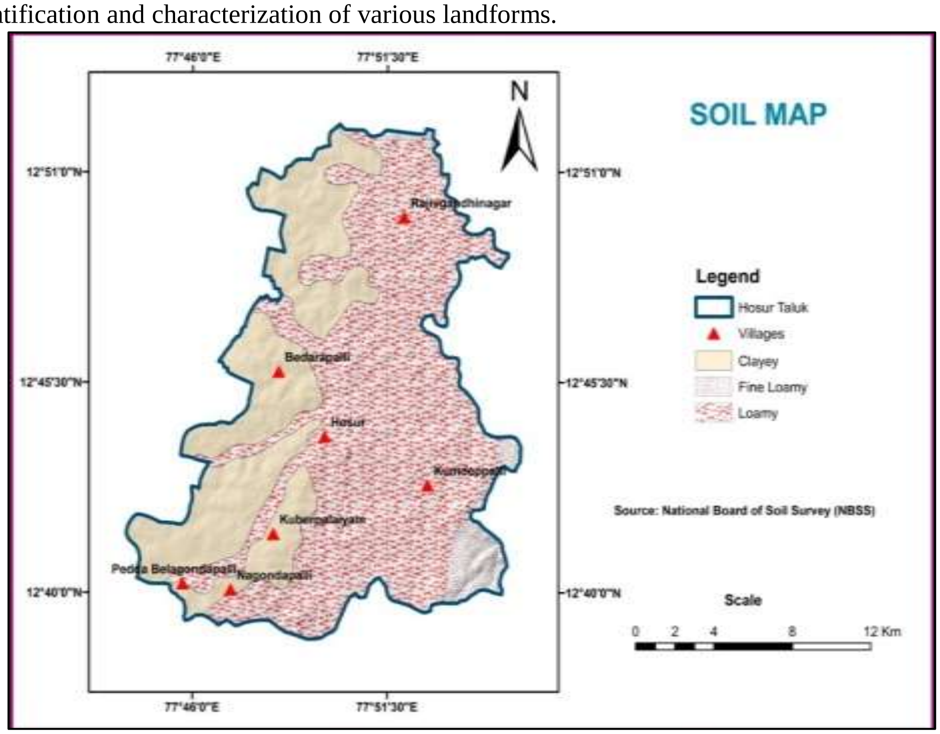



Fig. 6: Soil map for study area

### *D. Landuse/landcover*

The term land cover relates to the types of feature present on the surface of the earth. Urban buildings, lakes, trees and snow cover are all example of land cover. The term land-use relates to the human activity associated with a specific piece of land. Although land-use is generally inferred based on the cover, yet both the terms being closely related are interchangeable. The information gained like land-use/land-cover permits a better understanding of the land utilization aspects on cropping patterns, fallow lands, forest, wastelands and surface water bodies, which is essential for developmental planning.Land use / land cover map are prepared to get the information on the details to which the land has been put to use by man as well as naturally existing land cover like forest, agriculture area, built up area etc., The landuse/landcover classes of the study area include built up area, agricultural and, forest land, land with scrub, waste land, water body.. In the study area the built up land is identified by bluish green to bluish tone. Crop land is defined as the land with standing crop as on date of the satellite image.

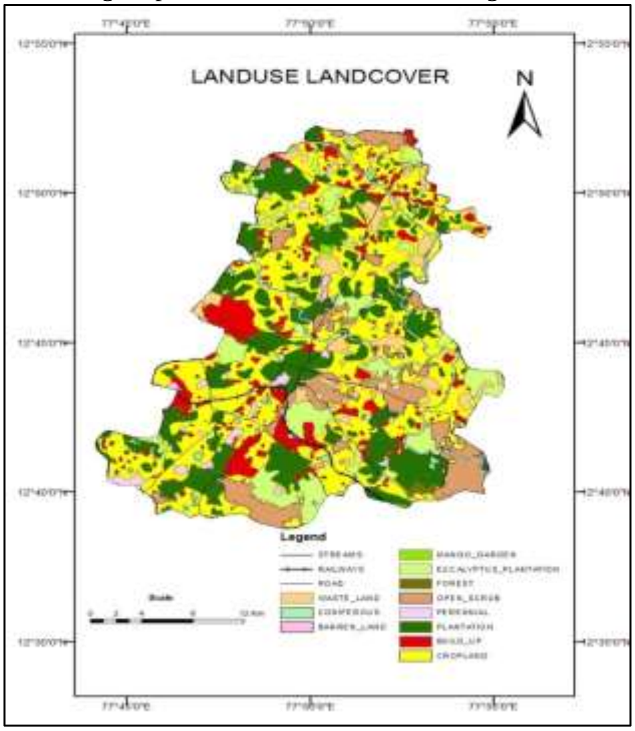



Fig. 7: Land use/Land cover map for study area (1992)

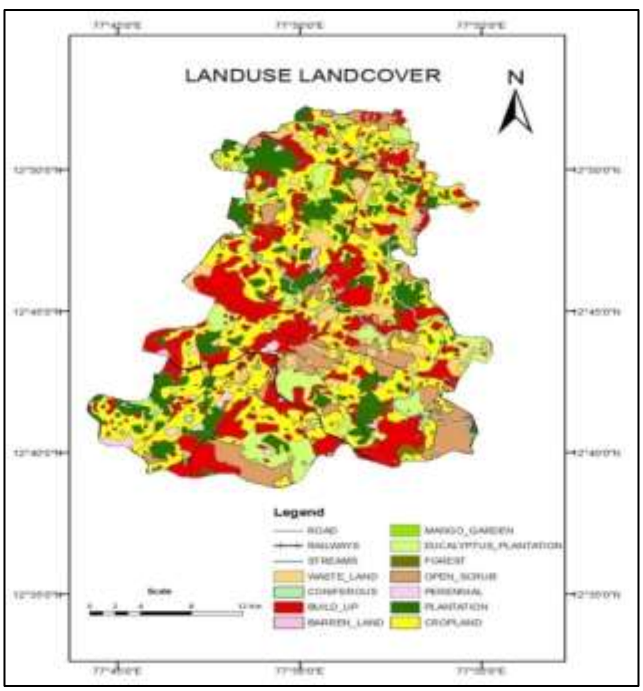
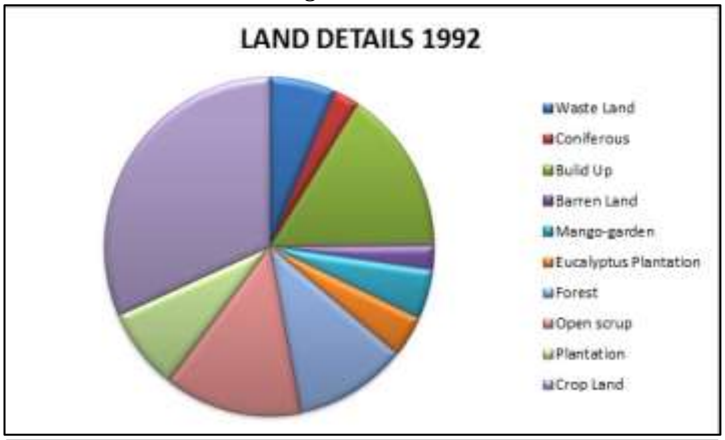



Fig. 8: Land use/Land cover map for study area (2014)

### E. Effect of urbanization and industrialization on agriculture land

Urbanization and Industrialization over the past few decades have been fairly rapid in affecting the agricultural regions around the world. Land converted to urban uses is increasing, though it has little effect on total crop production. The technological transformation of agriculture has had much larger effects and has operated as a push-pull on the city ward movement of people as farm functions have moved to the city. By using the above maps were are able to find the agriculture land loss. The relationship between urbanization and agriculture is examined and the agricultural land loss details are shown below,



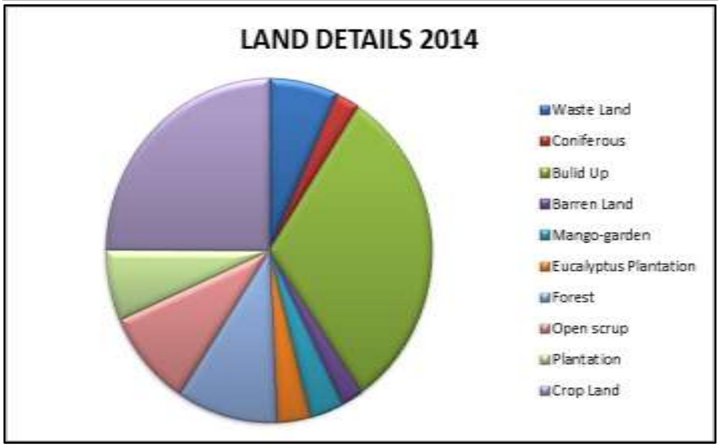




Fig. 9: Effect of urbanization and industrialization on agriculture land

Table – 1
Iimpacts of land

| *Land information* | *1992(%)* | *2014(%)* |
|---|---|---|
| *Waste land* | *6.69* | *4.58* |
| *Coniferous* | *4.2* | *2.56* |
| *Build Up* | *20.15* | *46.56* |
| *Barren Land* | *3.67* | *2.8* |
| *Mango garden* | *5.14* | *2.56* |
| *Eucalyptus Plantation* | *5.51* | *2.55* |
| *Forest* | *7.24* | *5.94* |
| *Open Scrub* | *6.58* | *3.67* |
| *Plantation* | *10.56* | *4.87* |
| *Crop Land* | *30.8* | *23.56* |

## V. CONCLUSION

The various literature reviews were reviewed regarding the landuse/ landcoverapproach using RS & GIS. This chapter has focused on the results obtained from the various analysis carried out. The results from the study indicates the characteristics of the soil, drainage, nature of the rocks and landuselandcover map of the study area. Thematic maps can readily be created with a wide range of Geographical Information Systems and specialist software. In the present study, the relationship between urbanization and agriculture is examined remote sensing and GIS technologies are used to identify the thematic layers of soil, geology, drainage and landuse/ landcoverof the study area.

## VI. FUTURE SCOPE

Thematic maps inform about type, properties, spatial reference and distribution of a phenomenon. Thematic maps provide specific information and they provide general information about spatial patterns of the study area. This study can be implemented in accounting the thematic layers of geology, drainage, soil and lu/lcands their benefits for various purposes.

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