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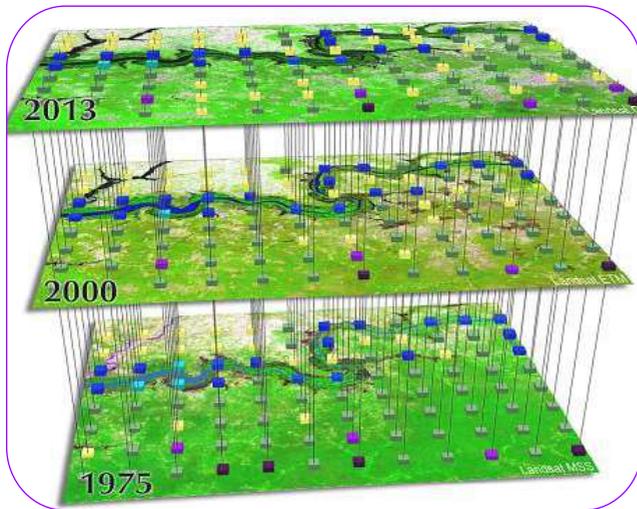
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APPLICATION OF GIS/REMOTE SENSING FOR URBAN LAND USE AND LAND COVER IDENTIFICATION-A CASE STUDY OF ROHTAK CITY



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ABSTRACT: -

Land use constitutes the basic element of city's physical space and reflects the form and nature of its internal arrangement. Land use of any city is the mirror of change and growth in city with time. The land use speaks the city's economic development and its cosmopolitan character. Land cover refers to the surface cover on the ground, whether vegetation, urban infrastructure, water, soil, etc. It designates the visible evidence of land use to include vegetative and non-vegetative features. Land cover emphasizes upon economic function that is essential to the concept of land use. The rapid change of urbanization combined with the explosive growth of population has made urban areas and their surroundings subjected to dynamic change. Because of this process, there is an increasing demand for urban land services. Everyone requires land to live or survive. The knowledge of the land use of urban areas is essential in understanding the general characteristics of cities. Existing land use arrangements determine the living, working, and behavioral aspects of people's lives, which have become very important aspects. To monitor all these changes in the physical landscape, there is a need to study the land use, especially in residential parts of urban areas. Geographical Information System (GIS): A computer-

based system for capturing, storing, analyzing, and displaying location (geographic) data. Remote sensing is the science and art of acquiring information about material objects, areas, or phenomena without coming into physical contact with the objects, areas, or phenomena under investigation. These tools are very helpful for identifying the land use and land cover and the changes of land use and cover over time.

In this paper, GIS and Remote Sensing techniques are used for identifying the land use and land cover and its changes over time for Rohtak City. Rohtak City is situated almost in the center of Rohtak District; it is located on 28° 54' North latitude and 76° 35' East longitude. The city gained district status in 1824 and the status of municipality in the year 1867. The dynamics of land use changes, like commercial, residential, industrial, and population changes over three decades, are identified using GIS/Remote Sensing techniques for the study area.

KEYWORDS: GIS/Remote Sensing, Land Cover Identification, basic element, city's economic development.

1.0 INTRODUCTION:

The term 'land use' has found its way into the language not only of geography, but also of other disciplines. Land use, in the simplest sense, denotes human intervention of the natural environment into the built environment to satisfy human needs such as

field's pastures and settlements. The urban land use refers to total area of the city lying at disposal for various kinds of development, planned or unplanned. The concept of urban land use deals with total covered space by built human settlements in general and by its various uses. Land cover designates the visible evidence of land use. It includes vegetative land and non-vegetative features such as man-made structure covering the earthen surface. Use of land is being controlled through land use planning regulations in order to avoid haphazard growth. There are several methods are available to identify the land use through land cover studies and classification of urban land use.

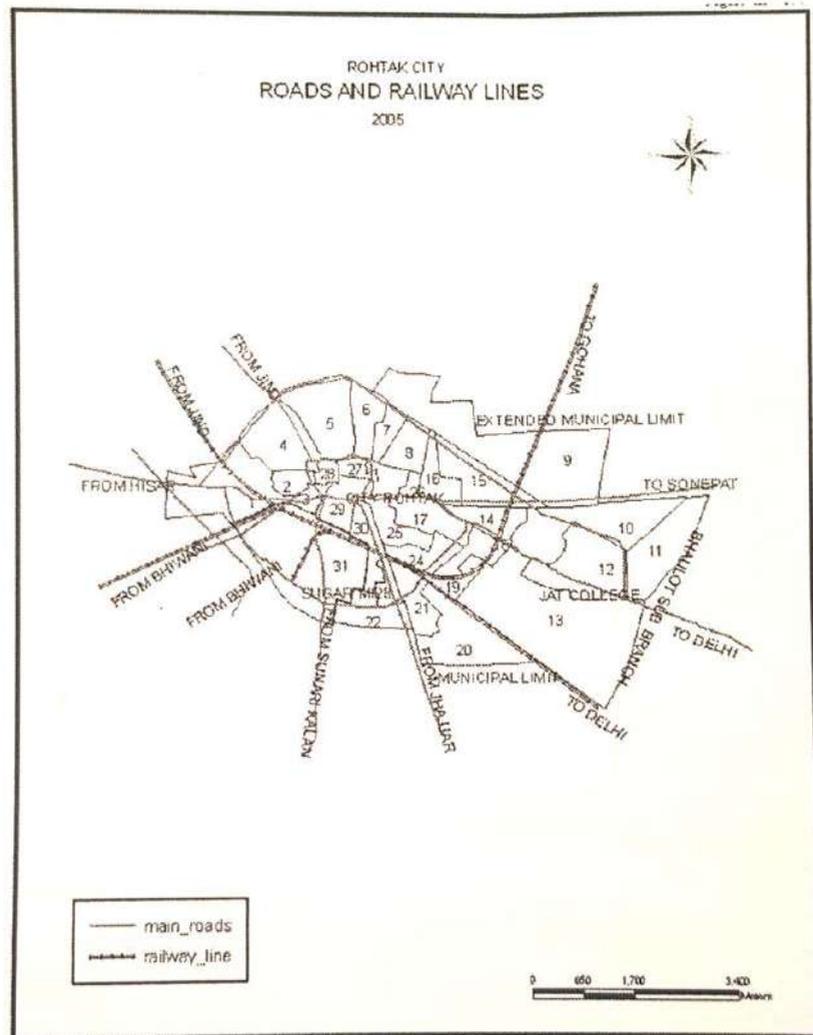
The land use and land cover studies in urban areas are mainly used to identify the physical growth and to relate socio-economic condition of human settlements. It is also useful to study the spatial differentiation in physical condition of the urban areas, its functional and morphological structure. In newly growing rural settlements it will be helpful in identification of the forces behind the changes of an urban pattern, urban fringe and sustainability of growth. In 1826 Von Thunen conceived the idea of a land use model in case of a rural and urban landscape around a city on an isotropic landscape. Chapin (1957) proposed a new dimension of urban land use analysis. He considered several aspects of human behaviors the product of particular land use. His concept is known as "Theory of Activity System" land use planning in urban area. It is basically concerned with the location 'intensity and amount of land development required for various uses of space, functioning of the urban facilities such as industry, business, housing, recreation, education, religious and cultural activities of the people. He categories urban land use into residential, retail, business, transport and communication, industries, wholesale and storage, public buildings open spaces, vacant or non-urban land use. World over several studies has been carryout to classify the land use and land cover pattern of urban areas. The recent trend in technology development in the field of spatial data capturing and analysis lead to use of geo-spatial technologies such as remote sensing, image processing, geo-spatial information system for classification of land use and land cover pattern.

2.0 OBJECTIVES

The study aimed to identify and classify various land use and land cover of an urban setting using remote sensing and GIS and it also relates the land use pattern with the population characteristics.

3.0 STUDY AREA

Rohtak city, headquarter of Rohtak district of Haryana state has been selected for the study. The city is located on 28 54' North latitude and 76 35' East longitudes. It is connected by broad gauge railway line and road network with Delhi and other regions of the country. The city is compressed of two parts, old and new differentiated on the basis of urban characteristics. The oldest part of the city coextensively spreads over the mound, the initial site of the occupancy. In the subsequent periods the city expanded in different directions and extents on the area adjacent to the mound. The new parts one located in this area, presently the city covers an area of six square miles. In the absence of striking physiographic boundaries the present site of the city is better defined in terms of man-made features. The city has been developed along roads and railway line and cutting through the agricultural lands of the adjoining villages. The largest expansion of the built-up area occurred during the British and Post Independence periods. During the British period, the civil lines and the administrative offices occupied with the construction of roads and railway line helped in the expansion on the southern and eastern side of the mound. In the post Independence period there was further expansion beyond the civil lines. The expansion is typical of the urban places of the states of Punjab and Haryana which experienced the influence of displaced persons originating in west Pakistan after the partition of the country in 1947.



4.0 METHODOLOGY

The methodology adopted for this study is as follows:

- ✦ Preparation of study area map using various sources of maps.
- ✦ Zoning of the study area.
- ✦ Identifications of land use and land cover.
- ✦ Study of population characteristics.
- ✦ Analysis and conclusion.

4.1 Map Preparation

The land use map of Rohtak city is prepared with the help of Google earth image and all the primary features relevant to study area are also identified. Second level information is captured with the help of Cartosat merged image, in which the built-up area land use such as residential, commercial, recreational, mixed, public and semi public services and industrial were identified and classified with the available information. Vegetation covered area comprises of group of trees and crop land are also captured. Within these broad groups several levels of classification has been attempted to study the land use pattern of Rohtak city. The Rohtak city Map shown in Figure 1.

4.2 Population characteristics

The study on population distribution and its growth in an urban area is significant as they also determine

the land use pattern. It also attributes the functional and morphological character of the city. The pattern of population distribution, density, growth and other functional attribution like working population are analyzed in detailed by taking ward as a unit. The population distribution of the city has been found to be very uneven. Density of the population is highest in the central part of the city and move from the central part of the city to the periphery the density of population shows a decreasing pattern. Most of the population of Rohtak city is engaged in tertiary activity. Table 1 gives the details of population characteristics. The growth of population during 1991-2001 was 32.71 percent per annum. The total work participation rate of city in 2001 is 29.47 percent and 85.79 percent are engaged in tertiary activity. The characteristics of population are shown in figure 2 given in appendix.

Table 1 population characteristics of city (1961-2001)

Years	Total population	Area in sq.Km	Density	Decadal growth in %
1961	88,193	11.66	7,563	-
1971	1,24,755	11.66	10,69	41.46
1981	1,66,767	22.03	7,569	33.68
1991	2,16,096	28.38	7,614	29.58
2001	2,94,577	30.89	9508	32.70

Source: Statistical abstract of Haryana , Economic and statistical advisor, planning department Haryana

4.3 Pattern of land use

The existing arrangement of land-use is a product of past growth and activities and it varies in spatial and temporal aspects. The spatial pattern of land use has been quantified taking wards as the unit of analysis. The spatial pattern of land use is shown in table 2. An attempt has also been made to study the directional differences in the land cover landscape pattern during the urbanizing development. The spatial land use pattern for the city into four major land use/land cover pattern such as built up area, water bodies, vacant land and vegetation cover. Further the built up area has been further divided into six type of urban land use pattern.

Table 2: Spatial pattern of land use

Land use category	Area in sq.km.	% of total municipal area
(1)Built-up area	25.42	82.29
(a)Residential area	18.31	72.03
(b)Recreational area	1.08	4.25
(c)Commercial area	0.38	2.07
(d)Industrial area	0.09	0.35
(e)Mixed land use	0.34	1.37
(f)Area of public and Semi-public services	5.22	20.53
(2)Surface water bodies	0.13	0.42
(3)Vacant Land	1.46	4.73
(4)Vegetation cover	3.88	12.56
(a)Group of trees	3.74	96.39
(b)Crop land	0.14	3.61
Total Area	30.89	100

Built-up area is comprised of residential area, industrial area, mixed land use and public and semi public areas. Total built-up of Rohtak city is 25.42 sq.km of which represents 82.29 percent area of total municipal area. The proportion of residential area is 18.3 sq.km and it covers 72.03 percent of total municipal area. Mixed built-up area is comprised of Commercial and residential area, this type of land use is found in the central and southern part of city. Commercial area of Rohtak city is 3.08 sq.km of total built-up area out of which 2.07 percent area of municipal area. The Commercial area is comprised of whole sale and retail areas and storage structure. The railway road had the advantage of being more accessible to modern motorized traffic and could

offer a much larger space compared to the central part of the city. The industries spread an area of 0.09 sq.km and 0.35 percent of the total built-up area. Like most of the urban places in Punjab and Haryana, the Industrial development in Rohtak started only in the post Independence period, this city is not having compact industrial zone. It has been observed that the concentrations of industries are mainly on major roads.

An attempt has been made to show the area under public and semi public utilities and it has found that it covers 5.22 sq.km and this accounts 20.53 percent area of built up area. This city has inner as well as outer transportation facilities. Importance of educational function in a city is manifold in modern time. Generally the city serves as an educational centre for its areas of influence. The overall concentration of these services is found in the eastern part of the city. Recreational land use is comprised of parks, playgrounds and cinema houses. The area under recreational land use is 1.08 sq.km out of which is 4.25 percent area of the total municipal area of the city. There is an increase in the recreational land use and it has been prompted by an increase in the population of the city it might be due to government policy of providing these facilities in all the new planned areas. The details of land use details are shown in Figure 3.

4.4 Land cover details

In addition to land use pattern the land cover parameters such as surface water bodies, vacant land and vegetation cover of the city limit has been studied.

Surface water bodies: The water bodies which include water tanks and natural bodies of water, it covers 0.13 percent area of the total municipal area of the city. Shortage of drinking water has always been a problem in Rohtak city. Water is supplied to the city daily only four hours. There is no storm water draining in the town and its disposal in the rainy seasons poses quite problems.

Vacant land: patches of vacant land are almost exclusively located in the south and south east of the built up area. These patches cover an area of 1.46 sq.km and 4.73 percent area of vacant land is found in the south and south east part of the city, is due to the respectability of the area to flooding, isolated location, lack of sewerage and proximity to the industrial area. These factors have discouraged individual purchases from constructing houses.

Vegetation cover: The large proportion of vegetation land in a city is a unique feature of all Indian and Oriental cities. This is related to the physical Indian and oriental economy in which part of the urban labour force is engaged in the primary activities and to the growth of the city from a village. The uniqueness of this attribute of Indian cities is further emphasized in this case because Rohtak city, a first class and serving as a dormitory town to Delhi has a very high proportion of vegetation land. Vegetation land in Rohtak as in all Indian cities surrounds the built up area and will provide the area required for future expansion of the city. Vegetation land is comprised of group of trees and crop land. Total vegetation Covered area of Rohtak city is 3.88 sq.km and 12.56 percent of the Municipal area. Group of trees covered 3.74 sq.km and 0.14 of vegetated area. The details of land cover are shown in Figure 4.

5.0 CONCLUSION

- ✦ The analysis suggests that in each ward majority of an area is used for residential purpose. The city has 82 percent, total built-up area of is 25.42 sq.km and 72.03 percent of total municipal area, commercial land use area is 0.38 sq.km.
- ✦ Very few Industries are there in the city, the area devoted for this purpose within Municipal limit is restricted to 0.35 percent. Majority area of each ward is used for residential purposes. Residential land use is followed by vegetation cover which comprises of 12.6 percent of total city area. Vegetation Covered area include group of trees and crop land. Group of trees is highest found in Northern, Eastern and Southern part of the city.
- ✦ Crop land is found in the Northern and Southern part of the city. Further about 5 percent of total city land is vacant. Patches of vacant land are almost exclusively located in the South-east of the built-up area. Surface water bodies occupied 42 percent of total area of city. It is found in the Eastern part of the city.
- ✦ The city serves as a residential cum service centre because most of the population of the city is involved in

the tertiary activity and every ward has dominance in tertiary activity.

REFERENCES

- + Baker, et.al. (1979) "Land use/Land cover Mapping from Aerial Photographs" photo Grammatical Engineering and Remote Sensing 45;pp.661-668.
- + Census of India (1971, 81, 91, 2001) Series of Haryana-District Census Handbook Rohtak Director of Census Operation Haryana.
- + Chapin (1957), "Urban Land Use Planning" xiv, Harper and Brothers, New York.
- + Chander Jagdish, (1996) "Process and Patterns of Development of Related Urban Center in Haryana part of National Capital Region" unpublished thesis, pp.38-54.
- + Dikinsan, (1964) City Region and Regionalism: Knowledge and Kegan Paul, London pp.135-138.
- + Hooda, D. (1987) "Dynamic Changes in Urban Land Use-A case study of Rohtak city" (1971-1981) unpublished thesis, pp.14-28.
- + Meena, "Pattern of Landuse and land cover in Rohtak city:A study based on Remote sensing and GIS" Unpublished M.Phil thesis.
- + Singh h.h.(1960) "Urban Land Use of Jaunpur" National Geographical Journal of India,Vol 6,no.1-4,pp.115-123.

APPENDIX

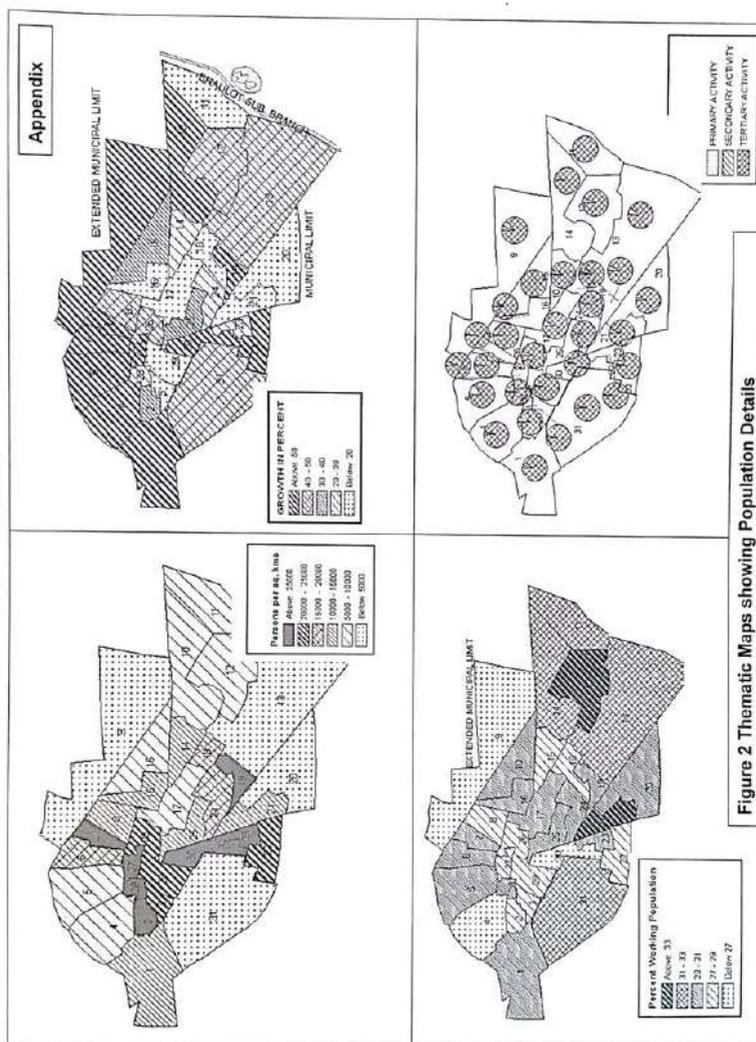


Figure 2 Thematic Maps showing Population Details

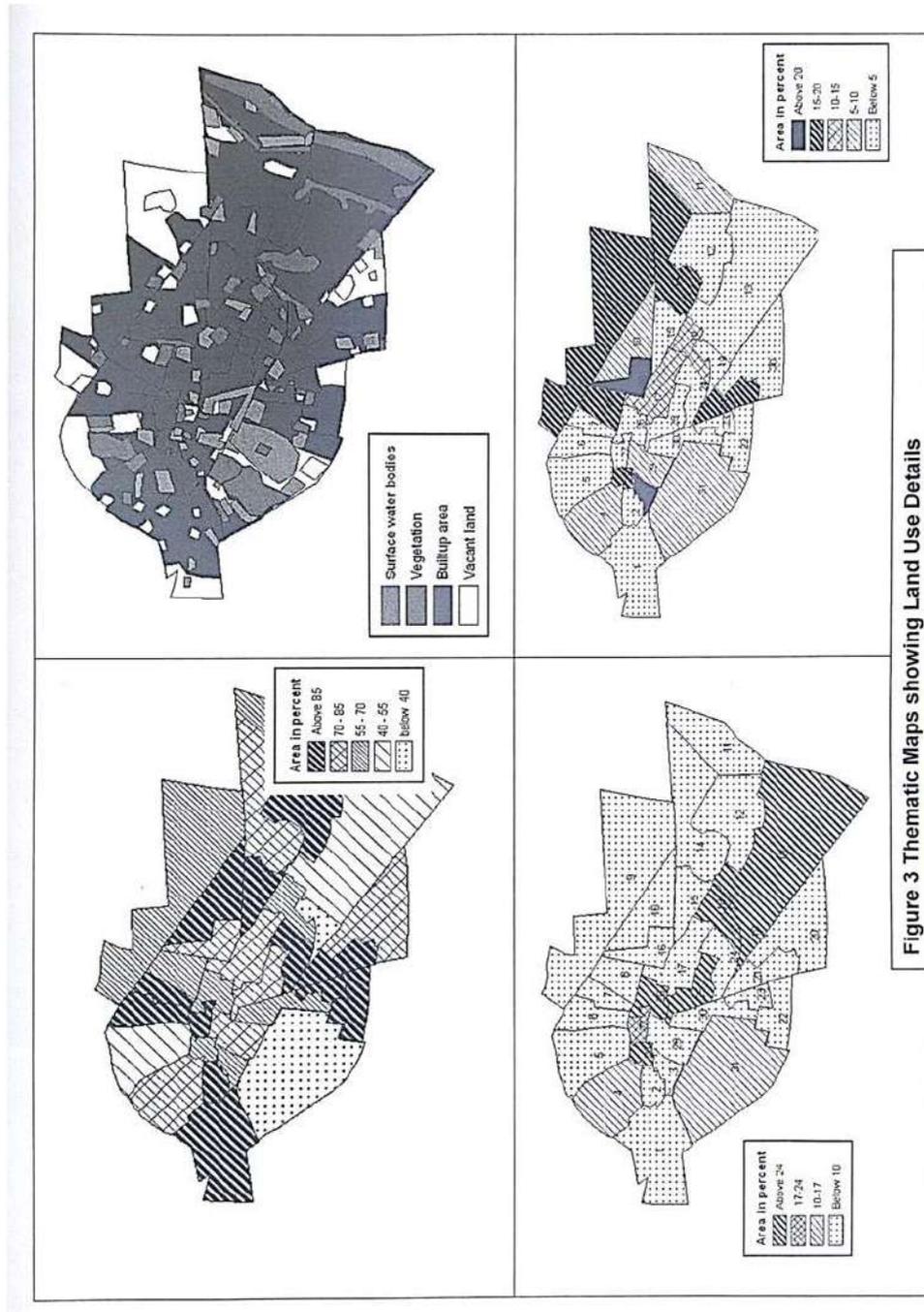


Figure 3 Thematic Maps showing Land Use Details

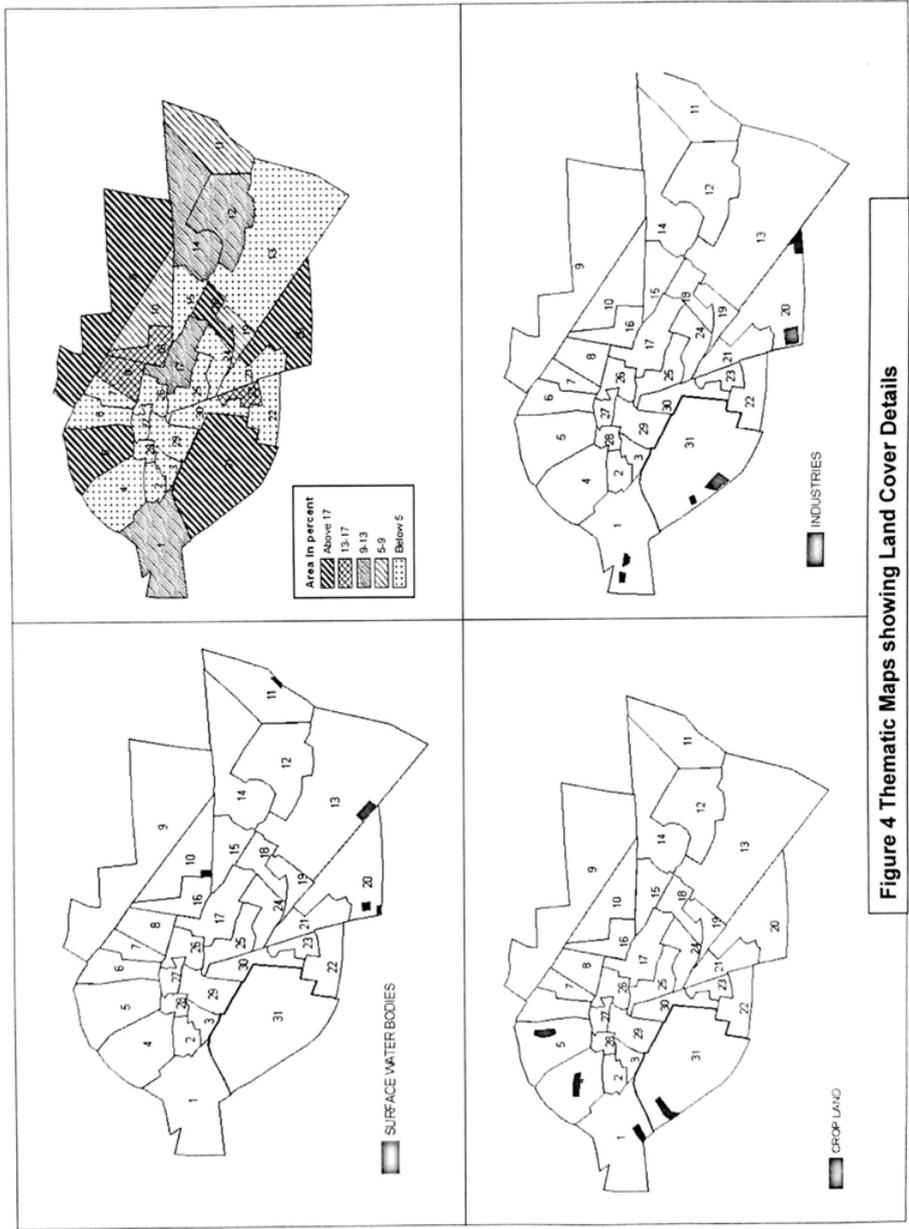


Figure 4 Thematic Maps showing Land Cover Details

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