

LANDUSE CHANGES DUE TO URBAN SPRAWL IN ALWAR CITY OF RAJASTHAN – A GEO-SPATIAL APPROACH

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ABSTRACT: *Urban sprawl in the United States has its origins in the flight to the suburbs that began in the 1950s. Sprawl is the spreading out of a city and its suburbs over more and more rural land at the periphery of an urban area. Urban sprawl refers to the extent of urbanization, which is a global phenomenon mainly driven by population growth and large scale migration. In developing countries like India, where the population is over one billion, one-sixth of the world's population, urban sprawl is taking its toll on the natural resources at an alarming pace. Urban planners require information related to the rate of growth, pattern and extent of sprawl to provide basic amenities such as water, sanitation, electricity, etc. In the absence of such information, most of the sprawl areas lack basic infrastructure facilities. Pattern and extent of sprawl could be modeled with the help of spatial and temporal data. GIS and remote sensing data along with collateral data help in analyzing the growth, pattern and extent of sprawl. With the spatial and temporal analyses along with modeling it was possible to identify the pattern of sprawl and subsequently predict the nature of future sprawl. The study also attempts to describe some of the landscape metrics required for quantifying sprawl. For understanding and modeling this dynamic phenomenon, prominent causative factors are considered. This is a comparative study .during this study used Indian Remote Sensing Satellite multi temporal (IRS)-LISS-III images of Alwar city were acquired for two Epochs; Both 2000 and 2008. The study area covers the city part of the Alwar district of Rajasthan. Total three categories of land use were identified in the study area which area Open Land, vegetation and Built-up Land. In Vegetation is 38.49%, Openland is 28.07%, Builtup land 33.43% and total area is 100%. And total area was covered In 2008 Vegetation is 21.067%, Openland is 25.07%, Builtup land 53.707% and total area is 100%.*

KEYWORDS: *Urban Sprawl, Remote sensing, IRS-P6 satellite, LISS-III.*

1. INTRODUCTION

Opinions are far from various on the concept of urban sprawl. However, in the present study urban sprawl has been considered as the areal extension of urban area over the adjacent rural area. It can be measured in term of acres of land or in terms of percentage, which are known as actual sprawl or percentage sprawl respectively. The percent sprawl refers to the percentage increase in the areal strength of the urban center over a period of time. Urbanized area stands for central city and its contiguously developed suburbs, as meticulously calculated by the Census Bureau. The growth of towns with time have been immemorial. Socrate and Plato in their study have pointed out “then we must make the city larger again,

for the health of the city is not enough now, it must be swollen and filled with people and things which are not in cities from necessity". This indicates that the city should take on to sprawling that too in planned manner.

There are few definition which are non-technical in nature but do convey the meaning of the word sprawl. According to the Oxford Dictionary, the word sprawl refers 'to spread out or stretch out (something) in a wide or straggling manner' while the Longman Dictionary of Contemporary English defines sprawl as: 'To stretch out awkwardly or to spread ungracefully, e.g. the city sprawls for miles in each direction'. Awkard and irregular spatial growth of a town or city mainly due to increase in population can be termed as urban sprawl. Hence, any area, which is under the jurisdiction of a municipality corporation, cantonment, or any notified town, which exceeds its administrative boundary and grows outward without any check, is considered to be a sprawl. The process and pattern, in which the increasing population occupies, will indicate the nature and type of sprawl. The infilling of vacant land within any area is an example of under-bound sprawl. Although there are many definitions of sprawl, a central component of most definitions and of most people's understanding of sprawl is given below: "Sprawl is the spreading out of a city and its suburbs over more and more rural land at the periphery of an urban area. This involves the conversion of open space (rural land) into built-up, developed land over time". Thus it may be inferred that the quality of sprawl doesn't affect the amount of sprawl. Generally, well-planned sprawl will result in fewer square kilometers of rural land being covered by urban development. The environmentalists are interested in the urban planning aspects of anti-sprawl work because they can reduce the amount of energy used and pollution produced by residents. And better-planned sprawl is likely to keep its residents happier and less likely to decide later to move even farther beyond the urban centre. Thus the amount of rural land lost to sprawl is the key issue from an environmentalist and agricultural perspective but the amount of rural land loss and urban expansion is also significant to the quality of life of urban dwellers. The larger an urban area, the more difficult it will be for the average resident to reach the open spaces beyond the urban perimeter; the increase in urban distances can also affect commuting time, mobility and a resident's feeling of being "trapped". Both the urban planning and environmentalist approaches to sprawl are valid ones for achieving something differing although not necessarily competing goals. During the 1970's, discussion on sprawl began to subside as other issues took centre stage. However, thinking at that time still focused on the use of land. Tyagi (1982) in his book demonstrated rural-urban interaction and impact of urbanization upon the physical, occupation and social structure. Rao (1970) mentioned that expansion of Bhilai industrial town uprooted few rural villages and the land of many others was acquired for the future growth of the town. Bose (1973) analyzed the problem created by rapid urbanization. Ramachandran and Shrivastava (1974) in their article, 'The Rural- urban fringe' defined " it as an area of mixed rural and urban population and land use which begins at a point where agricultural land use appears near the city and extends up to the point where some persons at least from the village community commute to the city daily for work or other purposes. Ottensmann's (1977) defined sprawl as "the scattering of new development on isolated tracts, separated from other areas by vacant land". Husain. and Siddiqi, (1979), in their article on Urban Encroachment on rural land : A case study of Modinagar used the urban encroachment as a process of acquisition and occupation of lands for the expansion of urban activities/ functions.

1.2 OBJECTIVES

1. To identify the process of sprawl (2000-2008)
2. To analyse the relationship between urban sprawl and emerging land use pattern in Alwar city

2. STUDY AREA:

Location and extent

Alwar district is situated in the north-eastern part of Rajasthan and extends between north latitude 27°03' to 28°14' and east longitude 76°07' to 77°13'. It has an average elevation of 271 metres (889 feet). It covers an area of 8380 sq km and is covered in the Survey of India toposheets No. 54A, 54E & 53D. Its length from south to north is about 137 kms and width is about 110 kms from east to west. The study area is located on 76 degree 36'' East longitude and 27 degree 34'' North latitude at 268 meters above the mean sea level. It is bounded on the north and north-east by Gurgaon district of Haryana and Bharatpur districts of Rajasthan, on the north-west by Mohindargarh district of Haryana, on the south-west by Jaipur and on the south by Dausa and Jaipur districts. This district with the present area occupies about 2.45% of the total area of the state. The region is characterized by topography of more or less flat-topped hills, which become predominant and precipitous in the southwestern parts of the district forming the north continuation of the main Aravalli Ranges. The most conspicuous feature of the Alwar District is the Aravalli range. The ridges of rocky and precipitous hills for most part are parallel and are observable throughout the district.

3 . Database Requirement:

Various types of data have been used as per the requirement of the study. The sources of data collected can be put under the following categories:-

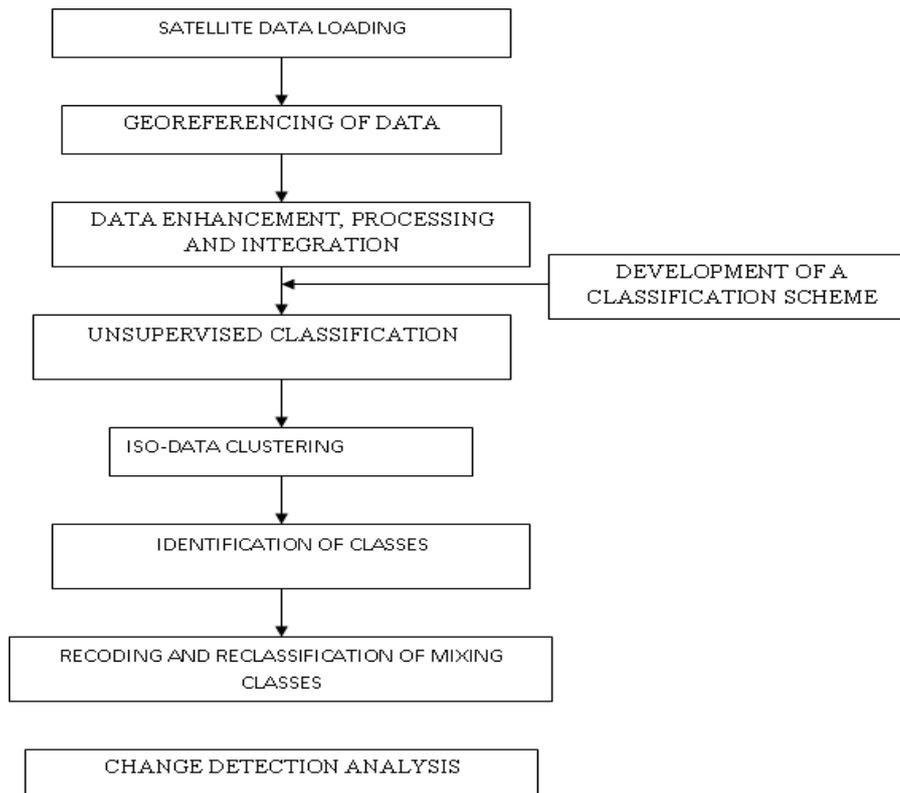
3.1 Remote sensing data

For the study, Indian Remote Sensing Satellite multi temporal (IRS)-LISS-III images of Alwar city were acquired for two Epochs; Both 2000 and 2008 were obtained from National Remote Sensing Agency, Department of Space, and Government of India.

Table-1 Description of Satellite data used in digital analysis.

Sensor	SPECTRAL BANDS	GROUND RESOLUTION (M)	SWATH (KM)
IRS-1C LISS III	0.52-0.59	23 (VNIR)	140
	0.62-0.68	70 (MIR)	
	0.77-0.86		
	1.55-1.70		

Chart 1: Flow Chart of methodology used



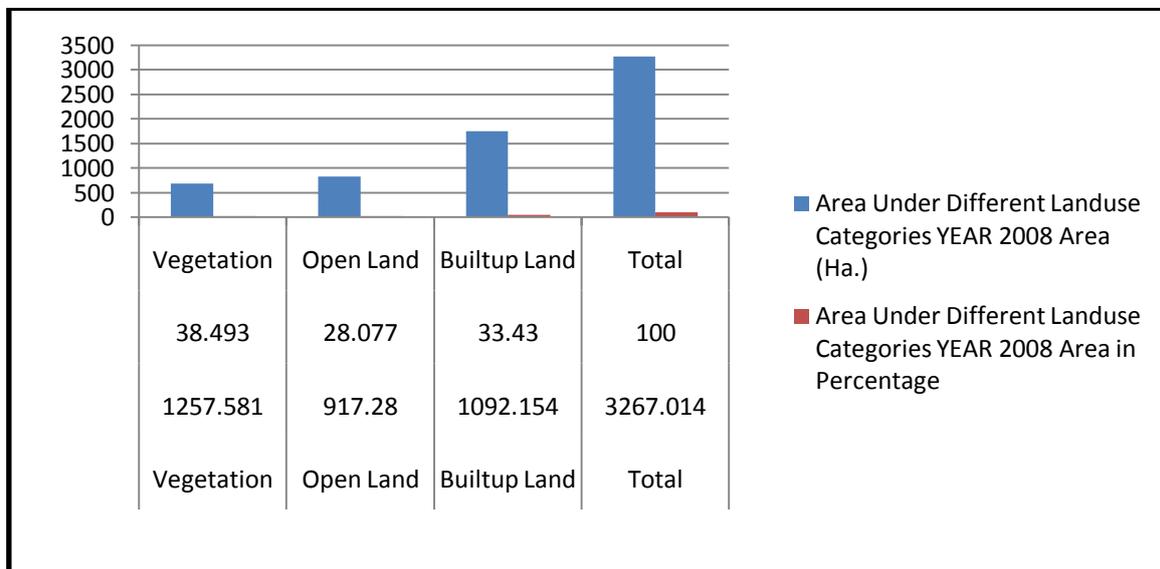
4. RESULT AND DISSCUSION

The study area covers the city part of the Alwar district of Rajasthan. Total three categories of land use were identified in the study area which area Open Land, vegetation and Built-up Land. The category wise description of the Land use categories and their areal extent is given below

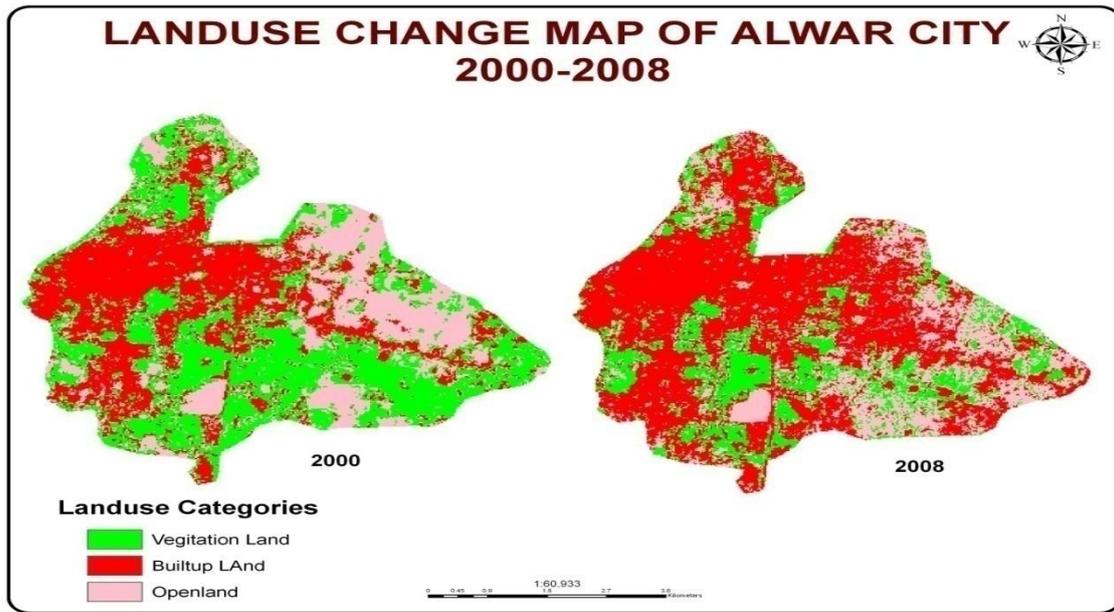
Table: 2 Areas under Different Land use Categories

YEAR 2000			YEAR 2008		
Categories	Area (Ha.)	Area in Percentage	Categories	Area (Ha.)	Area in Percentage
Vegetation	1257.581	38.493	Vegetation	688.262	21.067
Open Land	917.280	28.077	Open Land	824.141	25.226
Builtup Land	1092.154	33.430	Builtup Land	1754.611	53.707
Total	3267.014	100.000	Total	3267.014	100.000

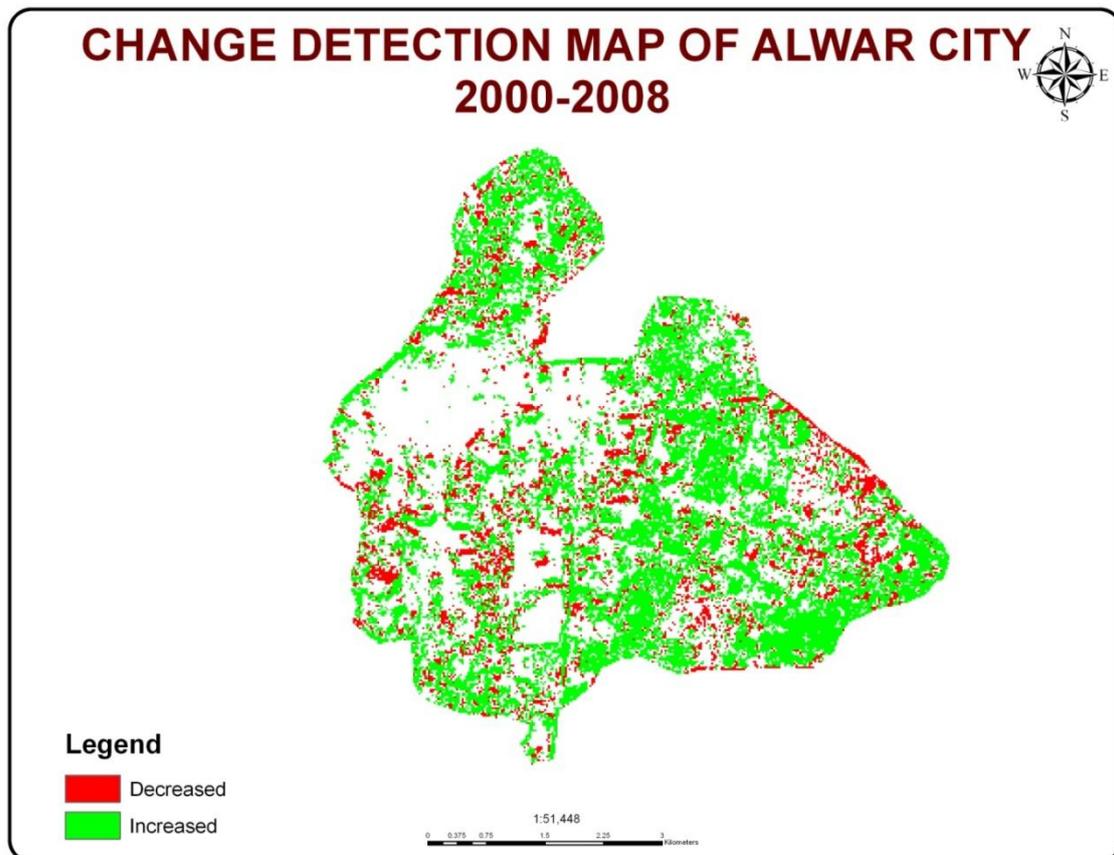
Fig: 1 Areas under Different Land use Categories



Map: 1 Land use map of Alwar City of 2000 & 2008 derived from Remote Sensing Data



Map: 2 Change Detection Map of Alwar city derived from Remote Sensing Data



5. CONCLUSION AND SUGGESTIONS

- In the course of urban spread, valuable land is being converted for building, industry, transport facilities etc.
 - Land being inadequate, government may need to develop policies to maintain it for intensive cropping and encourage peri-urban agriculture.
 - An absence of any land use planning may lead to land degradation. Un-planned decisions may result into misery for large segment of the local population and destruction of valuable eco-system.
 - Techniques for the planning and management of land resources specifically integrated and holistic will check long term quality of the land for human use, their prevention or resolution of social conflicts related to land use, and the conversion of ecosystem.
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- Thus it is, essential to review the conventional planning methods and introduce innovative measures like geo- spatial technologies in this regard.

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