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Urban Encroachment on rural areas, NASHIK

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Abstract - *Encroachment can be broadly defined as urban growth which is inefficient and dispersed. Present work emphasizes on several critical land resources and their associated impact on the encroachments along with various indicators that examine the per capita consumption of land. Loss of vegetation cover, prime agricultural land, and increase in population density are some of the impacts of sprawl. Retrospective data from 1991 to 2011 of land use and land cover from digital database with population growth statistics of Nashik city are used in this study to measure Land Resource Impact indicators. After thorough analysis the study shows that during the above said period, Nashik city was expanding in cluster manner and led to urban encroachment.*

Key Words: Urban sprawl; urban impacts; Land use, land cover

1. INTRODUCTION

Urban encroachment is a phenomenon happening worldwide. In developed countries, urban growth covers about 3,000 sq. Km area of agricultural land every year. As a result of fast economic advancement and development, urban encroachment is scattering of new development, several dramatic changes has been witnessed recently in many developing countries on isolated tracks, separated from other areas by vacant land rapid urban development It is considered that, Urbanization is the most significant drivers of soil usage and land cover change in human history associated with the growth of populations and economic development. Due to non-stop process of urbanization of land covers in urban areas, tend to change more significantly over a short period of time than any other feature. Necessity of large scale urban expansion resulting into encroachment of surrounding natural land parcels such as agricultural fields, forest lands or wetlands

Urban encroachment is an inherently dynamic spatial phenomenon. A number of recent researches have attempted to develop a means of characterizing encroachment by measuring particular spatial characteristics associated to encroachment along with comparison between metropolitan areas.

This works has served to provide fresh ground in characterizing a challenging and elusive concept. However, from both practical and research management view point, there is a need to understand the spatial and temporal patterns of urban land use change, especially in dynamic suburban and exurban areas. To be with these changes, agencies from all levels of government and private companies spend millions of dollars per year by obtaining aerial photography and other forms of remotely sensed data to extract detailed, up-to-date information about urban or suburban infrastructure.

There is often a lack of consistently interpreted, appropriately detailed land use/land cover change (LU/LCC) data at sufficient time intervals to characterise and monitor urban growth over wider geographical extents, i.e., Larger than a county

Building of Impact indicators were for identifying the impact of new urban development in specific critical land resources, including: (1) efficiency of land usage (i.e. Density); (2) prime farmland; (3vegetation cover.4). Land use and cover

In the present study, the emphasis is given mapping of urban encroachment and land transformation process caused due to urban encroachment keeping the main objective of using remote sensing technology and Geographical information system tools.

2. METHODOLOGY

2.1 Study area:

Nashik city is located between 20°02'00'' North latitude and 73°50'00'' East Longitude at North western part of the Maharashtra State, at 529.5 meters above sea level. Nashik city covers area of 259.10 sq.km. Nashik city lies in Maharashtra, India. It is situated in northwest of Maharashtra, nearly 180 km from Mumbai and 206 km from Pune. Nashik city is the administrative headquarters of North Maharashtra and also knows as "Wine Capital of India". Nashik NMC area is situated on the banks of the river Godavari. Nashik is claimed to be the 13th fastest growing city of Maharashtra

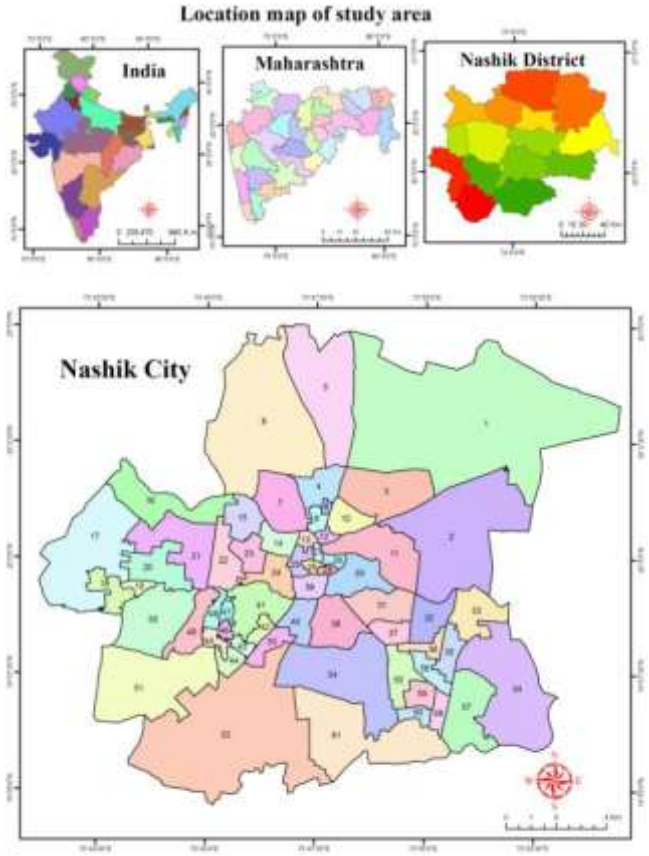

Figure -1: Location Map of Study Area

2.2Methods:

The following methods were used to achieve the objective of present research:-

Step I: Primary data was collected by extensive literature survey of the topic of investigation. Published literature, reports were collected from various libraries, institutions and from various departments of government etc. Moreover, some literature will also be collected from reference books, bulletins, reviews etc.

Step II: The information of land use and land cover pattern, drainage network, roads and railways network and administrative boundaries was collected by using toposheets of Nashik city. The digitization was done by using editor tool of ARC GIS software for different feature class14.

Step III: Normalized difference vegetation index (NDVI) methods were used to check vegetation cover by using satellite images. The NDVI was calculated in ERDAS Imaging, an image processing software. The NDVI map and temporal changes of in the study area was also determined by using same software15.

3 RESULTS AND DISCUSSION

3.1 Density of Urbanization

Density is one of the most important factors for the densely populated cities such as Nashik city. The density index provides information about quantity of land consumption for new urban development. In the present work population, computations of changes occurred by comparing the difference in population between 1991 and 2011. The population density of different administrative wards was determined by tabulating the built-up area and increase in population for 1991 to 2011. In 1991, the population density of Nashik city was 2535 per sq. Km. which was increased up to 5735 per sq. Km. in 2011.

3.2 Loss of Prime Agricultural Land:

The increase in population may encroach the prime agricultural land surround to the city. The agricultural land loss and increase in built up area was represented in the form of LULC map of 1991 and 2011. For the year 1991 and 2011, the disturbance in agricultural land was calculated by using classified satellite images of Nashik. In 1991 the built up areas was only spread over 18.36 sq. Km. Area. But it increased up to 98.63 sq. Km in 2011. The generation of per capita metric was done by normalizing the amount of prime farmland loss by the simultaneous growth in population and built up area.

3.3 Loss of vegetation cover:

The NDVI of Nashik city was represented in the NDVI images of 1991 and 2011 of Nashik city in the NDVI map. Too much loss was occurred in vegetation cover in last 20 years. In 2011 vegetation cover loss was only because of increase in built-up area in the form of settlement, industrial and commercial areas.

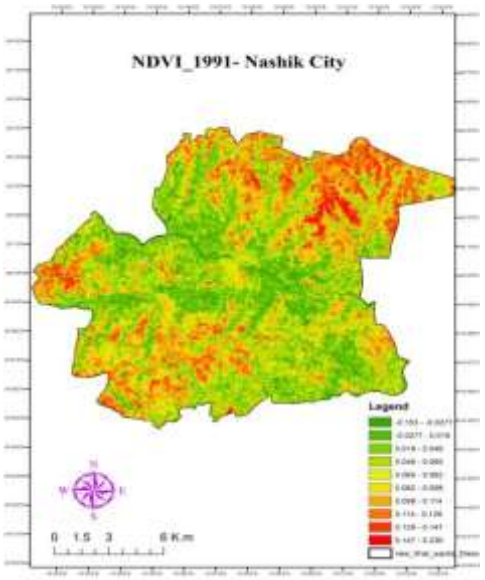

Figure -2: NDVI-1991 Nashik City

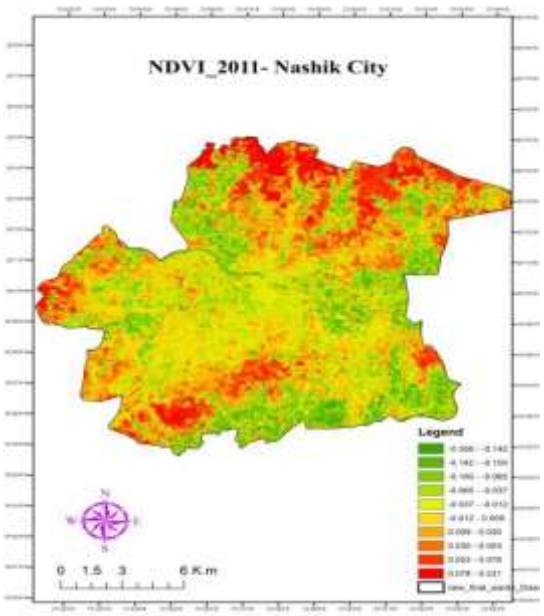

Figure -3: NDVI_2011- Nashik City

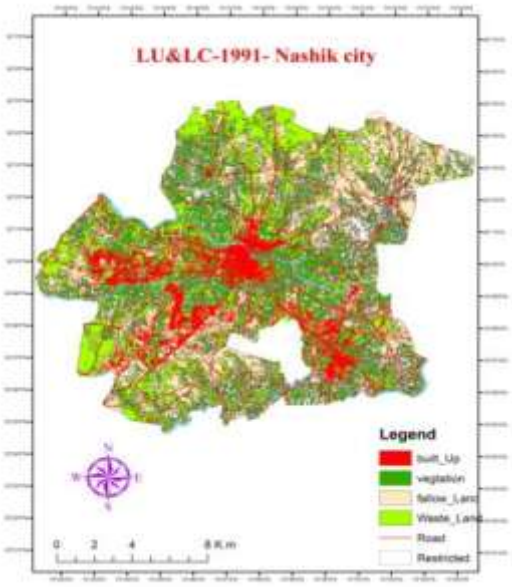

Figure -4: LU & IC-1991- Nashik

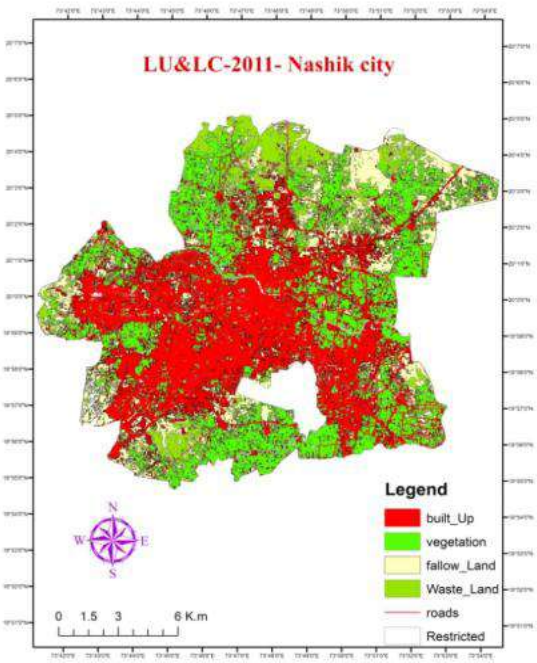

Figure -5: LU & IC-2011- Nashik

3.4 Land Use/land Cover change:

The digital classification of 1991 and 2011 satellite images determined the temporal changes in the LU/LC of Nashik city. A dataset of Nashik city original LU/LC 1991 , delineated and updated in 2011, and was enhanced in spatial accuracy through 'heads-up'on-screen digitizing and editing techniques. The 1991 and 2011 digital imagery of LISS-III data set with the spatial accuracy of 23.5 meter were digitally classified by using supervised classification technique. The level of accuracy exceeded than other computer-classified remote sensing-based datasets available for Nashik city and has a high degree of reliability for analyzing detailed land use/land cover change along the rural-urban fringe as the dataset was compiled by expert photo-interpretation

3.5 Land resource impact indicators:

Population of Nashik city was calculated from 1981, 1991, 2001 and 2011 census counts by simple linear interpolation for 1991 and 2011 to coincide with the dates of the LU/LCC dataset delineations16-17. The percentage and per capita urban growth, also changes in selected land resources was measured for the Nashik city to determine the impact of land resource indicators. The efforts were taken to examine the impact of new development on four specific critical and resources, including: efficiency of land usage (i.e.Density); prime farm land; loss of cover of vegetation; the individual land resource. These impact indicators provide very useful metrics to focus on individual resource impacts. Population losers divide into two camps: older urban/suburban area and rural area commutes. Population density in 1991 was 2535 per sq. Km. which increased up to 5735 per sq. Km. In two

decades, population density has increased double in Nashik east and Satpur administrative wards. In the land usage and land cover analysis in built –up areas is increased in twenty years, but fallow land, waste land and the vegetation cover was decreased. The road networks features and slum areas features along with water course were increased.

4. CONCLUSION

Along a city scale, Land Resource Impact indicators were calculated to identify localities that have experienced the highest impacting patterns of growth in relation to the selected critical land resources. Population density in 1991 is 2535 and to be increased in 2011 of 5735 density of population, which was increased in two folds in twenty years. The region like Satpur and Nashik east administrative wards was with very high density of population and low built-up area in 1991. But this built-up area was increased more in 2011 due to increase in population. NDVI and satellite imagery calculated the vegetation cover for the years 1991 and 2011. The NDVI results shows that, the prime agricultural land was reduced in these twenty years and there was increase in residential, industrial and commercial areas.

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