REVIEW OF RESEARCH

SPATIAL PATTERN ANALYSIS OF PUNE CITY URBAN GROWTH USING GIS AND RS

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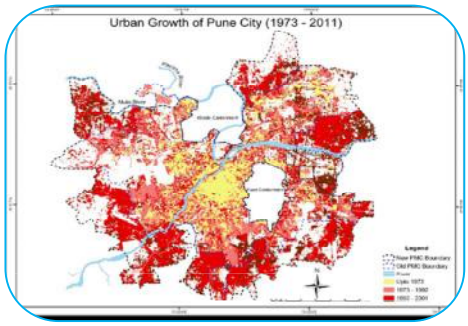


ABSTRACT:

It is a fact that urban growth is affecting on Environment. Because of urbanization we face a number of problems in the future also. So, we should give more attention on environmental awareness. The urban areas in the developing world are under constant pressure of a growing population. Indian cities have experienced an accelerated pace of growth since independence. Pune (Maharashtra) is one of the many cities in India, growing at a very quick pace. In the patronage of kings and rulers, it has taken a complex urban social organization over the long time. The urban center has gone through unusual changes from last 40 years in terms of economic, societal and physical shifts. Pune city situated on the 18^0 31' North latitude and 73^0 51' East longitude and cover an area of 243.96 sq.km. It holds a strategic place in the vales of the Mula and Mutha, which link up each other in the Pune city. An attempt is made to prepare a Development Plan in duration of three years on a Geographic Information System (GIS) platform, ensuring the connectivity and integration of core area with the rest of the city using spatial information obtained through remotely sensed data, city maps and Survey of India (SOI) topographical sheets. Pune is one of fast developing urban agglomerations in Asia and ranks eight at national level (Census 2001). It has grown quite haphazardly. The present growth is due to several elements such as industrialization, location of several Central and state Government establishments.

KEYWORDS: *GIS, RS, Growth, Change detection.*

INTRODUCTION

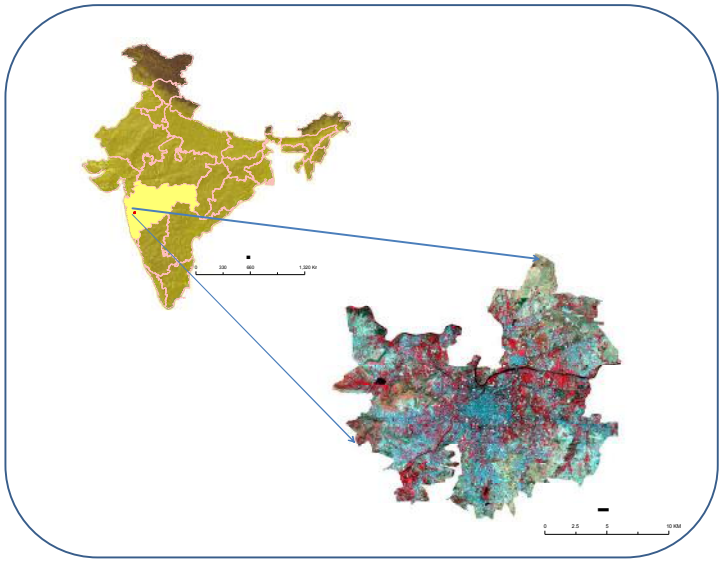
In Pune city total 177 census wards are there where, more than 600000 households and more than 3.2 million people (according to Pune Municipal Corporation 2006). Pune is one of fast developing urban agglomerations in Asia and ranks eight at national level (Census 2001). It has grown quite haphazardly. The present growth is due to several elements such as industrialization, location of several Central and state Government establishments.

Remote sensing and GIS are time and again proving that they are highly capable in urban studies particularly in urban management and preparation. With these modern tools it is quite possible to study the spatial form of urban growth over different time periods and it can be systematically mapped, monitored and accurately assessed from remotely sensed data along with conventional ground data. Pune is going through a high pace of population increase. Between 1976 and 1981, the population of Pune city grew by 16.7% and from 1981 to 1991 it rose by 30.2%. Between 1991 and 2001, the growth was more than two times, i.e., 62.17%, whereas the Pune district has the growth rate of 30.58% and the state experienced the growth rate of 22.5%. This indicates that the increasing population of Pune city exercise lot of pressure on available land in the urban center and city's limit had been pushed towards the next small towns.

STUDY AREA

Pune city situated on the 18^0 31' North latitude and 73^0 51' East longitude and cover an area of 243.96 sq.km. It has a strategic position in the valleys of Mula and Mutha, which join each other in the Pune city. In Pune city total 177 census wards are there were, more than 600000 homes and more than 3.2 million people (according to Pune Municipal Corporation 2006). Pune is one of fast developing urban agglomerations in Asia and ranks eight at national level (Census 2001).

It has grown quite haphazardly. The present growth is due to several elements such as industrialization, location of several Central and state Government establishments.



NEED OF THE STUDY

Usually researches use technique and satellite data to see the changes of the growth of a city. In the present work I have conducted the research with searching ground truth, with the help of extensive fieldwork. To see the change, occur in economic activities of Pune city in last 30 years and how Pune city transformed from the small hamlet with only 15 huts in 613 A.D. to 1.3 million in 1981 and in 2001 the population has reached 3.5 million. City dwellers economically transform from fisherman to IT professionals. How spatial change occurred in different phases of Pune city and surrounding area with the help if peoples' participation in the research.

DATABASE

1. Collateral data: temporal population data from the government agencies, cadastral data from land records department and topographical sheets from Survey of India in 1:25000 scale 47 F/14.
2. IRS – 1C/ID, LISS- III - For 1997 and recent one. Remote sensing data from National Remote Sensing Agency, Hyderabad.
3. Data related to Population of the city, workers' participation in different activities, Housing will be used from Census of India.
4. Random Sample Survey

METHODOLOGY

The digital remote sensing data were processed and go-referenced in Erdas software. Initially the toposheets were scanned and Geo-referenced and used as base for image registration. The Geo-referenced FCC image was further enhanced by using necessary enhancement techniques. After that visual interpretation of the image was done to identify the major land use classes. The enhanced image was classified on the basis of sample collected from different classes. Maximum likelihood classifier of

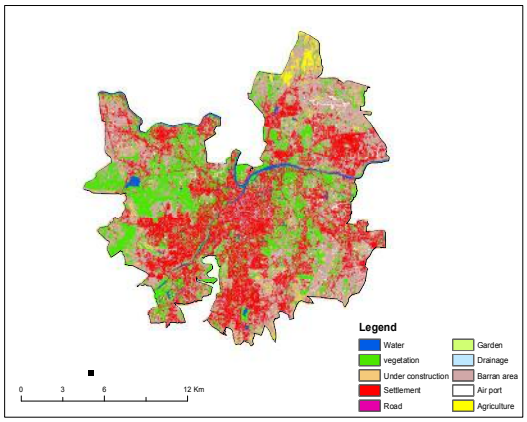
supervised classification in Erdas was used to classify the image into major classes and again, they emerged into two main classes as built-up and Non built-up area.

Hence, considering the built-up area as a potential and fairly accurate parameter of urban growth gives better knowledge for understanding the behavior of such growths. Therefore, the classified image and the merged toposheets were brought into an Arc View 3.2 environment and the toposheets and the area under built-up was calculated for further analysis.

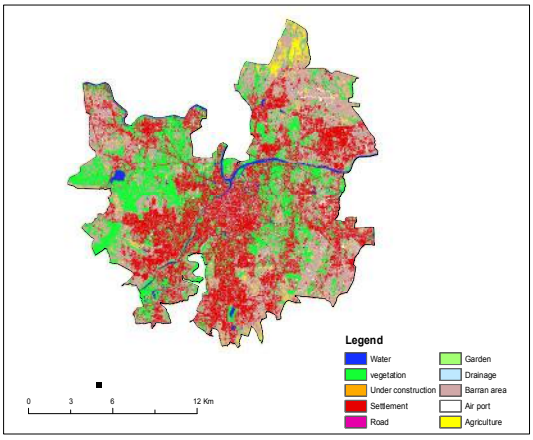
URBAN GROWTH ANALYSIS

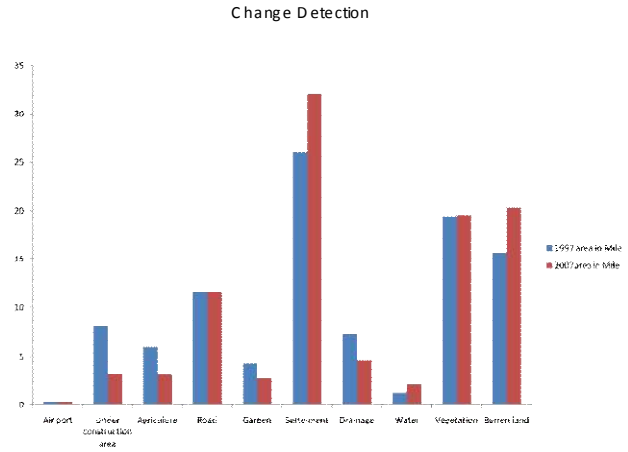
Urban growth over the period of 1970 to 2001, almost a period of three decades was determined by computing the area of all the settlements from the digitized toposheets and comparing it with the area obtained from the classified IRS ID image.

Classified Image of Pune City (1997)

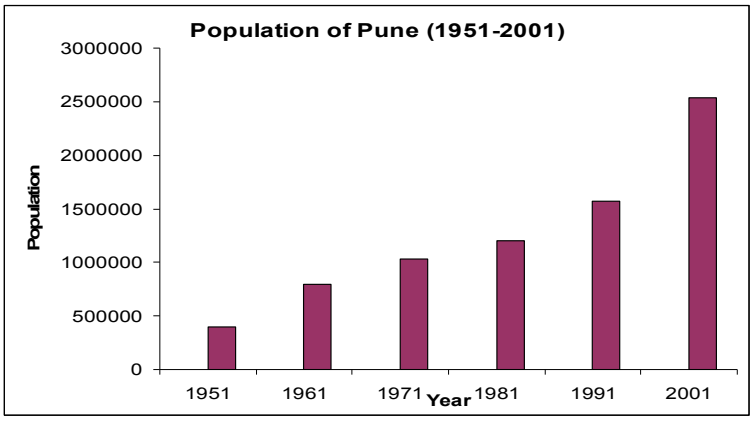


Classified Image of Pune City (2007)





Population of Pune



Between 1976 and 1981, the population of Pune city grew by 16.7%, and from 1981 to 1991 it rose by 30.2%. Between 1991 and 2001, the growth has doubled to 62.17%. In comparison, Pune district has a growth rate of 30.58%, while the nation is experiencing the growth rate of 22.5%. These tendencies are likely to remain in the hereafter. This proves that the larger urban agglomerations are getting overcrowded and fastest growing in a haphazard and unplanned way. Thus, it is necessary to evaluate the past and present development trends of these rapidly growing cities, for effective urban management and sustainable evolution.

RESULTS AND CONCLUSION

- Remote sensing and GIS are time and again proving that they are highly capable in urban studies particularly in urban management and preparation. With these modern tools it is quite possible to study the spatial form of urban growth over different time periods and it can be systematically mapped, monitored and accurately assessed from remotely sensed data along with conventional ground data.
- Pune, is having high rate of population increase. Between 1976 and 1981, the population of Pune city grew by 16.7% and from 1981 to 1991 it rose by 30.2%. Between 1991 and 2001, the growth was more than two times, i.e., 62.17%, whereas the Pune district has the growth rate of 30.58% and the state experienced the growth rate of 22.5%.
- This indicates that the increasing population of Pune city exercise lot of pressure on available land in the urban center and city's limit had been pushed towards the next small towns.

- This will indicate how much pressure has been given to the available state. Recently, 23 villages had been appended to the old municipal limit and the entire area of Pune city has increased from 145.92 sq.km. to 243.96 sq.km.
- The municipal corporation has also organized the development program for these villages. Our present work does not have any intention to examine the growth program of fringe village. Only to help the planners to identify the villages which have to be given more priority and where precisely the growth takes place and to understand the level and strength of such increase of better management.
- As the urban phenomena (residential, industrial, commercial, public and semipublic uses… etc.) have a uniform reflectance throughout the electromagnetic spectrum, it is not possible to identify delineate urban land use classes using digital analysis techniques as these techniques employ spectral characteristics of the objects for the classification.
- This survey indicates that the metropolis of Pune is experiencing a leapfrog pattern of urban growth due to the hills, and ribbon growth along the main roads.
- With the integration of remote sensing and GIS, it is easy to carry out in the study of Pune city and quite sure that the consequences will be definitely useful for implementing and overseeing the growth plan of Pune.

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