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## INTEGRATED TOWNSHIPS IN PUNE: A TEMPORAL STUDY USING REMOTE SENSING TECHNIQUES

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### ABSTRACT

The recent developments are in real estate in integrated townships having increased in the past couple of years. The term integrated townships are a residential area which has a balanced mix of residential and commercial spaces along with well-developed infrastructure and recreational amenities besides green and open spaces (T. Lalit Singh). Since these townships cover a sizeable area they are located usually in the outskirts of the city. These residential areas have achieved sustainable development due to the proper planning of resources. The growth of integrated residential townships and gated communities in Pune was during the last decade. There have been phenomenal rises in the residential development in Pune. Due to the requirement of the large work force in the services sector many high-rise buildings have emerged due to the demand. Many of the builders have constructed eco-friendly residential colonies. The integrated townships contributing to environmental sustainability, in their own dutiful rights to the countries they are situated in and others as well thus are reducing the carbon emissions. The features incorporated thereof, are peculiar to large scale urban habitat, A very interesting such tool that both India and UAE are adopting, to set in sustainability, is the creation of "cities within the cities", that is integrated townships (Pallavi Tak Rai). The fringe areas which usually have a zone of mixed land use and haphazard development are changing in the socio-economic conditions on account of these integrated townships. This paper attempts to explore the changes which have taken place in five of the integrated townships located in Pune city namely Nanded city, Magarpatta city, Blue-ridge, Oxford City and Down town township. The residential townships are mainly located along the eastern and western zone of Pune. These Residential Township are away from the city hub areas. They are established on the highways routes of Mumbai-Bangalore (NH45), Pune-Solapur (NH65). The growth of population and changes in the demography has an impact on the land use and land cover. The images of LANDSAT ETM+ and LANDSAT 8 spanning the years 1992, 2000, 2011 and 2015 have been used to study the changes. The study of the residential areas is of great relevance for the understanding of sustainable urban processes.

**KEYWORDS:** integrated Township, GIS, Remote Sensing.

### INTRODUCTION

With the rapid growth in the population there are limited spaces for the proper lay out of the residential areas in the cities. The new trends which have been introduced is the concept of integrated townships to occupy and to accommodate the population with better facility and services. Nowadays the introduction of integrated township or gated communities has been developed to a large extent in Pune. These townships are introduced to provide better living of standard and security for the people.

As Pune's population has been rapidly growing in the city the township is developed away from the city. Many of them are located near the IT parks to provide better accessibility. The higher incomes made it possible for the people to live in such gated communities. The rate of urbanization has risen from 28-31% in the decade from 2001 to 2011 and is expected to rise to 41% by the year 2030 (Mckinsey & Co. 2014)

Urbanization refers to the population of a nation living in urban areas, which is very comprehensive process. Urbanization as a process reveals itself through temporal, spatial and sectorial changes in the Demographic, social, economic, technological and environmental aspects of life in a region (Ramchandra duet all, 2004). Urbanization is an increasing proportion of a population living in urban areas. It symbolizes the migration of people from rural to urban areas or natural increase (the excess of births over deaths). The urban population in India increased from 62.4 million in the year 1951 to 377.1 million in 2011. According to 2011, Census of India, Pune district is the fifth urbanized district in Maharashtra state with an urban population of 60.99%, after Mumbai (100%), Mumbai Suburban (100%), Thane (76.92%) and Nagpur (68.3%). This increasing rate of urbanization is responsible for various environmental and social changes in the urban environment and its effects are strongly related to global change issues.

Work done on gated communities and integrated residential township in different parts of the world shows that places have unique characteristics of growth and development. Example: Pune is of the fastest growing metropolitan city with being the seventh largest metropolitan city. The population is 3.115 million in 2011.

The growth of population and changes in the demography has an impact on the land use and land cover due to which LANDSAT ETM+ and LANDSAT 8 images of 1992, 2000, 2011 and 2015 has been used to study the changes. Has studied the integrated township to sustainable cities as this city grow in the process of urbanisation it has build a concern for the environmental issues as such there are some township such as the Masdar City, Magarpatta City which has been developed to monitor these environmental issues for sustaining development. (Pallavi Tak Rai, 2012)

The study focuses the change occurred in the land use and land cover due to the emergence of the integrated residential township or gated communities in the eastern and western zone of Pune. Population from migration and endogenous growth of large cities and industrial location on their fringes are actually expanding the urban areas to from what has been labeled as Extended Metropolitan Regions (EMR) (Globalising Indian Cities-Special Reference to Pune, Sulochana Shekhar and Jaymala Didee 2009).

## AIMS AND OBJECTIVES

In order to study the hypothesis, the following aim and objectives have been considered. The aim of the study is to assess the change in land and land cover with time in the surrounding parts of the eastern and western part of Pune.

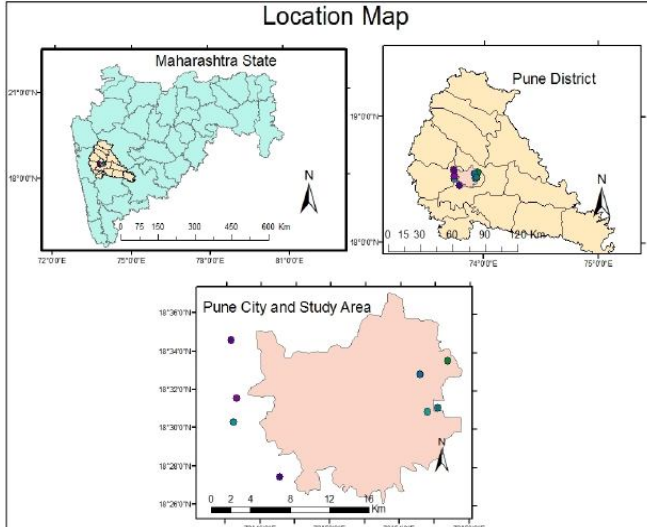
1. To classify the satellite image (LANDSAT 7 TM, ETM+ and LANDSAT 8) for the study area of 1992, 2000, 2011, 2015.
2. To evaluate the change in the LU/LC for these years using image processing techniques.
3. To analyze the impact of the integrated residential township/gated communities on surrounding areas using the primary surveyed data and their characteristics.

## STUDY AREA

This paper attempts to explore the changes which have taken place in five of the integrated townships located in Pune city namely Nanded city, Magarpatta city, Blueridge, Oxford City and Down town township. The residential town ships are mainly located along the eastern and western zone of Pune. These Residential Township are away from the city hub areas. The Townships areas are Hinjawadi, Lavale, Sinhagad Road, Hadapsar, Kharad, and Bhugaon. They are established on the highways routes of Mumbai-Bangalore (NH45), Pune-Solapur (NH65). Pune district is located between (17° 54' and 10° 24' North latitude and 73° 19' and 75° 10' East longitude). The district has geographical

area is 15.642 sq.km. Pune district is bound by Ahmednagar district on northeast, Solapur district on the south-east, Satara district on south, Raigad district on the west and Thane on the north-west. It is the second largest district in the state and covers 5.10% of the total geographical area of the state.

**Table 1: Location of Study Area**



Names	Latitude	Longitude
Blue ridge	18°30'18"	73°44'26"
Nanded City	18°27'28"	73°47'6"
Downtown	18°33'35"	73°56'43"
Oxford City	18°31'33"	73°44'37"
Magarpatta City	18°30'52"	73°55'44"

**Location Map (Source: Compiled by authors)**

**DATA AND METHODOLOGY**

Spatial distribution of land use and land cover information and changes in it is desirable for any planning, management and monitoring at local, regional and national levels (Dhorde Amit et al. 2012). This information not only provides a better understanding of land utilization aspects but also plays a vital role in development of any region. The conventional approach of identifying land use and land cover changes is costly, low accuracy and present picture of only small area (Jaiswal et al. 1999). Remote sensing because of its capability of synoptic viewing and repetitive coverage, provides useful information on land use/land cover dynamics (Sharma et al. 1989)

The change in land use and land cover for the time period 23 years was analyzed by using satellite images at around 10 year interval 1992, 2000, 2011 and 2015. The images were downloaded from internet. After scanning topographical map of study area were georeferenced using Arc GIS software.

The satellite images after downloading were used to plan the survey in the study area using FCC (false Color Composite) format. The villages in the study area were then surveyed and the ground control points for each class were then used for the generation of the training sites and using those classes, the supervised classification was performed and the classified output was derived.

**Table 2: Satellite Details**

Path/row and date	Satellite data
147/47, 12-02-1992	LANDSAT TM
147/47, 02-02-2000	LANDSAT ETM
147/47, 08-02-2011	LANDSAT ETM
147/47, 18-02-2015	LANDSAT 8

Source: Compiled by authors

Survey for the location was carried out using GPS (Global Positioning System) instrument. The GPS data was then used to identify the survey locations on the Toposheet and Satellite images. The Hinjewadi and Talwade IT Park was identified as the centre of the study and proximity circles were drawn using the Arc GIS software to identify the nearest villages on the basis of distance from the IT Park. The proximity circles having the distance of 3, 5, 7 and 9 km were used and the study area was identified for the further analysis.

The villages in the study area were surveyed and primary data was collected for eighteen villages with the help of the questionnaire method (20% sample collected for each village). The data then was compiled, tabulated and analysed for understanding the impact of IT Park and related activities on the socio-economic behaviour of the villagers. Few socio-economic parameters were selected and data was analysed.

## RESULT AND DISCUSSION

### **GROWTH OF INTEGRATED TOWNSHIP:**

The rapid growth of integrated townships developed during the post liberalization. The boom in the IT sector led to the growth in tertiary services and consequently the demand for housing increased. Since the year 2000 for a decade the city of Pune has experienced a growth in integrated townships in many parts of the city. In Pune there are many Real Estate Developers that has provided this integrated township facility for the people along the highways of eastern and western zone of Pune.

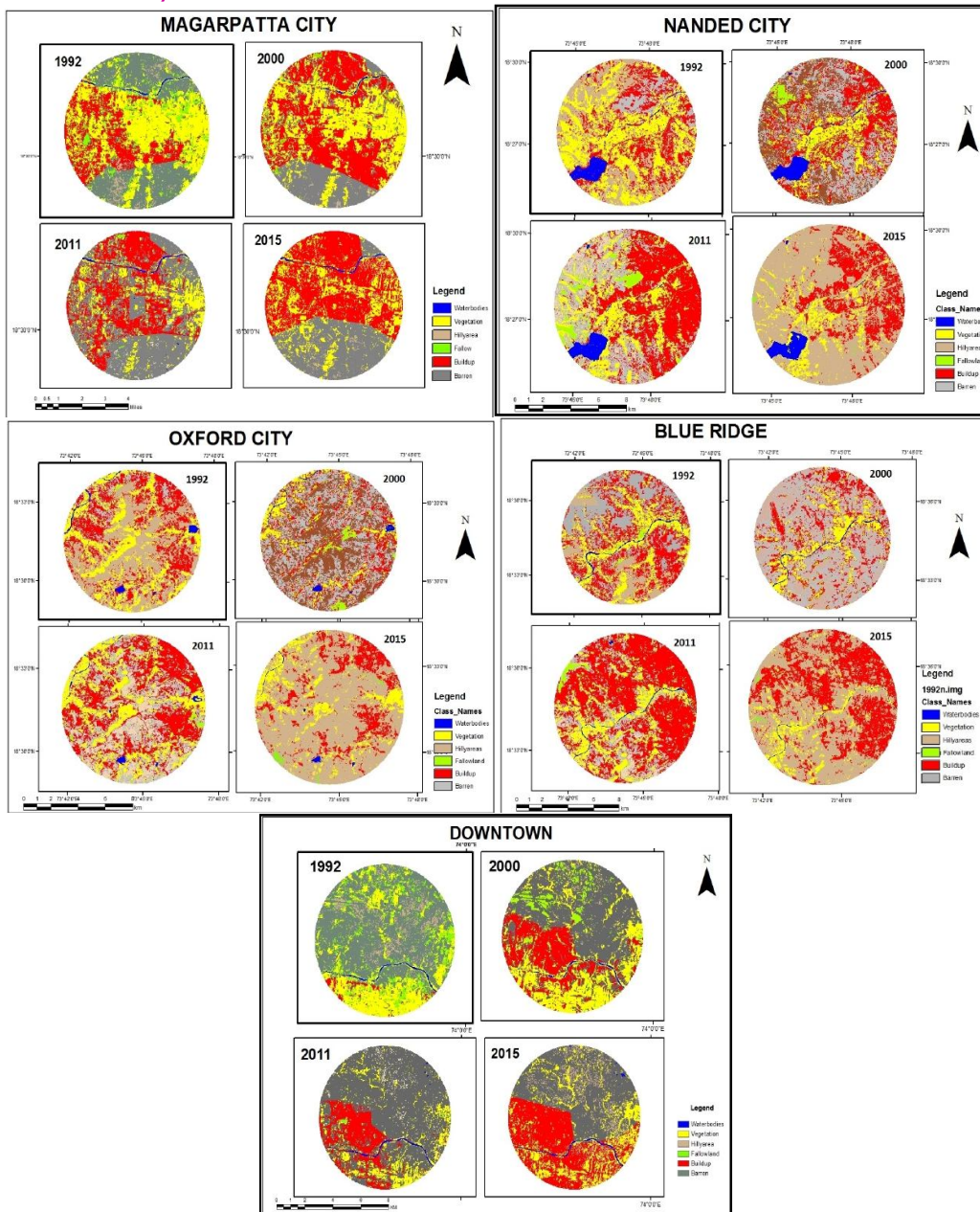
**Magarpatta City** Hadapsar which was established in 2000 in area about 430 acres which is surrounded by Commercial, Residential, Shopping Malls, and around 25 acres of Eco garden "Aditi Garden", they provide accommodation over 2000 residential apartments that provides facilities such as Hospitals, School, Banking and for recreational activity there are play ground, gymkhana. IT is surrounded by this township such as SEZ.

**Oxford City** by Oxford Groups which was established in 2006 covering an area more than 600 acres, it is a Residential, Commercial and Educational township. This township which is located in Lavale, Mulshi which provides services such as residential, school, hospital, resort, club house and it has its own oxford golf course which provide a great deal in the recreational sector. It was a green place before the establishment was set up. This township provides around 11602 flats to the population, where the residing population is mostly from different parts of Pune, NRI and pensioner people. This township is enclosed with educational institute Flame University.

**Nanded City:** This was established in 2007 and it covers an area of around 700 acres. The previous land use was before the establishment mainly agricultural and fruit farming activity. This integrated township offers about 7084 tenants, 40,000 flats and 3 prior 32 storeyed by Dec 2018 will be occupied. Within the residential area there are schools provided by the different enterprises Nanded City Public School, Pawar Public School. The populations are from Pune and various parts of Maharashtra. Amenities provided within the area are Clubhouse, Play ground; Recreational area and other services provided within are D-mart and other retailers. As the area is an Environmentally safe zone within the area there is a crop-cultivated area with Sugarcane and an area where green plants are being cultivated. Although like the others it does not offer any services within the city yet, but IT Park is under construction and which will be active soon.

**Blue Ridge** by Paranjpe Developers with an area of 138 acre was build up in 2007. This was established with a sole purpose of providing better services and facility to the people in their standard of living. It provides around 3000-4500 residential apartments along with school for children and provide Swimming area, Golf Course, Boating for recreational purposes. Facility of Banking Retail Shops and Shopping malls are also being set up. As being near to the IT Park there are mostly IT working people that has been accommodated in this township.

**CHANGE IN LAND USE/LAND COVER:**



LU/LC Classified Images of 1992, 2000, 2011, and 2015  
(Source: Compiled by authors)

It can be observed that land use in the eastern and western zone of Pune has undergone a significant change within a span of two decades. This may be mainly due to the establishment of IT Park and the integrated residential township or gated communities in these areas. The changes can be mainly observed through changes in built up and barren land. The change in the other land use is less 23%. The growth of integrated township demands an increase in the Built-up areas, which is reflected in the category of the Built-up areas. It can be seen that there is a phenomenon increase in the Built-up areas during 2000-2011. The percentage rise in both decades is 7 to 8%. However, the total has increased from 24-88%. Barren land, hilly grass land and vegetation areas have shown a decline. In the

decades from 1992-2000 the barren land has declined by 78-23%. The integrated townships of the eastern zone is much more developed than the western zone. Such as if we compare the decadal year wise it shows much changes in these zonal regions. Magarpatta City, it has shown growth in the built-up area from 2000- 2011 with about 3-7% and shown that the previous land use was totally covered by these IT Parks and Residential buildings.

Downtown, has been developed after 2005 and thus the influence of IT Parks near the surrounding has brought into its existence as the previous land was under barren land and fallow land as the establishment of new integrated townships had been developed which caused in the decrease of barren land.

Blue Ridge, it shows changes after between 2000-2011 where the built-up areas grew rapidly and the green areas or the vegetation areas has been covered up by other activities or buildings.

Nanded City, this area was under vegetation and fallow land after 2000 and 2015 it shows that the change in the built-up areas are increasing with the years go by.

Oxford City, this area was under barren land and mixed vegetation not much built up area as large section was under built up area.

## CONCLUSION

Prior to the development of the integrated residential townships, the region was covered by primary activity which as agricultural and agro based industries and green fallow land. Large area was under barren land. There have been changes in the land use and land cover. From 1992-2000 the percent of fallow and barren land use has decreased considerably for most of the study area. This is mainly on account of the need of land for construction of building such as IT Parks and Residential Townships. The built-up area has increased rapidly in most of the selected study areas as these areas is on the highways of Mumbai-Bangalore and Pune-Solapur. The IT Parks has increased growing on these lines of the highways because of this growth in the IT sector it has also bought establishment of residential townships which can be seen for the decadal year from 2000-2011. The neighboring areas has also shown a rise in the built-up area as a result of urbanization and the growth of secondary and tertiary activities due to the IT parks and the residential townships. Area under water has remained the same all through the decades. The barren land and hilly areas together shared about 45% out of which 20% is covered by built up area. The area under green area/agricultural or vegetation has declined for all the township areas after 2000. It can be observed that land use in the eastern and western zone of Pune and the selected study area has undergone a significant change within a span of two decades. This may be mainly due to rise in the establishment of Integrated Townships. The changes can be mainly observed through changes in built up, fallow land, barren land.

The land use and land cover changes have occurred due to the changes in the process of urbanization. These changes have occurred as a result of the IT Parks and the Integrated Residential Townships in the eastern and western zone of Pune. This mainly occurred on the urban fringe area of Pune. The new development in these regions led to the change in the scenario of the built-up areas in the regions of Pune. The method of Remote Sensing and GIS are useful in measuring the change of percentage of different land uses. The rise in the built-up area from 1992-2015 by 25% within a span of two decades has shown the level of urbanization in the study area whereas the other land use shows a decline in percentage due to the growth in the built up. Barren land has declined by 8% in the first decade. Fallow land has declined by 3-4% in the second decade. The built-up area in the last decade from 2000-2015 has shown the highest rapid growth in the development of the residential townships. Hence the growth of the integrated townships can be observed by the land use and land cover for the selected areas in Pune. The growth in the integrated townships during the last decades is phenomenon. Prior to the development of these townships the land use consisted of mainly of agricultural land, therefore there has been a major change in the residential in these land use areas. The study of the services and function in the integrated townships indicates a new kind of organized development in these regions. The fringe areas which had haphazard seem to be better organized due to these integrated townships. In terms of development Magarpatta have more facilities whereas the others

townships are still in the process of evolution. In future they will probably get developed due to the plans and proposals for the new facilities.

## REFERENCES

1. Amit Dhorde, Sayantan Dasand, Anargha Dhorde (2012): Evaluation of land use/ land cover changes in Mula-Mutha Watershed Pune Urban agglomeration Maharashtra, India, based on remote sensing Data. *Earth Science*, 5(III), 108-121. <http://earthscienceindia.info>
2. Desai et al. (2009). Application of remote sensing and geographic information system to study land use/land cover changes: a case study of Pune metropolis. *Advances in Computational Research*, 1(2), 10-13.
3. Emtiaj Hoque et al. (2013). Analyzing Urban sprawl using Geoinformatics: A case study of Pune. Institute of Environment Education & Research, Bharati Vidyapeeth University, p.2.
4. Jiaswal, R.K., Saxena, R. Mukherjee. (1999). Application of remote Sensing technology for Land use/Land cover analysis. *Photnirvachack: Journal of Indian Society of Remote Sensing*, 27, 123-127.
5. Magda Metwally & Sahar Soliman Abdalla. (2008). Impact of Gated Communities on the Urban Development of New Cities in Egypt.
6. Mckinsey and Co. (2014). Indian's Urban Awakening and Implication for Pune. Pune International Center, p.15.
7. Pune Municipal Corporation (2010). Comprehensive Mobility Plan for Pune City, Published by PMC, Chapter 3.
8. Rupali P Zope. (2013). The planning Strategies for urban land use pattern: A case study of Pune city. *International Journal of Innovative Research in Science, Engineering and Technology*, 2(7).
9. S.B Nalavade (2000). Changing Geography of Pune Urban Area. *Journal of Ecological Society*, 13/14:5-7.
10. Shekhar Sulochana. (2009). Globalizing Indian Cities - spatial reference to Pune Globalization: Issue and challenges for India, Department of Geography, Smt. Parvatibai Choughule college, Margo, Goa. pp.161-177.
11. Sudhira H.S. (2008). Unpublished PhD. thesis "Studies on urban sprawl and spatial planning support system for Bangalore", Centre for Sustainable Technologies and Department of Management Studies Indian Institute of Science Bangalore, p.2.
12. Tereza Kolarikova. (2010). Gated communities in Prague, Thesis No. 32, Department of Real Estate and Construction Management ,RoyalInstitute of Technology, Stockholm.
13. Tewari Vinod. (2011). Managing the Urban fringe of Indian Cities. Published by Rawat (Urban Fringe on Indian Cities) pp.16-23.
14. Uttam K. Roy (2005). Development of New Townships: A Catalyst inthe growth of rural fringes of Kolkata Metropolitan Area (KMA). The Annual Conference of HUDCO Chair 2005.