

Cover Page



## TREND AND LEVEL OF URBANIZATION IN PUNE DISTRICT USING GEOGRAPHICAL INFORMATION SYSTEMS (GIS) APPROACHES

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### Abstract

Urbanization is a process in which a large number of people move to cities to live permanently. Economic development or economic progress is considered to be the most important factor for this urbanization process. Due to this economic activity, a large number of people migrate to urban areas. Urbanization is a process of transformation from traditional rural society to modern industrial and urban society. This process is a long-term one. Urban population is an economically progressive and urbanization is an expansion of human habitation and is considered a process to move from urban centers to a greater one. In terms of urbanization in India, 11.4 per cent people lived in urban area in 1901 census period, 28.53 per cent in 2001 census period and 31.28 per cent in 2011 census and 34.47 per cent in 2019 year as well as India's urban growth rate is 2.07%. This research paper is based on the secondary data information. This data is taken from District Census of Pune from 1991 to 2011 census periods. The main objective of this research is geographical and analytical analysis of urbanization in Pune district.

**Key words:** Rate of Urbanization, Trend and Level of Urbanization, GIS Approaches, Urbanization.

### Introduction

The urbanization or urban life is the physical growth of urban area as a result of global change. The urbanization is closely linked to modernization industrialization and the sociological process of rationalization. Urbanization can describe a specific condition at which the set times that is the proportions of total population or area in cities or towns are the term can be described the increase of these proportions for times so the term urbanization can represent the level of urban relative to rural populations or it can represent the rate at which the Urban population is increasing. Urbanization occurs naturally from individual and cooperative effort to reduce time and expense in community and transpiration will improve the opportunities or job, education, housing and transportation. Living in the cities permits individual and families to take advantage of opportunities of proximity, diversity and Marketplace competition. People move into cities to seek economic opportunities a major contributing factor is known as rural flight. Rural area open on small families form palms it is difficult to improve standard of living behind basic sustenance. Therefore, people from rural areas come to urban areas for various businesses and employment, education etc. which helps in economic development of themselves and their families and helps in raising their standards of living <sup>[10]</sup>. 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 <sup>[11]</sup>. Rainfall is considered to be important for human settlement in areas where water is available <sup>[7,8,9]</sup>. In short, rainfall or water is one of the most important resources for economic development or for human beings <sup>[21,22]</sup>.

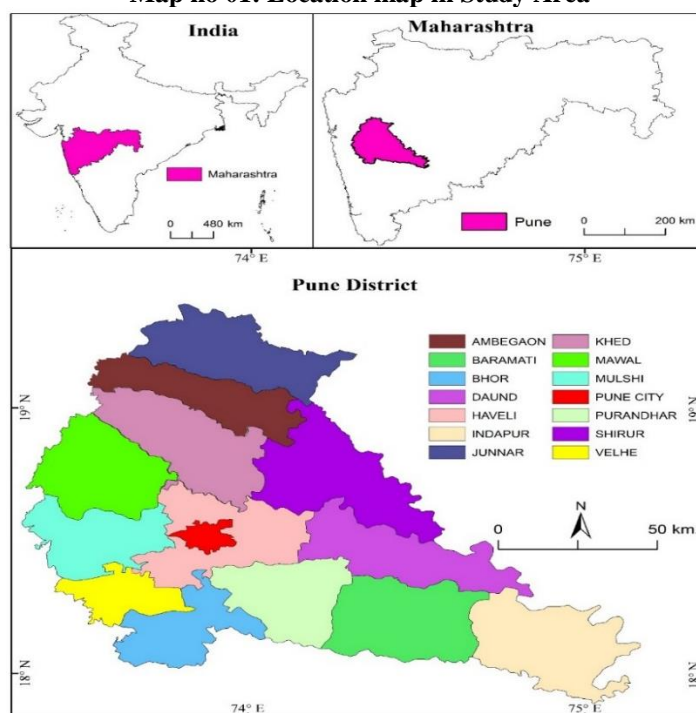
Human resources are a resource, through their technology and knowledge, are developing economically and building facilities in urban areas <sup>[15,16,17]</sup>. On the one hand, pollution is a major problem in urban areas. There are advantages as well as disadvantages of urbanization e.g., water problem in these urban areas rising land prices, lack of electricity, lack of water and pollution as well as social problems etc. Although there are various reasons for urbanization, this growing population is one of the main reasons why the rate of urbanization is higher in developing nations than in developed countries as the level of urbanization is higher in developed nations. Therefore, the level of urbanization is higher in developed countries but the rate of urbanization is faster in developing countries. Population growth has led to large-scale changes in land use and land cover, which has led to a decline in vegetation <sup>[5,6,14]</sup>. The process of becoming urban of complex process of change affecting both people and place main dimensions are a progressive concentration of people and activities in the town and city thereby increasing the general scale of urban settlement for change in the economy of a country or region nearby nonagricultural activities become the dominant change in the structural characteristics of populations for example low birth rate, higher death rates, for positive migration balance etc. spread of urban reason behind the buildup areas of towns and cities nearby indexing rural difficult times the transmission or diffusion of change economic social technological etc. down the urban hierarchy and into rural areas <sup>[18]</sup>. The key factors for economic inequality in any geographical region are the geographical, social and political factors. Economic inequality depends primarily on resources <sup>[4,7]</sup>. Although many factors are important for urbanization, transportation is considered to be an important factor as it increases connectivity, which in turn increases migration, which in turn leads to greater urbanization. Therefore, it has been decided to conduct a study for urbanization of Pune district. This study is geographical analytics. While conducting this study, trend and levels of urbanization have been calculated using census data.



## Study area

Pune district is unique in India in terms of socio-economic and education, It is also the second largest district in Maharashtra terms of area. The total geographical area of Pune district is 15642 sq. km, which is 5.10 percent of the state of Maharashtra. Pune district lies between latitudes 17° 54' N and 19° 24' N and longitudes between 73° 19' E and 75°10' E. As per 2011 census, Pune district has a total population of 94.29 lakhs which is 8.39 percent of the total population of Maharashtra. At the same time out of the total population in Pune district, 60.99% of the population lives in urban areas and 39.1% of the population lives in rural areas. There are a total of 14 talukas in Pune district, according to the 2011 census, the population density of Pune district is 603 per square kilometer and sex ratio is 915. Out of the total population in Pune district, SC population is 12.51%, ST population is 3.69% and total literacy rate is 86.15%, literacy rate is 80.98% in rural areas and 89.45% literacy rate in urban areas. According to 2011 census, Pune district has 1866 villages with 13 Panchayat Samities and 1407-gram Panchayats. It is located in the Deccan Plateau and is about 100 kms east from Konkan coast and at a distance of about 160 kms from Mumbai. It is located at the confluence of Mula-Mutha Rivers. It is bounded by hills on the western side. One can see the Sinhagad-Katraj hilly area to the south.

Map no 01: Location map in Study Area

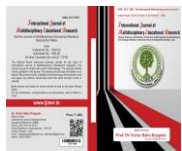


## Objective

The main objective of this research paper is to study the changes in urbanization in Pune district as well as the level of urbanization in this Pune district. At the same time, one of the objectives is to conduct a geographical study in the field of urbanization in the census year 1901 to 2011. In this research, qualitative maps have been prepared in different formats using GIS system and thus the level of urbanization in this study area has been studied.

## Database and Methodology

The data taken for this research paper is dependent on the secondary source of information. The data is taken from District Census Pune, the data is from 1901 to 2011 census. From this data, the trend and level of urbanization according to the tehsils of Pune district has been calculated, the level to be calculated are drawn in percentages. In order to calculate this level, four groups have been formed, these population concentrations low level concentration (less than 25 %) medium constipation (25.1 to 50 %) and high urban level or concentration (50.1 to 75.00 %) and very high urban level or concentration (more than 75.1%) have been prepared. The GIS method has been used to calculate the level of this urbanization with this system way has produced various maps. As well as bar graph and line graph have been drawn. GIS methods have been used to draw maps of urbanization in Pune district.



Cover Page

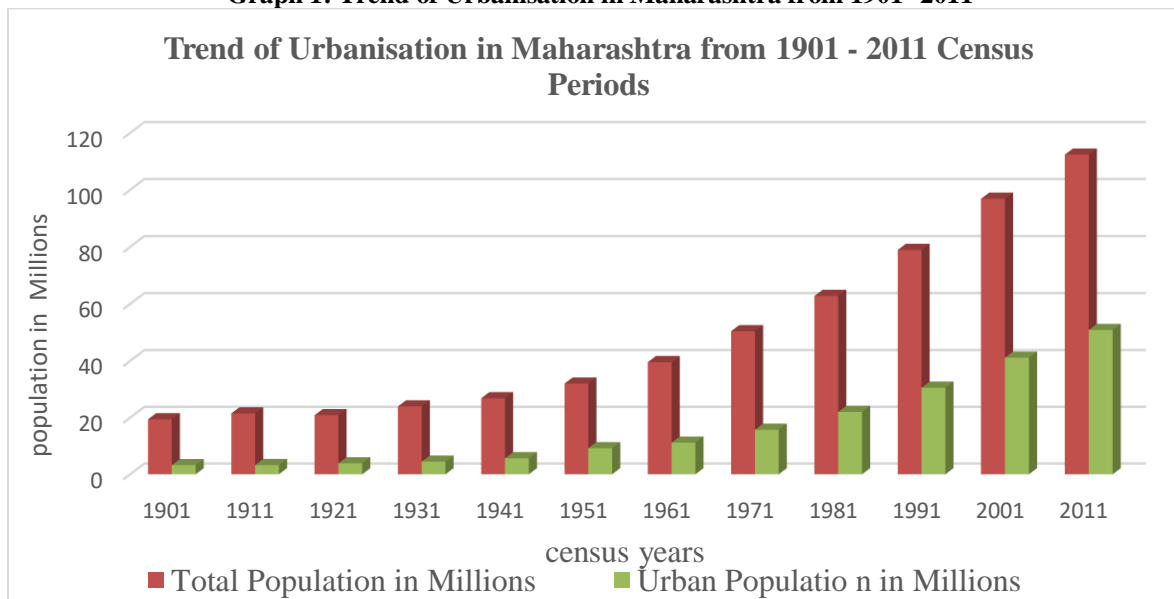
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## Result and Discussion

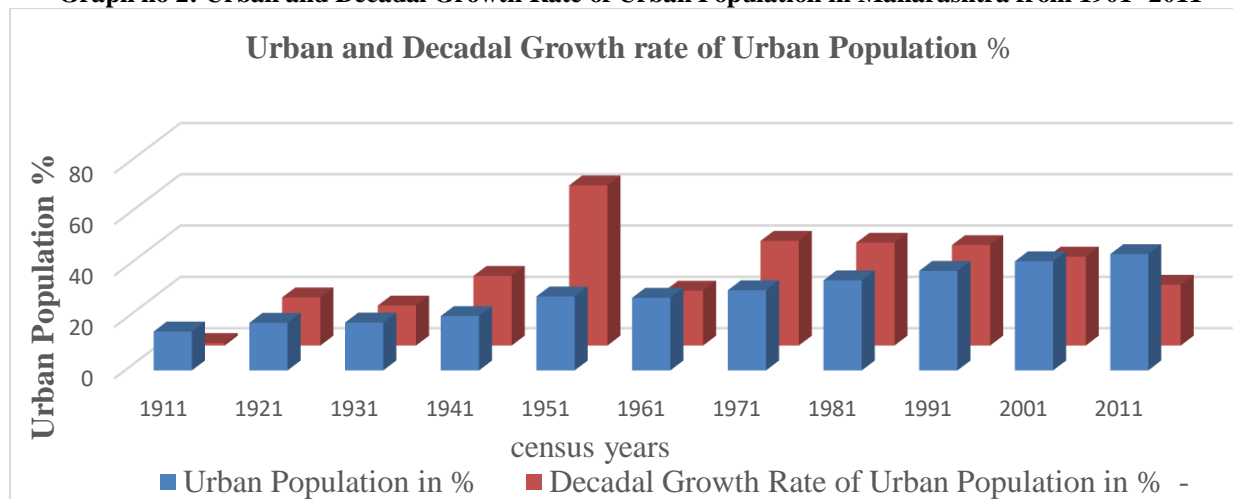
Graph number 01 shows the total population of the state of Maharashtra as well as the urban population of the state of Maharashtra. This population is also shown between 1901 to 2011 census. Maharashtra has the highest total population in 2011 census year. The lowest population is 1901 census year. This shows that the population in Maharashtra is increasing at a constant rate, in a nutshell, this shows that the birth rate in Maharashtra is because of the two factors that mainly affect the population growth are birth rate and mortality rate. It means that every census year in the state of Maharashtra increases the birth rate. Although it has an economic, socio-political impact on urbanization, transport is an important factor Affects urbanization lot of economic development in places where transportation has developed <sup>[12,13]</sup>. At the same time, migration is a factor that affects population growth. Despite being a leader in population growth, Maharashtra has a total population of 1921 census year has been a negative change in population growth. In short, the population was 21.47 million population in 1911 census year, and in 1981 it was 20.85 million population, and in other census years, there has been a positive change. The main reason behind the negative population in 1921 was the various diseases that fell this year. Group No. 2 shows the urban population of the State of Maharashtra as well as the Urban Growth Rate of the State of Maharashtra from 1901 to 2011 census year. Its urban population and growth rate are expressed in percentages. The graph shows that Maharashtra State Urban Population is on the rise but the highest population is 45.23 percent in 2011 census and the lowest urban population is 1911 census which is 15.13 percent of the total population. At the same time, you see the highest annual urban population growth in 1951 census year about 62.42 %, followed by urban growth in 1971 census year about 40.74% and the lowest population growth in 1911 census year 0.99 %. In short, in the state of Maharashtra, both population growth and urbanization are increasing. In this state, Mumbai is the number one urbanization in the country. Also in these states Nagpur, Pune, Nashik and Aurangabad are major centers of urbanization. However, the urban population in the state of Maharashtra was 42.40 percent in 2001 census year and 45.23% in 2011 census year. The urban population in Maharashtra declined in 2011 to 2011 census year. The annual growth rate is declining along with the urban population. In 2001 census year, the urban population in Maharashtra was 34.57 percent, while in 2011 it was 23.67 percent. In short, the annual population growth in 2011 census year is in negative form.

Graph 1: Trend of Urbanisation in Maharashtra from 1901 -2011





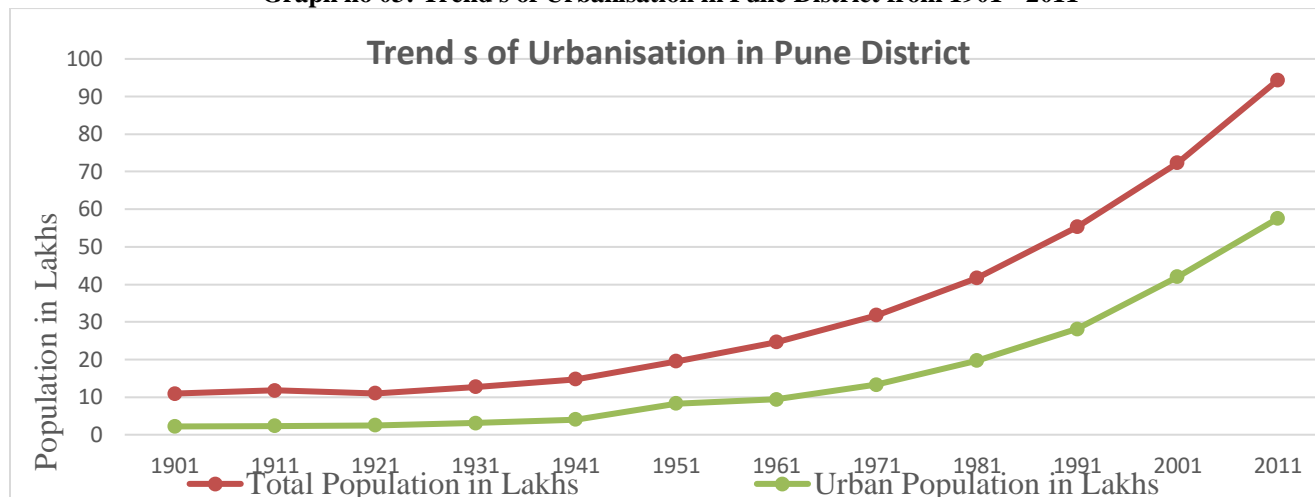
Graph no 2: Urban and Decadal Growth Rate of Urban Population in Maharashtra from 1901 -2011



Source: Census of India, 1901 to 2011

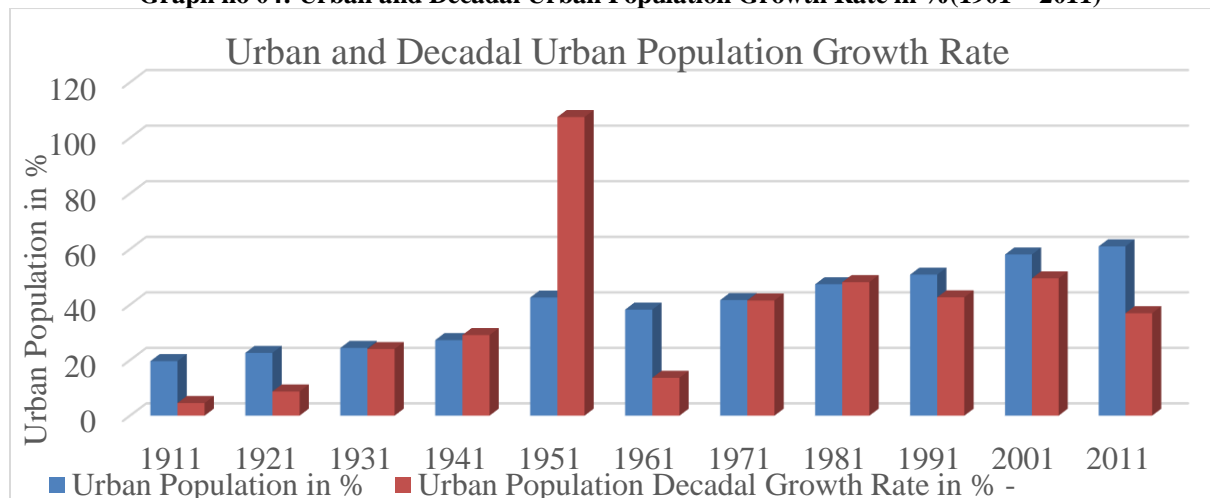
Graph No. 3 shows the trend of urbanization in Pune district. The trend is between 1901 and 2011 census periods. The population in this group is also shown in lakhs. From these figures, it can be that the total population of Pune district has progressed significantly after 1951 years. Before 1951, can see that it has increased peacefully till 1901. This means that you can see the rapid population growth after the 1951 census because the post-1951 migration and birth rate in Pune shows the increasing population of urbanization here as well as the industrialization in these Pune districts as it generates a lot of jobs. Increasing urbanization in Pune district is mainly due to various factors such as educational facilities and development of industries, transportation facilities, attracting people here and creating new jobs. In short, the population of Pune district was 10.96 lakhs in 1901, then it increased to 19.51 lakhs in 1951 census year and from 72.33 lakhs in 2001 census year and in 2011 census year it was 94.29 lakhs population. However, the total urban population of Pune district is more than half of the population living in urban areas above the 2011 census year and more than half of the population was living in urban areas even in the year 2001 census year. Before 1951 census year, the number of people living in urban areas in Pune district was less than the total population. In 1901, 2.2 lakh people were living in urban areas. In 1951, the population was 8.3 lakh, in 1971 it was 13.3 lakh and in 1981 it was 19.7 lakh. This shows that the urban population of Pune district has increased rapidly after 1991 census years. Briefly, from 1991 to 2011, more than 50 per cent of the total population lived in urban areas, mainly 50.81 percent in 1991 census year, 58.2% in 2001 census year and 60.99 percent peoples living in urban area at 2011 census year. On the other hand, the highest annual growth rate is in 1951 census year. In short, the total annual growth rate was 31.3 per cent in 1941 and 107.1 per cent in 1951. This means that you can see almost double increase in population this census periods. After 1950, you can see that the annual increase in urban population has been declining sharply since 1961. It has increased since 1971 and 1981, but again you can see how much it has decreased since 1991. It also shows an increase in the 2001 census year and a decrease in 2011 census periods.

Graph no 03: Trends of Urbanisation in Pune District from 1901 - 2011



Source: Census of India, 1901 to 2011

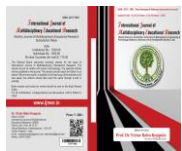
Graph no 04: Urban and Decadal Urban Population Growth Rate in %(1901 – 2011)



#### Patterns and Level of Urbanization in Pune District (1991-2011 Census Periods)

Five groups have been formed to calculate the level of urbanization in Pune district. These groups depend on the percentage of the population. The level of urbanization is derived from the percentage of the urban population. The first Very low urban population area (Zero Percentage), second low urban population area (less than 25 Percentage) third Moderated level (25.01 to 50 Percentage) forth Progressive level (50.1 – 75.0 Percentage) five number High level of urbanization (more than 75 Percentage).

- 1. Very low urban population area (Zero Percentage):** The period taken to measure the level of urbanization in Pune district is from 1901 to 2011 census years. As per 1991 census, Ambegaon, Mulshi, and Velhe has urbanization level in these three tehsils which means no urbanization in these areas. But in 2001 only Velhe tehsil was included in 2001 but in 2011 the entire Velhe tehsil was not urbanized but you can see the economic development of Ambegaon and Mulshi tehsils as this tehsil was transformed urbanization level into 2001 and 2011 census years. In short, the economic development of the two tehsils of Ambegaon can be seen here, even though the process of urbanization is slow and that economic development has attracted a large number of people. Map No. 2, 3 and 4 show the level of urbanization in Pune district with tehsil wise.
- 2. Low urban population area (< 25 Percentage):** In some tehsils of Pune district, the level of urbanization is less than 25%. In the year 1991 census, this level includes eight tehsils, mainly Junnar, Shirur, Khed, Daund, Purandar, Bhore, Baramati, and Indapur. This means that the economic development of this tehsil was low in this census year so that the percentage of urbanization here was less than 25 percent. But in the census year 2001, this low-level urbanization included ten tehsils, mainly the two new tehsils are included of Haveli and Mulshi. This means that the level of economic development and urbanization of



these two tehsils has decreased in 2001 census year and in the tehsil's of 1991 census year, there has been no change in the form of urbanization. But in the 2011 census, it included nine tehsils. In 2001, it included ten tehsils. But in the 2011 census of Khed tehsil, you can see that it has changed to a moderate level. In short, the nine talukas included in 2011 were mainly Junnar, Ambegaon, Shirur, Mulshi, Daund, Purandar, Bhor, Baramati and Indapur, but Khed was not included. This means that the level of urbanization is higher in Khed talukas than in other talukas. This means economic development and various jobs have been created in this tehsil. Map No. 2, 3 and 4 show the level of urbanization in Pune district with tehsil wise.

### 3. Moderated level (25.01 to 50 Percentage):

The level of moderator urbanization is mainly between 25 to 50 percent. In 1991, the moderated level included only one taluka, is Mawal, then in 2001 census year is same tehsil, but in the census of 2011, only two tehsil were involved namely Khed, Mawal. This means that the level of urbanization or group of Bawal tehsil seems to be stable but Khed tehsildar has been newly included in this level in 2011. This means that urbanization has increased in Kheda tehsil. In short due to economic development and employment creation must be urbanized. Map No. 2, 3 and 4 show the level of urbanization in Pune district with tehsil wise.

### 4. Progressive level (50.1 – 75.0 Percentage):

The level of Progressive Urbanization includes cities between 50.1 - 75%. This level includes Haveli Tehsil in 1991 but does not include any taluka in 2001 census year. But Haveli Tehsil has been re-incorporated in 2011 census year and there is a huge possibility in next census year in developed level of Urbanization. This means that the educational, economic development in these areas and the creation of a large number of new jobs here should attract a large number of people.

### 5. High level of urbanization (>75.1 Percentage):

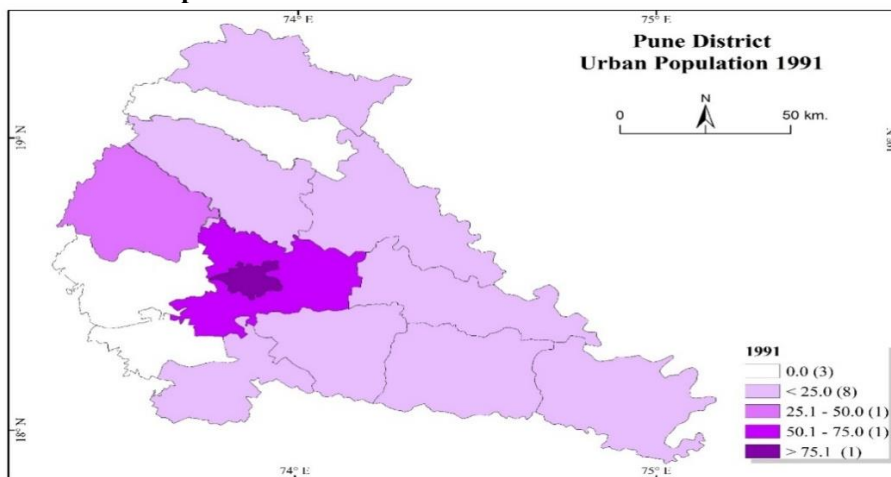
High Level of Urbanization in Pune City the level criteria is more than 75% peoples living in area. Which means Pune City stable of high-level Urbanization of from 1991 to 2011 census year, because of the large-scale educational development, employment creation, various business, banking facilities, transport connectivity. Due to the high facilities, people are attracted for new jobs and business. In the near future, Pune City may experience 100% urbanization, which could put a strain on a large number of government facilities in these areas, mainly road and transport, electricity, water supply, educational facilities and health facilities. In short, in this Pune City, various facilities will have to be increased for the future. Map No. 2, 3 and 4 show the level of urbanization in Pune district with tehsil wise.

**Table number 01: Level of Urbanization (Result Table 1901 to 2011 Census Periods)**

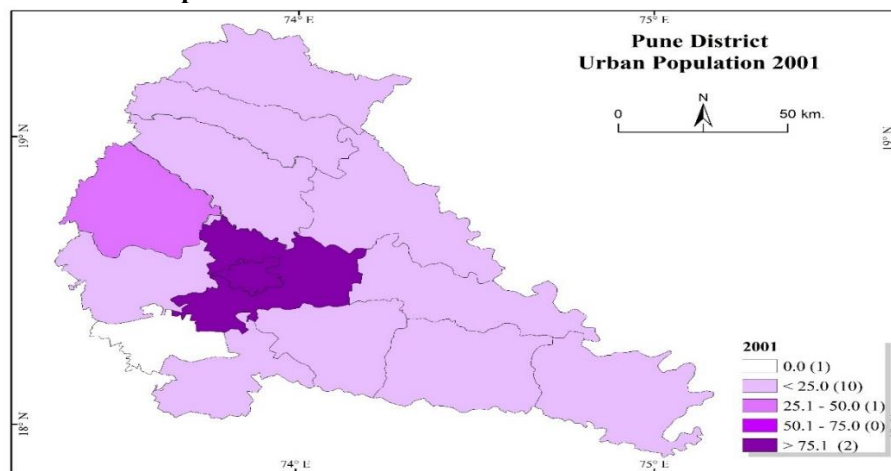
Census Years	Value of level in %	Types of level	Number of Tehsils	Name of Tehsils
1991	00	Very Low level	03	Ambegaon, Mulshi, Velhe
	< 25.0	Low	08	Junnar, Shirur, Khed, Daund, Purandar, Bhor, Baramati, Indapur
	25.01-50.0	Moderated	01	Mawal
	50.1 – 75.0	Progressive	01	Haveli
	>75.1	High level	01	Pune City
2001	00	Very Low level	01	Velhe
	< 25.0	Low	10	Junnar, Ambegaon, Shirur, Khed, Mulshi, Haveli, Daund, Purandar, Bhor, Baramati, Indapur
	25.01-50.0	Moderated	01	Mawal
	50.1 – 75.0	Progressive	00	-
	>75.1	High level	02	Haveli, Pune City
2011	00	Very Low level	01	Velhe
	< 25.0	Low	09	Junnar, Ambegaon, Shirur, Mulshi, Daund, Purandar, Bhor, Baramati, Indapur
	25.01-50.0	Moderated	02	Khed, Mawal
	50.1 – 75.0	Progressive	01	Haveli
	>75.1	High level	01	Pune City

Source: Census of India, 1991 to 2011 and Calculated by Researchers

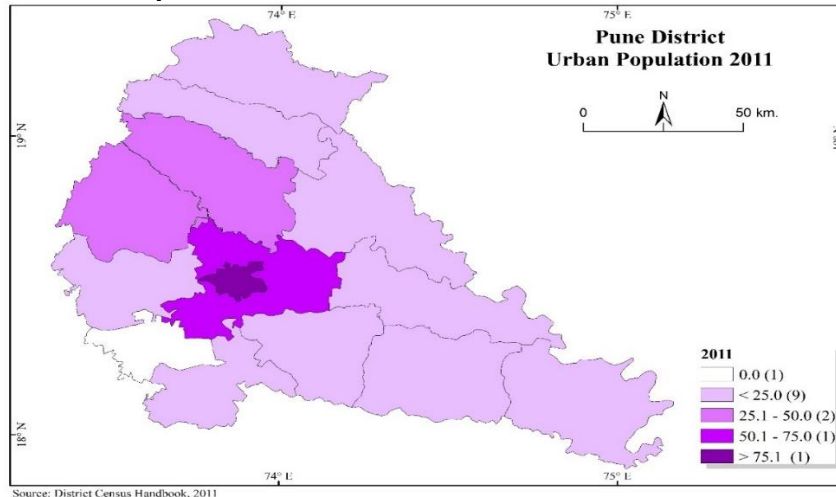
Map no 02: Level of Urbanization in Pune District 1991



Map no 03: Level of Urbanization in Pune District 2001



Map no 04: Level of Urbanization in Pune District 2011





Cover Page



## Conclusion

The increase in the level of urbanization in Pune district which took place on a large scale after independence but before independence the growth in urbanization was slow. There are a large number of suburban centers in Pune district, mainly in places like Pimpri Chinchwad, Khed, Baramati Bhor etc. The reason behind the massive urbanization in this Pune district is the transportation system, various facilities, educational development, health development, industrialized and IT Park etc. which has created a lot of employment. In the future you will see increasing urbanization in Junnar, Bhor, Baramati, Indapur, Puranda, Daund and Shirur talukas as industrial development is taking place here due to which there is a lot of scope for urbanization and Khed, Maval and Haveli tehsils can go to high level in future. Therefore, in this tehsil, there will be a need to increase the number of amenities and facilities of human, mainly transport roads, water, educational facilities and health facilities etc. This research can be used for future urban planning in study area.

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