

Prognostication of Urbanisation Growth, Trend and Level in Maharashtra State, Using GIS Techniques

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Abstract:

Urbanization is a process in which the transformation of rural settlements into urban settlements is considered to have occurred mainly after the industrial revolution and the development of communication. At present, the process of citizenship has started in all countries of the world. But the pace of civilization, however, is not the same across countries. Although the pace of population is different, the proportion of population in urban areas is increasing day by day in every country. Due to increasing urbanization, various types of serious problems have arisen in urban areas. If these problems are not considered in time, it will be difficult for human to live in urban areas. Therefore, the study of the nature of citizens has become dynamic in modern times. Urbanization is influenced by many factors such as geographical, socio-economic and political. The pace of urbanization in India has changed drastically since independence. In that, the nature of urbanization in the state of Maharashtra is seen in a different form. Urbanization is at a faster pace towards the western part whereas in eastern Maharashtra we can see that urbanization is happening at a slower pace. For this it is necessary to study the urbanization of Maharashtra state. However, secondary data has been used to study urbanization in the state of Maharashtra. The data is taken from Indian census 1901 to 2011, numerically processed and mapped.

Key word: Urbanization, Prognostication, Growth, Trend and Level, Maharashtra, Human Resources.

INTRODUCTION:

During the urbanization of the village, the first encroachment occurs on the land or agricultural land around the city. After that, the forests, grasslands, wetlands of are destroyed due to urbanization. The growth of cities is not only wide/horizontal but the growth of cities is vertical and there are tall buildings. Village open spaces and green belts are destroyed and the standard of living in urban areas is rapidly eroded⁽⁵⁾. Land use, elimination of slums, proper management of waste water to increase the water level of the land and treatment of waste water, planning of the city to create a proper system is necessary. The responsibility for providing these facilities in urban areas has been given by law to municipalities or local governments there. In order to maintain good facilities in urban areas,

participation of all citizens is expected, so it is necessary for all citizens to strictly follow the rules there⁽⁹⁾. The socio-economic development of any geographical area is continuous. There are many factors that contribute to the economic development of that region. Among them, urbanization is considered to be an important factor. Urbanization is a process due to migration. People's rural areas move to urban areas to get various employment opportunities, which results in large-scale urbanization. In short, the process of migration increases urbanization, but people go to cities to change their lives or to better their lives and find employment⁽¹⁵⁾. Urbanization or urban life is the result of global change in which the physical growth of urban areas is expected mainly modernization industrialization processes are linked with socio-economic development. Maharashtra State ranks third in terms of urbanization followed by Tamil Nadu and Kerala in terms of urbanization. It can be seen that the growth in the urban population of Maharashtra state has increased by 23.7% in the last decade. Also, from the census year 1901, we can see that the urban population of Maharashtra state is increasing steadily and rapidly^(16,19). Although geographical, social, economic and technological factors are responsible for urbanization, the most important factor is considered to be human resources. The development of the entire geographical area depends on this human resource, be it any form of development. Also, if the natural resources available there are properly combined, all forms of development can take place in that place and there is scope for urbanization. Although urbanization is considered as a factor of economic development in countries like India, its effects are both positive and negative.

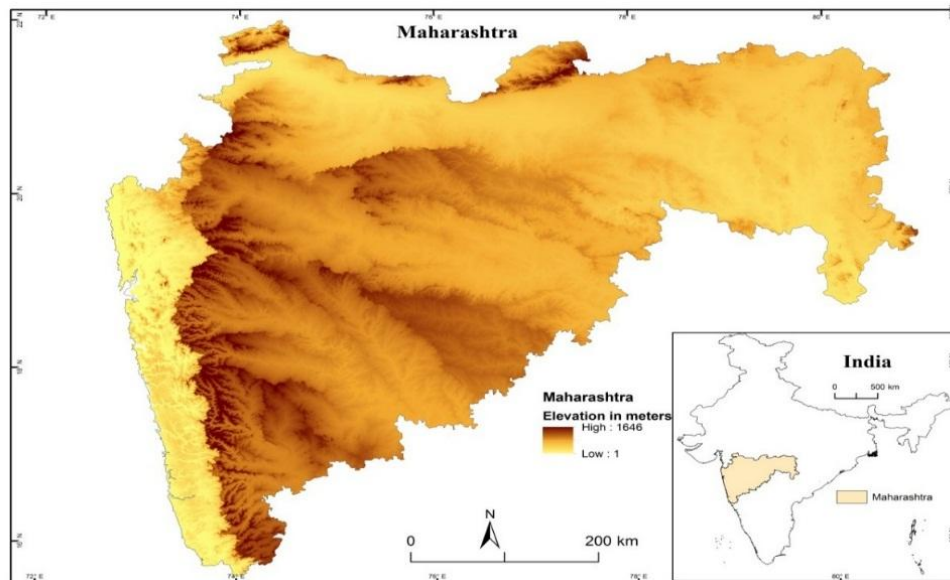
It can represent the rate at which population or urban population is growing. Individual and cooperative efforts to reduce time and costs in society naturally lead to urbanization and improve employment opportunities, education, housing, and transportation. The level of urbanization rose from 27.81% in 2001 to 31.16% in 2011. The number of urban units in India has increased by 2774 during the last decade the growth in urban population rose by 23 per cent during the last decade⁽²⁷⁾. The urban population in Maharashtra State has increased fourfold since the year 1961 from 1.2 million to 40 million with an urban population of 45.23 per cent, Maharashtra is the third most urbanized among major Indian states - behind Tamil Nadu (48.45%) and Kerala (47.72%) . Maharashtra has the higher number of people living in the urban areas. In terms of percentages, 45.23 percent population is urban as against 31.16 per cent at the national level. The growth of urban population for Maharashtra from 2001- 2011 show the urban population has grown by 23.63% in assessment with the rural population 10.34%. In terms of percentages 62.8 percent of population added during 2001-11 is in urban area only whereas this figure at the national level is 50.1 per cent.” The states of Punjab, Haryana, Karnataka, Tamil Nadu, Gujarat and Maharashtra are leading in the rapid urbanization. Urbanization is taking place rapidly in many districts of Maharashtra state⁽²⁷⁾. Urbanization is a process in which the transformation of rural settlements into urban settlements is considered to have occurred mainly after the industrial revolution and the development of communication. At present, the process of citizenship has started in all countries of the world. But the pace of civilization, however, is not the same across countries. Although the pace of population is different, the proportion of population in urban areas is increasing day by day in every country. From this perspective, it is necessary or necessary to study how the trend, pattern and Level of urbanization in Maharashtra state have been increasing. The study of urbanization in the state of Maharashtra will be useful for urbanization planning and resource allocation. At the same time, it would benefit from numerical processing of the application of GIS techniques for distributional mapping and studies of urbanization.

STUDY AREA:

Maharashtra State was formed on 1st May 1960. It extends from 15° 45' to 20° 6' north range and 70° 36' to 80° 54' east longitude (Map no 1). The entire geographical place is 3, 07,713 sq. Km. Maharashtra ranks third with recognize to region. The western Ghat is the bodily backbone of the Maharashtra kingdom. Deccan Plateau is geographical identity of state. Maharashtra occupies the western and central part of the country and has a long shoreline stretching nearly 720 Km along the Arabian Sea. The relative location of Maharashtra state is Chhattisgarh in the East, Andhra Pradesh in the Southwest, Karnataka in the South and Goa in the Southwest, Madhya Pradesh in the North. Maharashtra state has

36 districts and 355 Tehsils and 63663 villages under 6 subdivisions. According to 2011 census state has 35 districts and newly adds Palghar (total Districts are 36). According to 2011 census the sex ratio is 925 and population density is 365 per sq.km. Human Development Index (HDI) of Maharashtra state is 0.695 which ranks 15th rank in country according to 2017, current population is 124,862,220.

Map no 1: Location Map Maharashtra State



AIMS AND OBJECTIVE:

The main purpose of this research is to study the urbanization in the state of Maharashtra and to study how the nature of urbanization has changed in the state of Maharashtra. The following objectives have been considered for this.

1. To study the trend and Pattern of urbanization in the state of Maharashtra.
2. To behavior a proportional study of urbanization in the state of Maharashtra and also to study the factors affecting urbanization.
3. To study Prognostication of Urbanisation Growth and Level in Maharashtra State.

RESEARCH METHODOLOGY:

Secondary data has been taken to study the trend and nature of urbanization in the state of Maharashtra and the level of urbanization in the state of Maharashtra has been studied district wise. For this, the following research methodology has been used.

1. **Literature survey:** A vast amount of literature is present that explains urban population/ Urbanization and its distribution. The first phase of this study is to find the available literature and understand the materials, methods and models that has been extensively used in the published literature.

2. **Data Collection:** The second phase of this research is the collection and compilation of database essential for this study. The Urban population/ Urbanization data of the study area is gathered from Census of India online platform for the years 1991 and 2011. Secondly the spatial data that includes the shape file of the study area is gathered from online GIS platform. The other database includes various websites, news, journal articles that are extensively surveyed and incorporated in the present study.

3. Analysis of Data and Statistical Methods: The gathered population data for each district which is a part of the study area is compiled using MS-excel and SPSS. The data for various urban population/ Urbanization are then extracted from the huge database and analyzed using different statistical techniques.

Table no 01: Statistical Techniques

No	Indices/ Methods	Formula	Where
1	Population Decadal Growth Rate (DGR)	$DGR = \frac{(P_2 - P_1)}{P_1} \times K$	P₂ = Population of current decade or Year. P₁ = Population of current Previous decade or Years , K = 100
2	Level of Urbanization	$LU = \frac{U_p}{T_p} \times K$	U_p = Urban Population T_p =Total Population K = 100

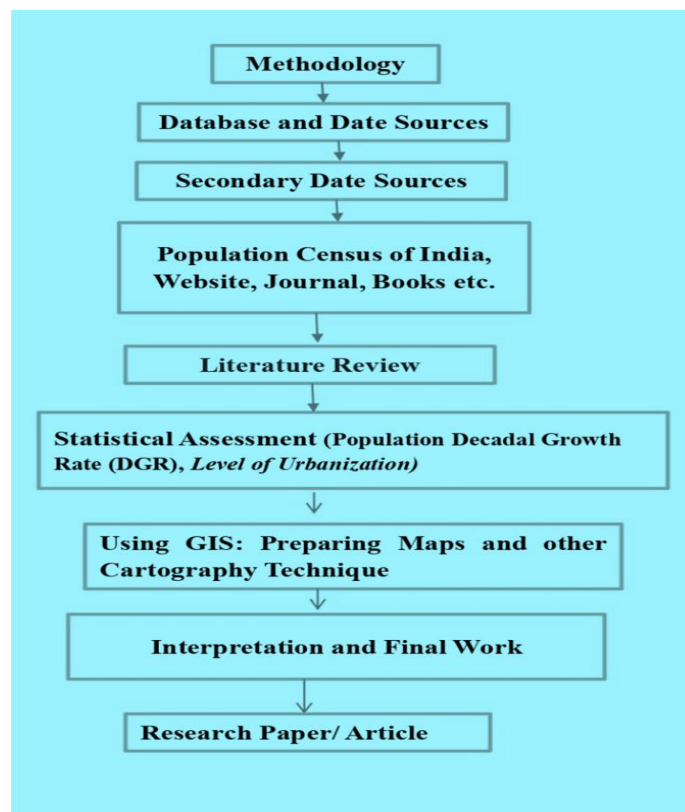
4. Level of Urbanization:

Five groups have been formed to study urbanization level. Very low, low, moderate, high, and very high urbanization level groups have been created in this, and these groups have been drawn according to percentages. Five groups have been made to determine the level of urbanization in the state of Maharashtra out of which fewer than 20% are Very Low level of urbanization, 20.1 to 36.00 % Low level, 36.1-60.00 % Moderated level, 60.1 to 80.00 % High level and 80.01 to 100 % Very High level of urbanization. There are five groups in this format.

5. GIS Technique:

Maps have been prepared by GIS method to show geographical distribution of level of urbanization in Maharashtra state and to convert numerical data into qualitative Cartography or Maps QGIS software has been used.

Chart No 01: Research Methodology

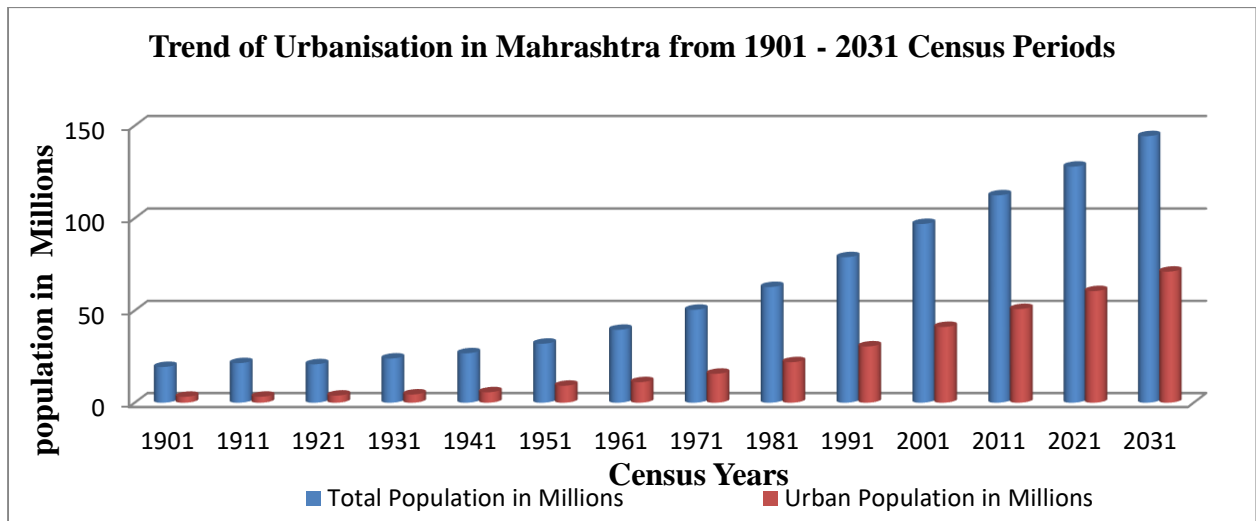


RESULT AND DISCUSSION:

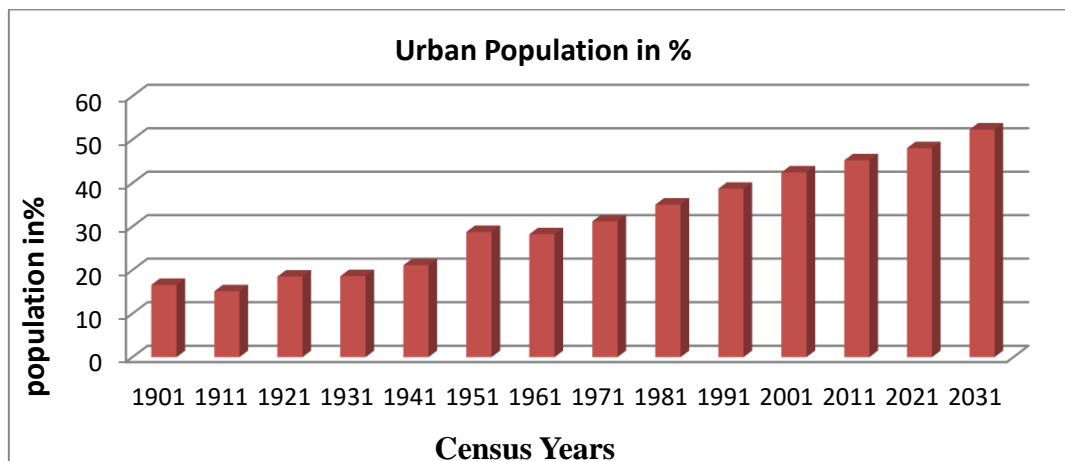
Urbanization is a process and it is not only in the life of urban areas but also in rural areas. The process of urbanization which was not prevalent in ancient times is a gift of industrialization. Before understanding the meaning of urbanization, it is necessary to define what a city is and its effects are less well studied. In the last few centuries, many new cities came into existence. Most of these cities have grown very rapidly in the last hundred years. This growth rate is increasing day by day as people migrate from rural areas to urban areas and urbanization is taking place in unlimited form with unlimited growth of world population. This growth is closely related to improved agricultural techniques, industrialization and increased trade. The surplus production of grain in some countries has increased trade and transformed them into unlimited civilizations. In some other countries too, the effects of industrial progress are adding to urbanization. The characteristics of the trend, nature and level of urbanization in the state of Maharashtra can be described as follows.

Maharashtra (45.23%) is the third most urbanized state in India followed by Tamil Nadu (48.456%) and Kerala (47.72%). The total geographical area of Maharashtra state is 3,07,7 square kilometers and it has 35 districts. And the total population is 112.37 million. The state of Maharashtra is witnessing an increase in urbanization as industrialization is the highest and the state maintains a leading position in the industrial sector. One hundred percent of the population lives in the urbanized areas of Mumbai and its suburbs in Maharashtra. While in the districts of Gadchiroli and Sindhudurg, we can see that less than fifteen percent of the population has been registered. Maharashtra consists of six cities namely Greater Mumbai, Pune, Nagpur, Nashik and Aurangabad with a population of one million and above. From many corners of India, we see people migrating to cities like Mumbai in Maharashtra for livelihood and employment. Graph number 01 shows the flow of urbanization in the state of Maharashtra. Also, consumer number 02 shows the decadal growth rate of population urbanization in the state of Maharashtra. From this it can be seen that urbanization is increasing day by day in the state of Maharashtra. This means that we get to see the growth rate in terms of urbanization in the state of Maharashtra is higher than other states. The most important reason for this is considered to be the most important reason for the industrialization, road traffic in the states of Maharashtra. A large number of people migrate from rural to urban areas in the state of Maharashtra from various states. The important reason for this is that people migrate to urban areas for employment, livelihood, and to improve the standard of living. From graph number two it is clear that the year 1951 saw the highest increase in urbanization. After this, 1971, 1981, and 1991 showed a deficit in population growth, but a parallel growth rate can be seen this year. The lowest urbanization growth rate can be seen in the year 1911. But you can see negative urbanization growth rate in 1931, 1961, 2001 and 2011. This means how much population has been urbanized in the current year compared to the previous year. From the above figures, it can be seen that the growth rate and flow of urbanization is increasing in the state of Maharashtra. The most important reason behind this is that due to the right political direction and policies, the industrialization and development of transport in the state of Maharashtra is getting a boost in this respect. Due to this, people migrate from different states of India to Maharashtra state for employment, industry and other business. Due to this, the population living in various cities of Maharashtra state is increasing and urbanization is taking place.

Graph 1: Trend of Urbanization in Maharashtra from 1901 -2031 Census Periods



Graph 2: Trend of Urbanization in Maharashtra from 1901 -2031 Census Periods



Graph no 3: Decadal Growth Rate of Urban Population in Maharashtra from 1901 -2031 Census Periods

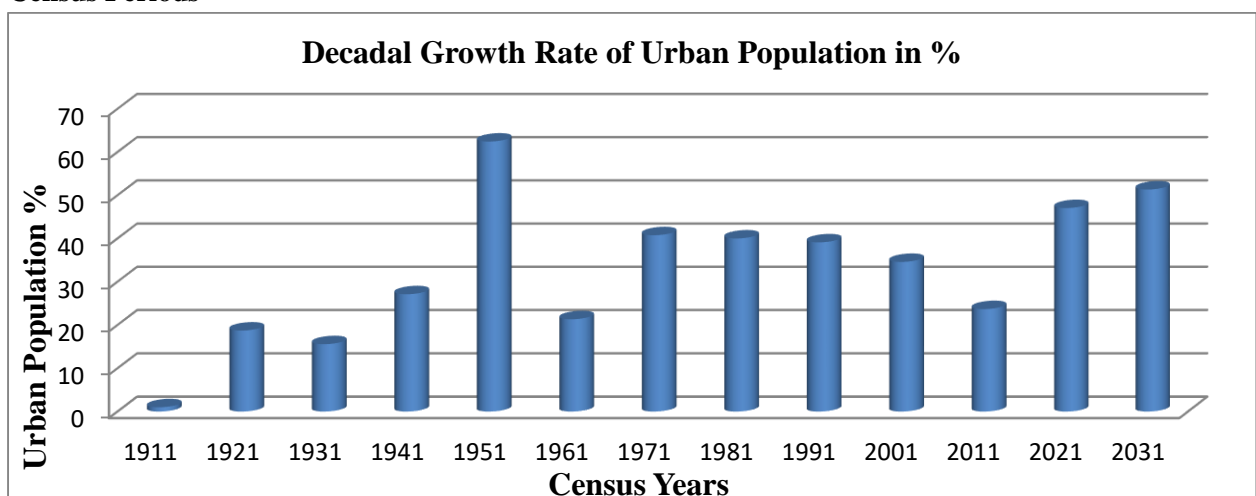


Table no 03: District wise Urbanisation in Maharashtra from 1991 -2011 Census Periods

District	1991	2001	2011	2021	2031
Ahmednagar	15.82	19.89	20.1	20.31	20.52
Akola	36.14	38.51	39.69	40.87	42.05
Amravati	32.6	34.5	35.19	35.88	36.57
Aurangabad	32.76	37.45	43.74	50.03	56.32
Bhandara	14.29	15.47	19.5	23.53	27.56
Beed	17.94	17.91	19.9	21.89	23.88
Buldhana	20.59	21.2	21.21	21.22	21.23
Chandrapur	28.04	32.11	35.08	38.05	41.02
Dhule	24.18	26.11	27.91	29.71	31.51
Gadchiroli	8.71	6.93	11	15.07	19.14
Gondha	11.97	11.95	17.07	22.19	27.31
Hingoli	13.66	15.6	15.17	14.74	14.31
Jalgaon	27.44	28.59	31.8	35.01	38.22
Jalna	16.91	19.15	19.26	19.37	19.48
Kolhapur	26.33	29.81	31.75	33.69	35.63
Latur	20.39	23.57	25.47	27.37	29.27
Mumbai City	100	100	100	100	100
Mumbai Suburban	100	100	100	100	100
Nagpur	61.78	64.26	68.3	72.34	76.38
Nanded	21.72	23.96	27.23	30.5	33.77
Nandurbar	15.4	15.45	16.73	18.01	19.29
Nashik	35.55	38.8	42.53	46.26	49.99
Osmanabad	15.19	15.69	16.96	18.23	19.5
Parbhani	28.15	31.76	31.04	30.32	29.6
Pune	50.74	58.08	60.89	63.7	66.51
Raigarh	18.01	24.22	36.51	48.8	61.09
Ratnagiri	8.95	11.33	16.35	21.37	26.39
Sangli	22.64	24.51	25.51	26.51	27.51
Satara	12.88	14.17	18.98	23.79	28.6
Sindhudurga	7.59	9.47	12.6	15.73	18.86
Solapur	28.77	31.93	32.4	32.87	33.34
Thane	64.64	72.58	76.92	81.26	85.6
Vardha	26.56	26.28	32.47	38.66	44.85
Washim	16.59	17.48	17.69	17.9	18.11
Yavatmal	17.18	18.6	21.59	24.58	27.57

Sources: Indian Census 1991 to 2011 Periods (2021 and 2031 Census Calculation by Authors,)

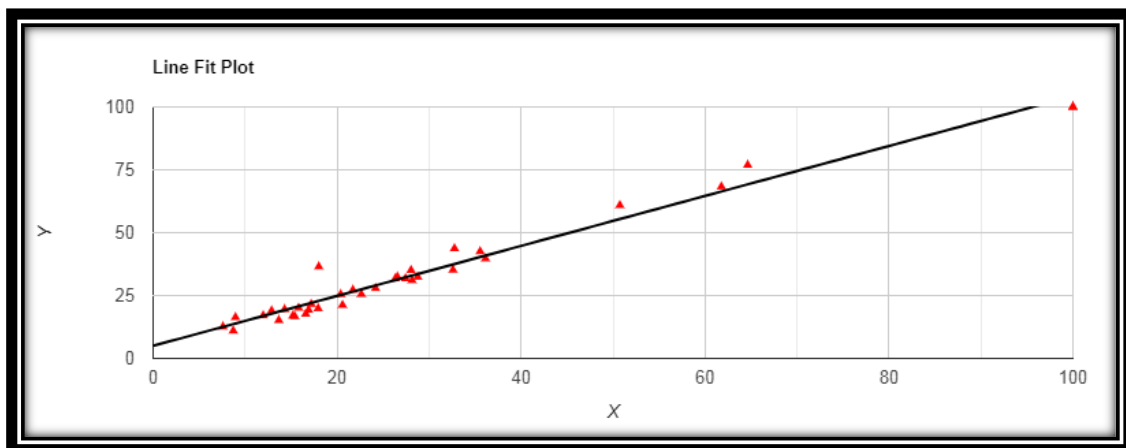
1. Slow Organization Periods is from 1901 to 1931 in India:

It has a level of less than 11 percent of citizens in India. By 1931, the level of citizenship gradually increased to 11.19 percent. In 1911 the level of urbanization was reduced as compared to 1901. An important reason for the decline in population in 1911 was the large scale of the plague epidemic in the ten years between 1901 and 1911. As a result, many people succumbed to the epidemic and within these ten years, rural areas had a higher mortality rate than urban areas.

2. Medium Urbanization Periods 1931 to 1961 in India: After 1931, the process of citizenship is seen to have started on a large scale. The fact that the civilian population increased by 32 percent between 1931 and 1941 clearly shows that this is the second phase of the civilian cause in India. During this period, civil life had started to develop to a great extent. Even during 1951 the growth rate of urbanization is 41 percent which is higher than the previous rate. About 17.29% people lived in urban areas during this decade. However, in the decade of 1951, the civilian population has decreased because the growth rate of the civilian population was 41.42% in the decade of 1941 to 26.41% in the period of 1951. The main reason for this is that the increase in the civilian population in the period of 1961 is faster as compared to the previous period, but the growth will be slow. Till 1961 there was no industrial progress in India and the rate of overall economic growth was also low.

3. Speedy Urbanization Periods 1961 to 2011 in India: India witnessed a rapid increase in urban population after 1961. In 1971, about 20 percent of the total population was in urban areas. Also during this period the urban population increased to a very large extent during which 23.34% of the total population lived in urban areas. Also, the growth rate of urban population was 46% during the period 1991 to 2001. 27.32% of India's total population lives in urban areas and India's population is growing rapidly. From 2001 to 2011, the population and citizens have increased rapidly.

Graph No 04: liner Relation between Level and Trend of Urban Population



$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{(\sum (x_i - \bar{x})^2)(\sum (y_i - \bar{y})^2)}}$$

Graph number 04 shows the linear relationship between trade and level of urbanization in Maharashtra state. From this, it is clear that the correlation between the level of urbanization and trade in Maharashtra state is positive ($r = 0.9858$), in short, the level and trade are changing in the same direction or both the factors are dependent on each other. In short, as the level of urbanization is increasing according to the district in Maharashtra state, the trade of urbanization is also increasing or both factors are increasing at the same rate.

Table number three shows the statistics of district wise urbanization from 1991 to 2011 Census Periods, the said statistics are shown in percentage. It is from this table that the maps are prepared by converting the numerical factors into qualitative characteristics. At the same time, the level of urbanization in the state of Maharashtra has been studied in table number four. In this five groups of level of urbanization have been made, mainly Very low, low, moderate, high, very high (1991-2011) Number of districts according to Census Periods.

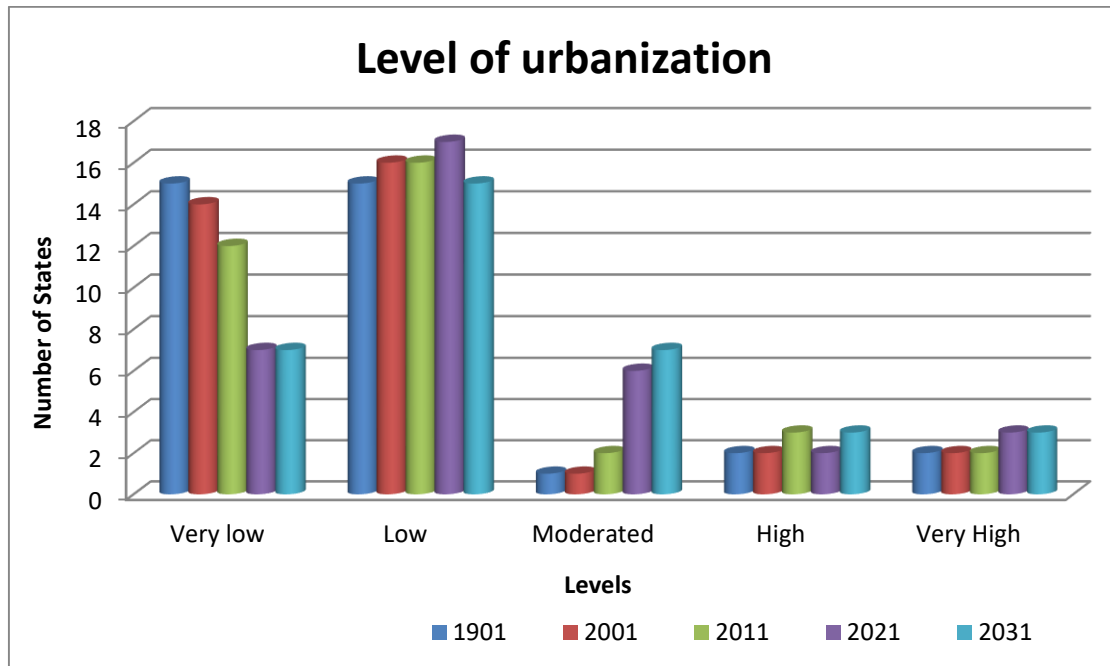
Table no 04: Level of urbanization

Sr. No	Level in %	Level	Number of State (Census Periods)				
			1901	2001	2011	2021	2031
1.	Below 20	Very low	15	14	12	07	07
2.	20.1-36.1	Low	15	16	16	17	15
3.	36.2-60	Moderated	01	01	02	06	07
4.	60.1 -80.0	High	02	02	03	02	03
5.	80.1 -100.0	Very High	02	02	02	03	03

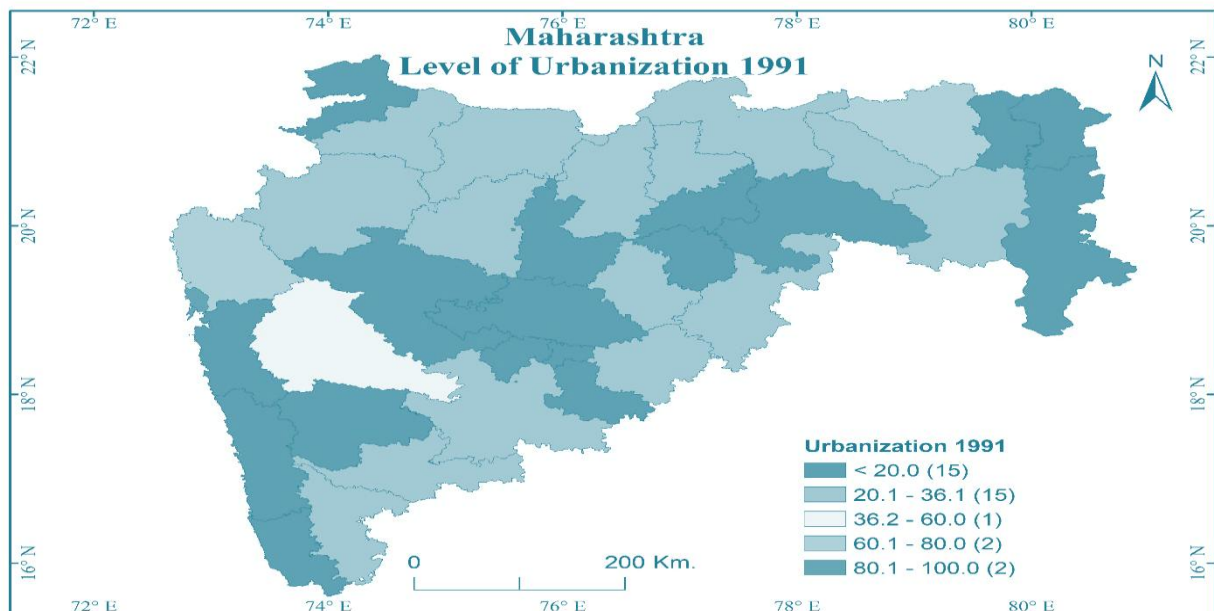
From this it can be seen that the most states are included in Very Low Urbanization and Low Urbanization 1901 Census year 15 states, 2001 Census year 14 states, 2011 Census year twelve states are included. So the low urbanization includes 15 states in 1901 Census, 16 states in 2001 Census, 16 states in 2011 Census. Whereas Very High means the most hundred percent urbanized state including two states/cities mainly. These areas have a very low level of urbanization because of very poor development of the agricultural and industrial sector, socio-cultural backwardness, and low levels of literacy rate. Considering the period 1991-2011, Ahmednagar, Bhandara, Beed, Buldhana, Washim, Satara, Osmanabad, Yavatmal Dhule, Gondia, Hingoli, Jalna, Latur, Nanded, Nandurbar, , and Sangli remained constant. These areas have a low level of urbanization due to peripheral location. And poorly developed infrastructural facilities are responsible for a low level of urbanization in these parts of the state. Considering the period 1991-2011, Akola, Amaravati, Aurangabad, Nashik remained constant. Hence these two districts remained in the category of areas with a very high degree of urbanization for the last three census period. The growth rate of population in urban areas of Maharashtra is seen to be high when compared to that of the rural population. Peoples are migration from the rural to the urban areas due to the availability of employment, education and business opportunities. Maharashtra is highly urbanized as 45.23% population lives in cities and it is high in literacy rate. Mumbai and Mumbai Suburban have 100% of urbanized districts in Maharashtra, while two other districts, Gadchiroli and Sindhudurga have less than 10% of their population living in the urban areas. Mumbai is known as the financial capital of Maharashtra as most of the various businesses in India are headquartered in Mumbai, as this Mumbai region has a large number of financial institutions, various banking facilities, insurance, as well as industrialization due to the creation of a large number of jobs and the financial income from various sources. Small and medium industrial establishment is seen in the state of Maharashtra, along with the agro-based processing industries are also concentrated in the said district. For example Nashik, Nagpur, Thane, Mumbai and Mumbai suburbs, Mumbai city has a large concentration of population. Due to the large concentration of factories in Thane, Mumbai and Mumbai suburbs and Pune, these areas witness a large degree of certification. Also, the infrastructure of roads, railways, air transport is seen to be largely developed in these districts. At the same time, literacy rate is also high in these districts, due to which people migrate from rural areas to urban areas in these districts. 100 percent urbanization is mainly found in Mumbai and Mumbai suburbs. From this data, it can be seen that as per 2011, the least urbanized states were twelve, and the number of such states is estimated to be seven in 2021 and 2031 censuses. Also in low

level there were 16 states as per 2011 while 2021 includes 17 states and 2031 includes fifteen states. Also, moderate mainly includes six states in 2021, seven states in 2019, while high level of urbanization includes three states in 2021. From this it is clear that in the year 2031, the proportion of urban dwellers is increasing in the state of Maharashtra.

Graph no 5: Level of urbanization with Number of States (1901 -2031 Census Periods)



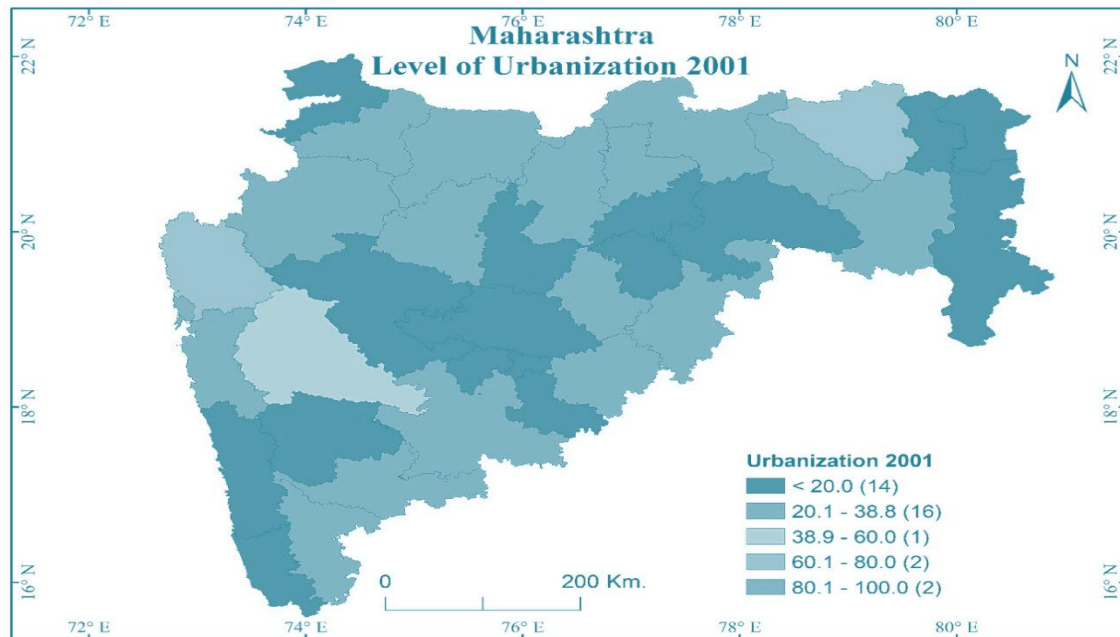
Map no 02: Level of Urbanization in Maharashtra 1991 census Year



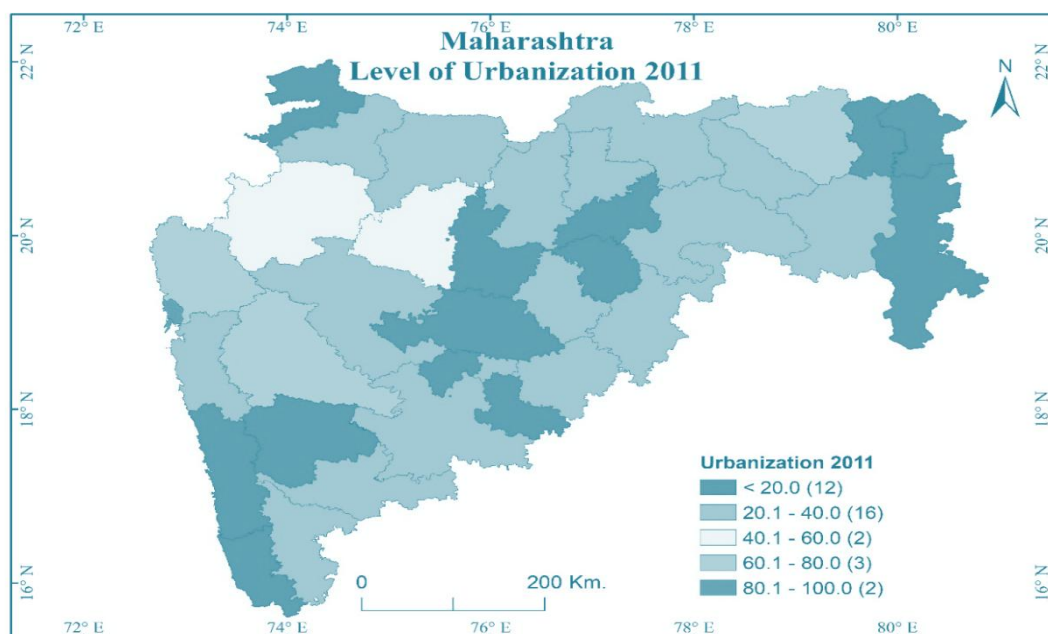
Maharashtra has seen fast urban growth. Maharashtra has the highest level of urbanization in India at 45.23 per cent compared to 29.5 per cent as the all India average in 2011. During the first decade of twentieth century, the decadal growth rate was 0.35 per cent in India and Maharashtra was 0.99 per

cent to census 1901. Maharashtra is highly urbanized as 45.23 per cent population lives in cities and it is high on literacy. Conclusion it is observed that the population of India has been continuously increasing from 1901 to 2011 minimum urbanization was observed in 1911 i.e. 10.29 per cent. The all-India average of such percentage of urban population stands at 31.16 per cent in 2011. The all-Maharashtra average of such percentage of urban population stands at 45.23 per cent in 2011.

Map no 03: Level of Urbanization in Maharashtra 2001 census Year



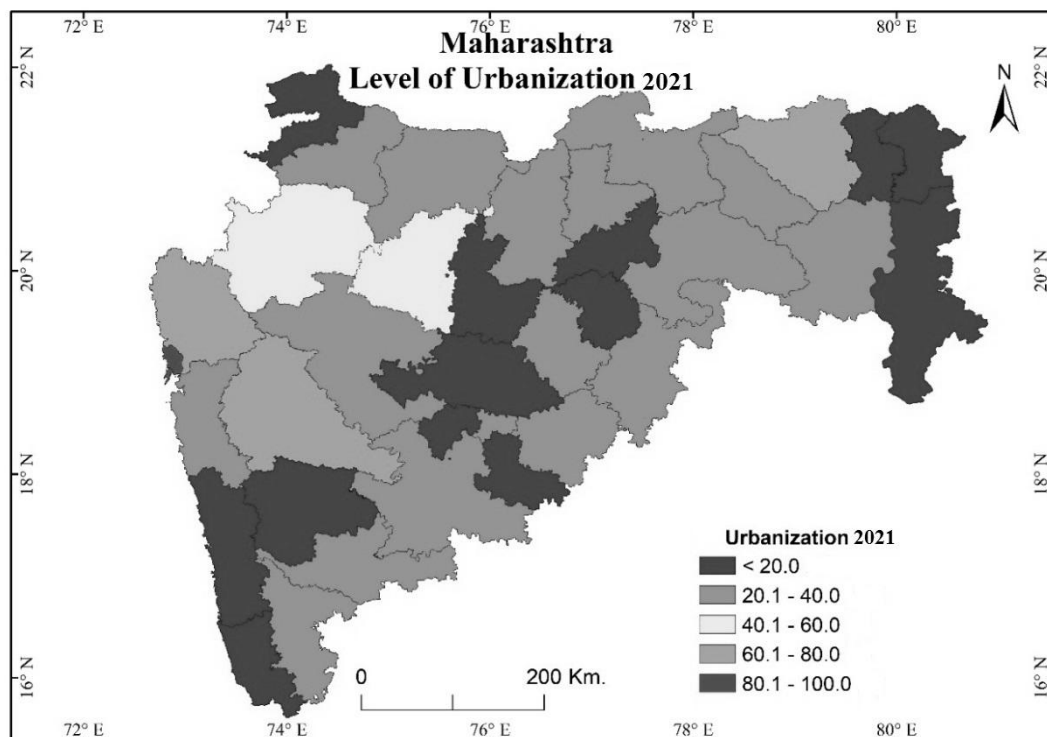
Map no 04: Level of Urbanization in Maharashtra 2011 census Year



Prognostication of Urbanisation Level in Maharashtra State:

Map number 05 and 06 shows the geographical distribution of urbanization in the state of Maharashtra. The said distribution is in the period of 2021 and 2031. The statistical data contained in it have been prepared by the researcher himself and the map has been prepared based on this. From this data, it can be seen that as per 2011, the least urbanized states were twelve, and the number of such states is estimated to be seven in 2021 and 2031 censuses. Also in low level there were 16 states as per 2011 while 2021 includes 17 states and 2031 includes fifteen states. Also, moderate mainly includes six states in 2021, seven states in 2019, while high level of urbanization includes three states in 2021. From this it is clear that in the year 2031, the proportion of urban dwellers is increasing in the state of Maharashtra. From this it is understood that the state of Maharashtra may require more than the water, electricity, resources needed for urbanization. According to the 2019 and 2031 censuses, seven states will be included in the low urbanization (less than 20%) as follows. Hingoli, (14.74: 2021, 14.31: 2031 censuses) Gadchiroli (15.07: 2021, 19.14: 2031 censuses), Sindhudurga(15.73: 2021, 18.86: 2031 censuses), Washim(18.01: 2021, 19.29: 2031 censuses), Nandurbar(18.01: 2021,19.29: 2031 censuses), Osmanabad(18.23: 2021, 19.50: 2031 censuses) , Jalna(19.37: 2021, 19.48: 2031 censuses). According to the census of 2021 and 2031, the following tehsils will be included in the low (20.1 – 36.1 %) urbanization in the state of Maharashtra. Ahmednagar, Buldhana, Ratnagiri,Beed,Gondha,Bhandara,Satara,Yavatmal,Sangli,Latur,Dhule,Parbhani,Nanded.Solapur, Kolhapur, In the census of 2031, this tehsil will be mainly included in moderate. Urbanization development of this tehsil is more than other previous very low and low urbanization. Therefore, the government has to do a different type of planning for this tehsil Jalgaon (38.22%), Amravati (36.57%) . Pune (66.51%) and Nagpur (76.38%), Raigarh (61.09%) This tehsil will be included in high urbanization (60.1 to 80.0%) in the year 2031. 2031 census years Urbanization in Thane District will be 85.6% and Mumbai City and Mumbai Sub-Urban share already 100%.

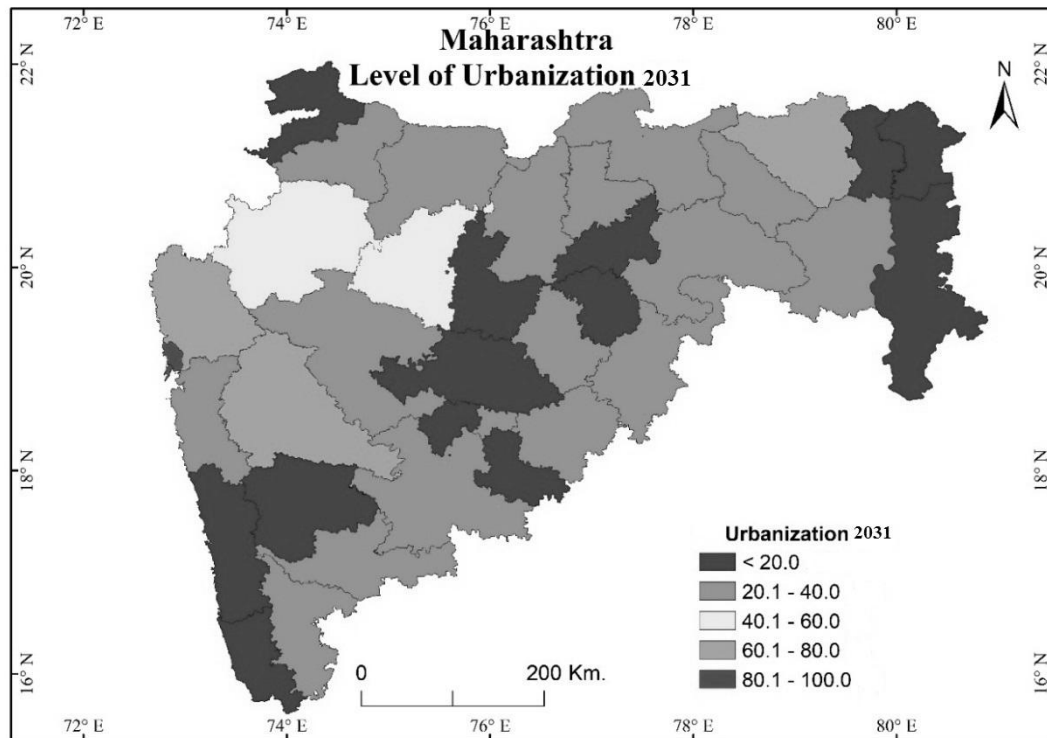
Map no 05: Level of Urbanization in Maharashtra 2021 census Year



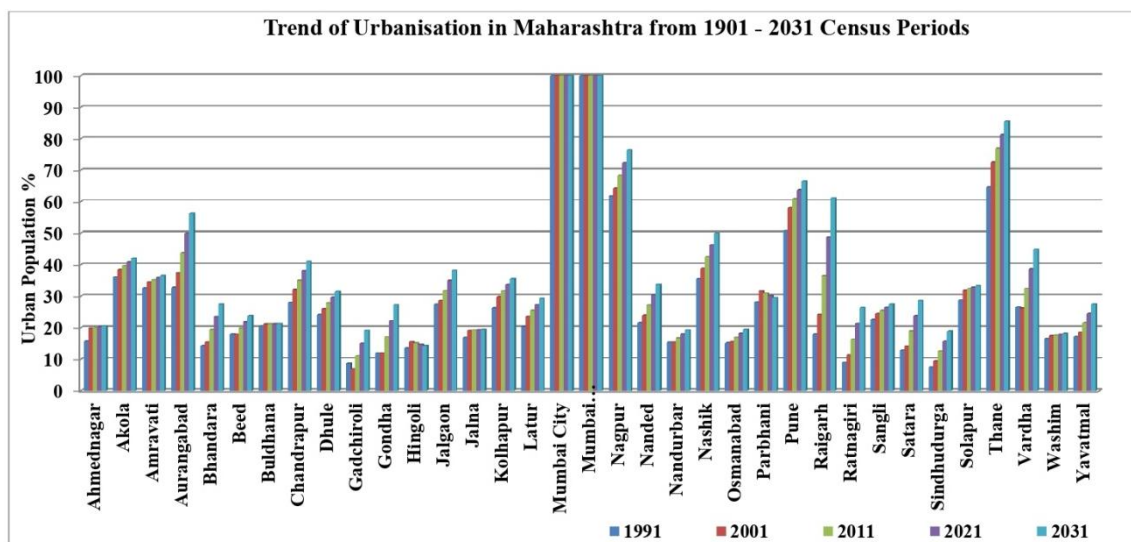
It is clear from this that the tehsil which is in Low Urbanization will have to be planned in a different form in the tehsil which will be included in Progressive in 2031 year. Also, where some tehsils are seen to have been converted into moderate ones, planning will have to be done in terms of resources. From

this it can be seen that in the future in many tehsils water planning, land use, land planning, transport, education, sanitation, electricity, health etc. facilities for the people will have to be increased and in the future they will have to find new drinking sources or build dams. . However, attention should be paid to the quality of the environment.

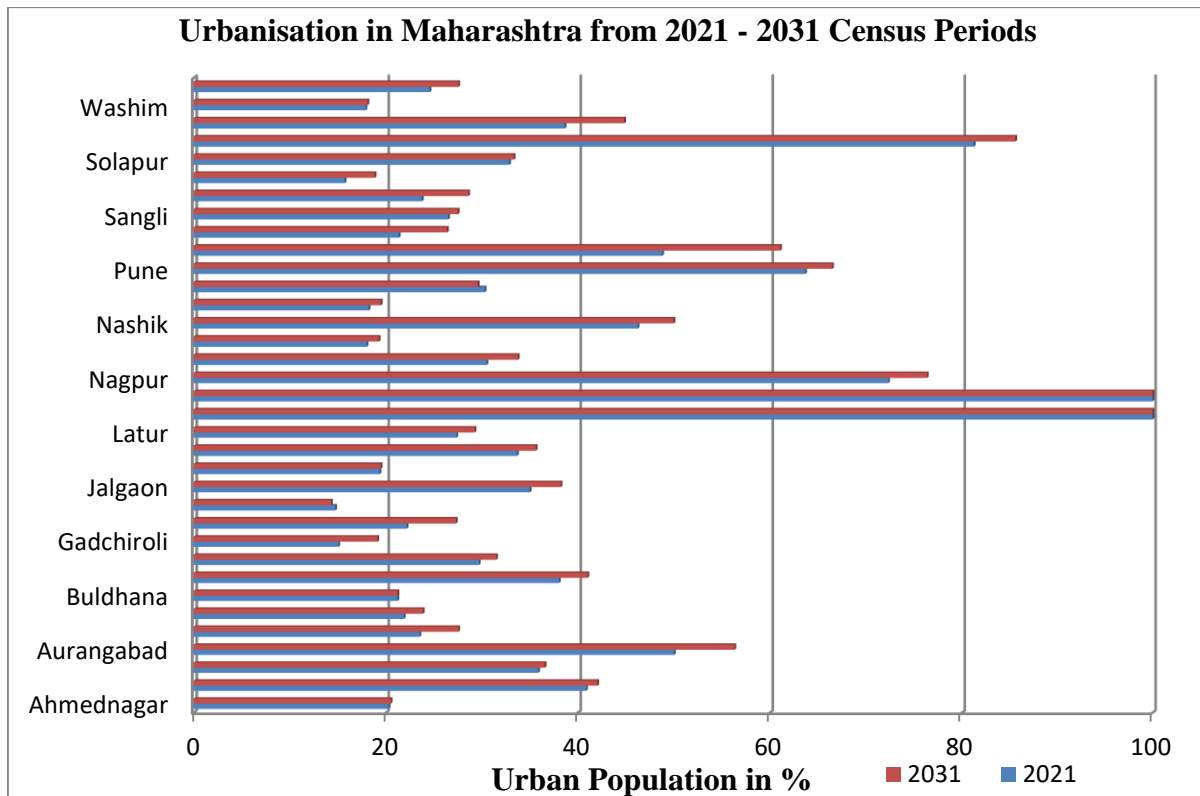
Map no 06: Level of Urbanization in Maharashtra 2031 census Year



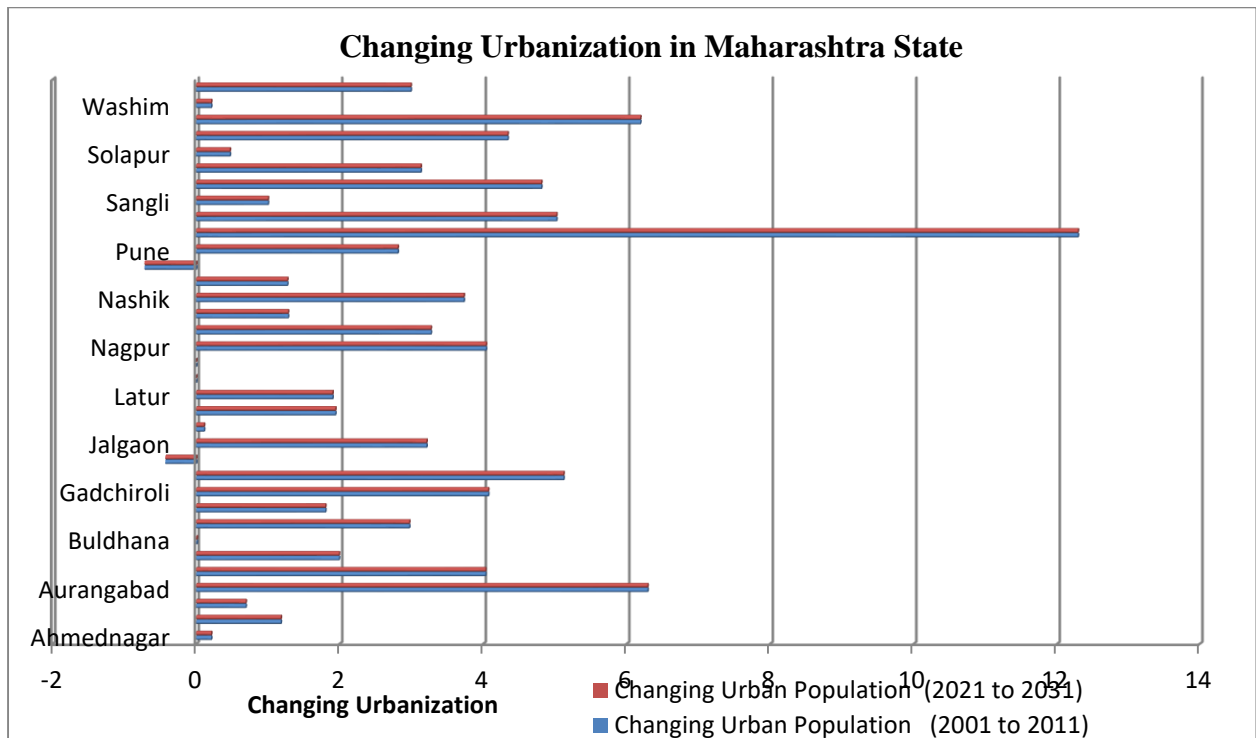
Graph no 6: Trend of urbanization in Maharashtra State (1901 -2031 Census Periods)



Graph no 07: Urbanization in Maharashtra State (2021 -2031 Census Periods)



Graph no 08: Changing Urbanization in Maharashtra State (2001 to 2021 and 2021 to 2031 Census Periods)



Five characteristics of urbanization are considered important in the state of Maharashtra:

1. The proportion of citizens compared to the total population is small
2. Only the total civilian population is very small compared to the total civilian population of developed and developing states.
3. With the exception of the period 1901-1911, rural areas had a higher rate of population growth than urban areas.
4. The proportion of male and female in urban population growth is not uniform or uniform.
5. The reasons for urbanization between East Maharashtra and West Maharashtra are different.

1. Overall Trend:

- Urbanization is increasing across most districts from 1991 to 2031, reflecting a broader national and global trend toward urban living.
- The rate of urbanization varies significantly across districts, with some showing rapid growth (e.g., Aurangabad, Raigarh) and others showing slower or stagnant growth (e.g., Buldhana, Hingoli).

2. Highly Urbanized Districts:

- **Mumbai City and Mumbai Suburban:** Both districts remain 100% urbanized throughout the period, as they are entirely metropolitan areas with no rural population.
- **Thane, Pune, Nagpur:** These districts show consistently high urbanization levels (above 50% by 2011) and continue to grow, with Thane projected to reach 85.6% and Pune 66.51% by 2031. These are major economic hubs with significant industrial, commercial, and IT sectors.

3. Rapidly Urbanizing Districts:

- **Aurangabad:** Urbanization rises sharply from 32.76% in 1991 to 56.32% in 2031, likely due to industrial growth, educational institutions, and infrastructure development.
- **Raigarh:** Shows a dramatic increase from 18.01% in 1991 to 61.09% in 2031, driven by proximity to Mumbai, port development (e.g., Jawaharlal Nehru Port), and industrial corridors.
- **Nagpur:** Increases from 61.78% in 1991 to 76.38% in 2031, reflecting its status as a major urban center with growing IT, education, and industrial sectors.

4. Moderately Urbanizing Districts:

- Districts like Nashik, Jalgaon, and Chandrapur show steady but moderate increases in urbanization (e.g., Nashik from 35.55% in 1991 to 49.99% in 2031). These districts are developing as secondary urban centers with agricultural and industrial bases.
- Kolhapur, Sangli, and Solapur also show steady growth, likely due to agro-based industries and improving connectivity.

5. Low Urbanization Districts:

- **Gadchiroli, Sindhudurg, Ratnagiri:** These districts remain among the least urbanized, with Gadchiroli projected at 19.14% and Sindhudurg at 18.86% by 2031. These areas are predominantly rural, with economies based on agriculture, forestry, or fishing.
- **Hingoli, Osmanabad, Washim:** These districts show minimal growth or even slight declines in urbanization (e.g., Hingoli peaks at 15.6% in 2001 and declines to 14.31% by 2031). This suggests limited urban pull factors or outmigration to larger urban centers.

6. Declining or Stagnant Urbanization:

- **Hingoli and Parbhani:** These districts show a slight decline in urbanization after peaking in 2001, possibly due to economic stagnation, lack of infrastructure, or migration to larger cities.

- **Buldhana:** Urbanization remains nearly stagnant (21.2% in 2001 to 21.23% in 2031), indicating limited urban development or economic opportunities.
7. **Projected Growth (2021–2031):**
- The projections for 2031 suggest continued urbanization, with some districts like Raigarh, Aurangabad, and Nagpur approaching or exceeding 50% urban population.
 - Rural districts like Gadchiroli, Gondha, and Bhandara are expected to see significant relative increases, though their absolute urbanization levels remain low.

Causes of Urbanization

Urbanization is driven by a combination of economic, social, infrastructural, and policy factors. The variations across districts can be attributed to the following causes:

1. **Economic Opportunities:**
 - **Industrial and IT Hubs:** Districts like Pune, Thane, Nagpur, and Aurangabad have seen rapid urbanization due to industrial estates, IT parks, and manufacturing units. For example, Pune's IT sector and Aurangabad's industrial estates (e.g., MIDC areas) attract migrants.
 - **Port and Trade Development:** Raigarh's proximity to Mumbai and the development of ports like Jawaharlal Nehru Port Trust (JNPT) have spurred urban growth.
 - **Agro-based Industries:** Districts like Kolhapur, Sangli, and Jalgaon benefit from sugar, textile, and food processing industries, contributing to moderate urbanization.
2. **Infrastructure Development:**
 - **Connectivity:** Improved road, rail, and air connectivity in districts like Pune, Nashik, and Nagpur has facilitated urban expansion. For example, the Mumbai-Pune Expressway and Nagpur's metro project enhance urban accessibility.
 - **Urban Amenities:** Access to better healthcare, education, and housing in urban centers drives migration from rural areas, particularly in districts like Aurangabad and Nashik.
3. **Proximity to Major Cities:**
 - Districts like Thane and Raigarh benefit from their proximity to Mumbai, a global financial hub, leading to spillover urbanization and suburban development.
 - Similarly, Nashik's growth is partly due to its proximity to Mumbai and Pune.
4. **Rural-Urban Migration:**
 - **Push Factors:** Limited agricultural opportunities, land fragmentation, and lack of rural infrastructure in districts like Gadchiroli, Bhandara, and Ratnagiri push populations toward urban areas.
 - **Pull Factors:** Urban areas offer better employment, education, and lifestyle opportunities, attracting migrants to cities like Pune, Nagpur, and Aurangabad.
5. **Government Policies and Investments:**
 - **Industrial Corridors:** Policies promoting industrial corridors (e.g., Delhi-Mumbai Industrial Corridor) have boosted urbanization in districts like Aurangabad and Raigarh.
 - **Smart Cities Mission:** Cities like Pune, Nagpur, and Aurangabad, included in India's Smart Cities Mission, have received investments in urban infrastructure, accelerating urbanization.
 - **Special Economic Zones (SEZs):** SEZs in Pune and Thane have created jobs and urban growth.
6. **Education and Healthcare:**
 - Districts with prominent educational institutions (e.g., Aurangabad, Nagpur) and healthcare facilities attract populations seeking better services, contributing to urban growth.
7. **Challenges in Low-Urbanization Districts:**

- **Geographical Constraints:** Districts like Gadchiroli and Sindhudurg have challenging terrains (forests, coastal areas) that limit urban development.
- **Economic Stagnation:** Limited industrial or commercial activity in districts like Hingoli, Washim, and Buldhana restricts urbanization.
- **Outmigration:** Residents of less urbanized districts may migrate to larger cities like Mumbai or Pune, reducing local urbanization.

Key Observations by District Categories

1. **Metropolitan Centers (Mumbai City, Mumbai Suburban, Thane, Pune):**
 - Already highly urbanized, these districts continue to grow due to their role as economic powerhouses. Mumbai's 100% urbanization reflects its status as a fully urban metropolis.
2. **Emerging Urban Centers (Aurangabad, Raigarh, Nagpur, Nashik):**
 - These districts are rapidly urbanizing due to industrial, infrastructural, and policy-driven growth. They are likely to become major urban hubs by 2031.
3. **Moderately Urbanizing Districts (Jalgaon, Kolhapur, Chandrapur, Solapur):**
 - These districts show steady growth, driven by agro-based industries and improving connectivity, but lack the rapid pace of metropolitan or emerging centers.
4. **Rural and Slow-Urbanizing Districts (Gadchiroli, Sindhudurg, Hingoli):**
 - These districts remain predominantly rural due to geographic, economic, or infrastructural limitations. Urbanization is slow, with some showing stagnation or decline.

CONCLUSION:

Geographical, socio-economic, political factors affect urbanization in the state of Maharashtra. The state of Maharashtra is the third largest state in India. The state is urbanized mainly due to various reasons like industrialization, transportation facilities, educational facilities, employment opportunities. In the state of Maharashtra, the factors of urbanization in West Maharashtra and East Maharashtra are different. Urbanization is happening rapidly in various states of western Maharashtra. Compared to this, the pace of urbanization in various districts of Eastern Maharashtra state is very slow. Urbanization is taking place at a fast pace mainly in the states of Pune, Nagpur, Solapur, Nashik. Compared to that, urbanization is decreasing in various districts like, Gadchiroli, in the eastern Maharashtra district of the state. The most important reason for this is the economic disparity in these areas, the underdevelopment of agriculture and industrialization, and the reasons for which urbanization is very low in these states.

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