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Spatio-Temporal Analysis of Population Growth and Urbanization in Ahilyanagar District, Maharashtra

Rahul Khandu Kadam

Abstract

Population growth and urbanization is one of the most important processes which is playing a great role in changing the social, economic and spatial structure of districts in India. The present study focuses on the spatio-temporal pattern of population growth and urbanization in the district of Ahilyanagar/Maharashtra which was earlier known as Ahmednagar/Ahmadnagar in Census publications. The analysis focuses mainly on the Census years 1991, 2001 and 2011, with earlier trends of population referred to when needed to give a longer-term perspective. Secondary data has been used for the study and was obtained from various sources including the Census of India, District Census Handbooks, Primary Census Abstracts, District Socio-Economic Reviews and publications by Government of Maharashtra. The indicators studied include: decadal population growth, rural-urban population ratio, level of urbanization, growth of urban population, number and size of urban centres and spatial concentration of urban population.

The results show that the population of the district in 1991 was 3.37 million, 4.04 million in 2001, and 4.54 million in 2011. The population growth rate was, however, significantly lower in 2001-2011. The proportion of urban population increased from 15.82% in 1991 to 19.89% in 2001 and 20.09% in 2011. The decade 1991-2001 thus marked an important period of urban transformation, with a growth in the urban population of over 50%. The district had 19 urban centres as of 2011, although urban development was not evenly distributed. The urban population of the district was largely concentrated in the city of Ahilyanagar and the other secondary towns of Kopargaon, Rahuri, Sangamner, Shirdi and other towns made up important sub-regional centres. The findings indicate that the city of Ahilyanagar is an example of a dispersed and hierarchical urbanization model, in which a central district city exists along with a set of agricultural-market, industrial, educational, administrative and pilgrimage cities.

The study recommends the shift from city-centred development in future plans for the development of Ahilyanagar and to promote intermediate towns, emerging peri-urban settlements, transport corridors, infrastructure, water management, housing, employment opportunities and coordinated rural-urban development.

Keywords*: Ahilyanagar, Ahmednagar, population growth, urbanization, spatial pattern, temporal change, census towns, rural-urban transformation, Maharashtra.*

Introduction

Urbanization is more than just a rise in the proportion of people living in towns and cities. It is a multi-dimensional process of demographic shifts, occupational transformation, migration, land use changes, growth of built-up spaces, services clustering and growing functional connections between rural and urban settlements. Urbanization in developing countries like India often manifests itself in ways which are very different from what is seen in highly industrialized countries, which tend to be characterised more by their metropolitan centres. The smaller towns, census towns, market settlements, pilgrimage centers, industrial nodes and peri-urban areas all have significant roles in the evolution of regional settlement systems.

India experienced an important change in its urban trajectory during 2001-2011. The percentage of the total population living in the urban areas rose from around 6% in 2000 to 31.16% in 2011, and for the first time since Independence, the number of people living in urban areas grew faster than the number of people living in rural areas (Bhagat, 2011). The creation and reclassification of census towns played an important role in this process as the rise of urbanization is not solely attributed to migration to metropolitan cities (Pradhan, 2013). Processes like in-situ urbanization, dispersed urban development, small-town growth and rural-urban economic integration have, therefore, been increasingly focussed in studies (Denis et al., 2012; Mukhopadhyay et al., 2020).

Maharashtra is one of the most urban and diversified economically states in India. There is however, significant intra-state variation. Highly urbanised districts linked to the Mumbai and Pune metropolitan areas share an existence with districts where agriculture still dominates the settlement pattern. The district of Ahilyanagar is a good example of such a transition zone. It includes a significant district headquarters, vital agricultural centers, industrial zones, educational facilities, pilgrimage sites (like Shirdi), sugar belts, market towns, and vast drought-affected rural regions.

The total area of Ahilyanagar district is 17,048 sq. km and as per 2011 Census, the population of the district was 4,543,159. Its vast size and wide variations in physical and economic environment have led to significant internal variations in population density and urbanisation.

The official Census records have always been known as Ahmadnagar or Ahmednagar. The present paper refers to the current name of the city as Ahilyanagar, but continues to employ the historical name in references and datasets when necessary.

Population growth in the district has not been uniform. Urbanization is focused in the city of Ahilyanagar and some of the towns to the north, west, and south of the study area, including Shrirampur, Sangamner, Kopargaon, Rahuri, and Shirdi. The other areas are still very rural, and some settlements show signs of a gradual transition from rural to urban. Therefore, it is not sufficient to analyse total population to understand demographic change. These questions require a spatial analysis to gain knowledge of the spatial distribution of urban population, the evolution of the town hierarchy and the trend of urbanization either diffused or focused in space over time.

The present study thus examines the spatio-temporal aspect of growth and urbanization phenomenon of the Ahilyanagar district with special focus on the changes in the district between 1991, 2001 and 2011.

The objectives of the Study are to:

The study intended to discuss about the patterns of population growth, analyse rural-urban population variation, measure urbanisation level and rate, identify the spatial distribution and hierarchy of the urban centres, discuss urban concentration of different areas of the district, discuss major causes of urbanisation and discuss planning implications of emerging patterns of population and urbanisation in the study area.

Review of Literature

Indian urban studies have been giving a considerable importance to the connection between population growth, migration, economic transformation, and urban development. The initial research related to Indian urbanization was primarily on the agglomeration of population in big cities and the steady shift of the workforce from agriculture to industry and services. Subsequent studies showed that the urban system in India was much more complex.

Sivaramakrishnan et al. (2005) analyzed the demographics, governance structure, migration pattern, historical pattern and policy dimension of Indian urbanization. They highlighted the importance of major regional contrasts and the requirement to look at urban change not just in the context of the metropolitan growth but as part of a wider system of settlements.

Bhagat and Mohanty (2009) studied contribution of migration to urban growth and showed that urban growth is generated by several factors namely; natural increase, rural-urban migration, expansion of existing urban centres and reclassification of rural settlements. Urbanization is especially relevant in the context of district-level analysis as an increase in the urban population does not necessarily imply the migration of large numbers to one city.

Kundu (2011) stated that regional and settlement class-based inequities are an important feature of India's urbanization. The distribution of development opportunities, infrastructure, investment, employment and institutional capacities within the urban hierarchy is unequal. While small and medium towns can play significant economic roles, they may not be getting the infrastructure investments they need.

Bhagat (2011) marked 2001-2011 as an important decade of the urban transition of India. The growth of population in urban areas has also outpaced the rural population growth and the growth of new census towns has played an important role in shaping the urban pattern.

Pradhan (2013) also found that newly identified census towns had a substantial share of urbanization. Many of these settlements were not clustered in metropolitan areas, but rather were independent processes of local economic and demographic change.

To express the significance of small and medium sized urban nodes outside the metropolitan sphere, Denis et al. (2012) coined the term 'subaltern urbanization'. They challenged the notion that Indian urban growth is mostly driven by the growth of large cities. Smaller centres could be strongly linked to neighbouring agriculture areas, local markets, industrial networks, pilgrage activity and regional transport systems.

Mukhopadhyay et al. (2020) later expanded this argument, emphasizing the importance of the networks of dispersed settlement and local agency, as well as the urbanization outside of traditional metropolitan areas. This is very relevant to the case of Ahilyanagar, which is characterized by the presence of a large urban center that has many functional and secondary urban centers.

Shaw (2005) has highlighted the peri-urban interface and how the process of urbanization affects the surrounding rural spaces as a result of changing land use, occupation, infrastructure, waste generation and environmental pressures. These processes are gaining in importance around district headquarters and in the development of secondary towns.

The National Institute of Urban Affairs 2017 found that smaller cities in India may be facing issues of housing and basic facilities despite their growing demographic and economic significance. Roy and Pradhan (2018) also highlighted the relevance of census towns and the future urban settlements in the urban path of India.

Research that specifically looks at Ahmadnagar/Ahilyanagar has found that the proportion of urban population is increasing over time, but the district remains predominantly rural. The evidence from the census indicates that the urban population has risen from 15.82% in 1991 to 19.89% in 2001 and 20.09% in 2011. The number of urban centres grew from 13 to 18 then to 19 in the same time.

These three analytical propositions are suggested by the literature. The first is that population growth and urbanization should be separated as a district may grow whilst urbanization proceeds at a slower rate. Second, urban transformation is linked to changes in census classification, and the expansion of smaller settlements. Thirdly, the spatial hierarchy of settlements will influence spatial distribution of the benefits and pressures of urbanisation. The present study extends the above perspective by not only examining the city of Ahilyanagar but the district level settlement system.

Study Area, Database and Methodology

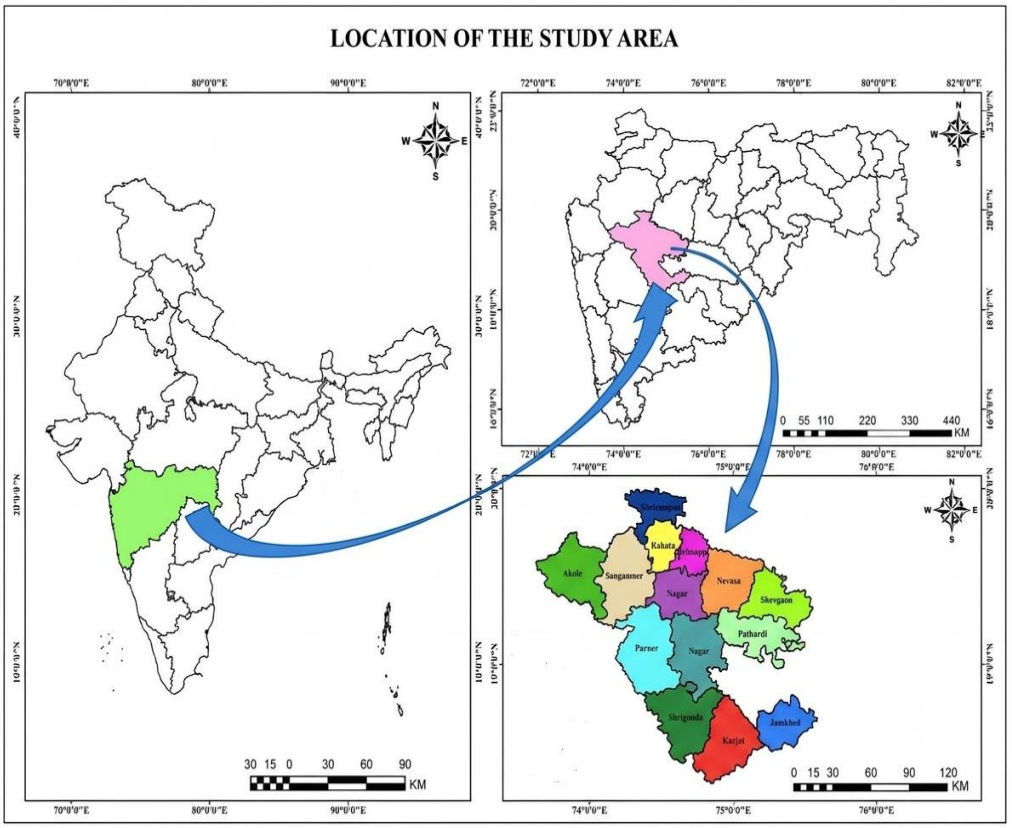
1 Study Area

Ahilyanagar is a part of Nashik revenue division, situated in the western part of Maharashtra. It lies approximately between 18.2° and 19.9° north latitude and 73.9° and 75.5° east longitude. The district is one of the largest geographically in Maharashtra as it spans an area of approximately 17,048 sq. km. The topography is hilly in the west and north west and lower and drier in the east. Spatial variations in rainfall have historically affected agriculture, settlement density, irrigation potential, and economic opportunities.

Today, the district has 14 tahsils. There were 1,581 inhabited villages and 19 urban centres in the settlement structure in 2011. The city of Ahilyanagar is the administrative and the largest urban centre of the district and several smaller centres around the region have commercial, educational, industrial, religious and administrative services for their respective regions.

The local administration has then undergone changes. Currently, the district administration recognizes a mix of one municipal corporation, municipal councils, and nagar panchayats, showing the ongoing institutional transformation of the urban system following the 2011 Census.

Map No. 01: Location of the Study Area: Ahmednagar/Ahilyanagar District, Maharashtra



2 Database

This study is entirely of secondary data. The primary sources are the District Census Handbooks of Ahmadnagar/Ahmednagar, Census of India, 1991, 2001 and 2011, Primary Census Abstract 2011, population information on Towns and Villages, District Socio-Economic Reviews (DSERs), published by Directorate of Economics and Statistics, Government of Maharashtra and official sources from the Ahilyanagar district administration.

The Primary Census Abstract for Census 2011 gives information on district, sub-district, village, town and ward level which are very suitable for spatial population analysis.

As of the time this study is prepared, the Census 2027 has been notified, but the results of the population enumeration have not yet been released. This makes the 2011 population census the most recent census to have comprehensive district, rural, urban, sub-district and town-level data. All post-2011 administrative data is therefore used only to gain insight into the conditions of the institutions at the time, and not to replace the Census population counts.

3 Methods of Analysis

The temporal analysis is primarily undertaken for 1991, 2001, and 2011. The following measures are used.

Decadal Growth Rate (%) = $[(P_2 - P_1) / P_1] \times 100$

where P_1 is the population at the beginning of the decade and P_2 is the population at the end of the decade.

Urbanization (%) = (Urban Population / Total Population) × 100

Urban Growth (%) = $[(U_2 - U_1) / U_1] \times 100$

where U_1 and U_2 represent urban population in two consecutive Census years. Spatial analysis is based on the distribution of towns among tahsils, town population size, relative share of major towns in district urban population, and the functional geography of different parts of the district.

Results and Analysis

1 Temporal Pattern of Total Population Growth

The population of Ahilyanagar district increased substantially during the late twentieth and early twenty-first centuries. However, the pace of increase has not remained constant.

Census Year	Total Population	Absolute Increase	Decadal Growth (%)
1981	2,712,491	—	—
1991	3,372,935	660,444	24.35
2001	4,040,642	667,707	19.80
2011	4,543,159	502,517	12.44

Source: Census of India and District Census Handbook, Ahmadnagar.

The district's population increased from approximately 3.37 million in 1991 to 4.04 million in 2001 and 4.54 million in 2011. A major feature of the demographic transition is the progressive decline in the decadal growth rate. Population increased by approximately 24.35% between 1981 and 1991. The rate fell to 19.80% during 1991-2001 and further to 12.44% during 2001-2011.

The fall does not mean that the district stopped growing. More than half a million persons were still added during 2001-2011. It instead indicates a transition from rapid demographic expansion towards a relatively slower growth regime.

Declining fertility, changing household structures, out-migration from drought-prone and agriculturally vulnerable areas, changing economic opportunities, increasing educational attainment, and broader demographic transition may all have contributed to this trend. However, the relative contribution of each factor requires separate household or migration-level data and cannot be determined solely from aggregate population figures.

2 Rural-Urban Transformation

A more important change becomes visible when total population is divided into rural and urban components.

Census Year	Rural Population	Urban Population	Rural Share (%)	Urban Share (%)
1991	2,839,454	533,481	84.18	15.82
2001	3,236,945	803,697	80.11	19.89
2011	3,630,542	912,617	79.91	20.09

Source: Census of India; District Census Handbook; Directorate of Economics and Statistics, Maharashtra.

The urban population increased from approximately 0.53 million in 1991 to 0.80 million in 2001 and 0.91 million in 2011. The rural population also continued to grow, increasing from approximately 2.84 million to 3.63 million during the same twenty-year period.

The district therefore remained predominantly rural throughout the period. Even in 2011, nearly four out of every five residents lived in settlements classified as rural. Nevertheless, a clear increase in the level of urbanization took place. Urban population accounted for 15.82% of the total population in 1991, 19.89% in 2001, and 20.09% in 2011.

The most substantial shift occurred between 1991 and 2001, when the level of urbanization rose by more than four percentage points. By comparison, the increase between 2001 and 2011 was only 0.20 percentage points. This distinction is important. The urban population continued to grow after 2001, but urbanization as a proportion of total district population almost stabilized. Rural and urban populations were therefore growing at more comparable rates during 2001-2011 than during the preceding decade.

3 Changing Pace of Urban Population Growth

Period	Urban Population Growth (%)	Rural Population Growth (%)	Total Population Growth (%)
1991-2001	50.65	14.00	19.80
2001-2011	13.55	12.16	12.44

The contrast between the two decades is striking. During 1991-2001, the district's urban population increased by approximately 50.65%, compared with only 14.00% growth in rural population. This explains the substantial increase in the level of urbanization from 15.82% to 19.89%.

Between 2001 and 2011, however, urban growth declined sharply to 13.55%, while rural population increased by 12.16%. The difference between the two growth rates became very small. Thus, the district experienced a phase of accelerated urban transition during the 1990s followed by a phase of slower and more balanced rural-urban demographic growth after 2001.

Several processes can produce such a pattern. These include slower natural population increase, reduced migration towards certain urban centres, saturation of existing towns, economic restructuring, and changes in census classification. The Census framework itself is important because an area may become functionally urban without immediately receiving statutory urban status (Pradhan, 2013; Roy & Pradhan, 2018).

4 Growth in Number of Urban Centres

Census Year	Number of Urban Centres
1961	5
1971	6
1981	8

Census Year	Number of Urban Centres
1991	13
2001	18
2011	19

The urban settlement system expanded substantially over the second half of the twentieth century. The number of towns rose from only five in 1961 to nineteen by 2011. The strongest increase occurred between 1981 and 2001.

The increase indicates that urbanization occurred not only through the growth of existing towns but also through the addition or recognition of new urban settlements. This pattern resembles broader Indian processes identified by Pradhan (2013), Denis et al. (2012), and Roy and Pradhan (2018), who argue that urban transformation frequently takes place through dispersed, smaller settlements rather than solely through metropolitan concentration.

5 Spatial Distribution of Urban Centres in 2011

The district contained 19 Census-recognized towns in 2011. Their distribution was highly uneven among tahsils. Nagar tahsil contained the largest cluster of urban centres, including Ahmadnagar Municipal Corporation, Ahmadnagar Cantonment, Nagapur, Burhanagar, Nagardeole, and Darewadi. Sangamner, Rahuri, and Rahta also contained more than one urban centre, whereas Nevasa, Shevgaon, and Parner had no Census-recognized town in the 2011 settlement structure.

The distribution therefore produced three broad spatial zones. The central urban concentration, dominated by Ahilyanagar city, forms the administrative, commercial, educational, health-care, military, and service centre of the district.

The northern and north-western belt, including Sangamner, Kopargaon, Shrirampur, Rahuri, Shirdi, Rahta, and nearby settlements, contains an important chain of secondary urban centres. Irrigated agriculture, sugar industries, trade, transport, educational institutions, agro-processing, pilgrimage tourism, and relatively strong regional connectivity have supported this pattern.

The southern and eastern region, including Karjat, Jamkhed, Pathardi, and Shrigonda, contains smaller and more widely dispersed urban centres. Larger rural territories, variable irrigation conditions, drought vulnerability, and a lower density of major economic centres contribute to a different settlement structure.

6 Hierarchy of Urban Centres

The populations of the principal urban centres in 2011 demonstrate a strong hierarchy.

Urban Centre	2011 Population	Share of District Urban Population (%)
Ahilyanagar Municipal Corporation	350,859	38.45
Shrirampur	89,282	9.78
Sangamner	65,804	7.21
Kopargaon	65,273	7.15
Rahuri	38,813	4.25
Shirdi	36,004	3.95
Jamkhed	34,017	3.73
Shrigonda	31,134	3.41

Source: Census of India, 2011.

By far the largest urban centre was Ahilyanagar Municipal Corporation with about 38.45% of the urban population of the district. The next largest centre was Shrirampur with less than 90,000. The four most populous urban centres (Ahilyanagar city, Shrirampur, Sangamner and Kopargaon) had nearly 62.6% of the urban population of the district.

This is an illustration of the high level of concentration (at the highest level in the urban hierarchy) despite the geographically dispersed overall urban settlement system. The entire structure of the town in 2011 also consisted of Pathardi, Deolali Pravara, Rahta Pimplas, Ghulewadi, Nagardeole, Karjat, Rajur, Nagapur, Darewadi, Burhanagar and some other smaller urban settlements.

7. The municipality is the primary urban centre of the city, with its population size of Ahilyanagar.

In the year 2011, the population of Ahilyanagar city was 350,859, which was significantly higher than that of all the other towns in the district. It is a dominant species because it is used for a variety of purposes. It is the seat of administrative, educational, medical, wholesale and retail trade, banking, transport, military and small and medium scale industries and professional services.

The peri-urban development can also be seen in the settlement pattern around the city. Census towns and settlements like Nagapur, Burhanagar, Nagardeole and Darewadi are part of a larger urbanizing zone that is affected by economic and spatial growth of the main city.

This is in line with the thinking that Shaw (2005) uses in describing the peri-urban interface: portions of rural areas that increasingly incorporate urban land uses and the urban way of life, the governance of which may not keep up with physical change, and the infrastructure that supports the new urban way of life.

Infrastructure, waste management, public services, housing, drainage, transportation, groundwater, and agriculture are all vulnerable to the impacts of urbanization in these locations. Future studies need to analyze the urban growth of built-up area within Ahilyanagar urban region on the basis of satellite data and GIS based change detection of land use.

8 Secondary Town Network

Shrirampur, Sangamner and Kopargaon constitute an important secondary level within the urban hierarchy in the district. The population of Shrirampur in 2011 was about 20,000, that of Sangamner was over 65,000 and that of Kopargaon was over 65,000. These towns offer services that are larger than local municipal services.

They are linked to regional markets, agricultural commercialization, the development of the sugar industry, educational institutions, health services, transport linkages, banking, agro-processing and administration.

Shirdi is a unique urbanisation. Its population size alone does not reflect its functional importance, as religious tourism creates a large floating population, and creates demand for hotels, restaurants, transport, retail, real estate and public infrastructure.

Rahuri serves a dual role in the functions of both the market and education and is affected by agricultural research and higher education. Other local administrative and market centres such as Shrigonda, Jamkhed, Pathardi, Karjat and small centres have large rural hinterlands. Therefore, it is not possible to determine the degree of urbanization by population itself. It is also important to have functional specialization.

9 Rural Dominance and Emerging Urban Linkages

Although the population is becoming urban, Ahilyanagar still had a rural population of 79.91% in 2011. A high proportion of rural population makes this district more different from the Maharashtra state average, which is much more urbanized.

At the same time, the conventional separation between urban and rural is becoming increasingly inadequate. Rural households rely on towns for education, specialized health care, farm inputs, banking services, markets, jobs, transportation, government services and consumer goods. Rural economies are equally critical to the needs of the urban ones in terms of agricultural products, labour, land, water and demand.

The district is thus not two distinct settlement systems, but a continuum between rural and urban. This observation is consistent with the main points made by Denis et al. (2012) and Mukhopadhyay et al. (2020) on the need to establish local and regional linkages between smaller urban centres and their rural hinterlands.

Factors that affect the growth of the population and urbanization

Agricultural Development and Irrigation.

The agricultural sector is still playing a key role in the economy of Ahilyanagar. Surpluses of agricultural output are available to assist in processing, transporting, storing, extending credit, operating machinery, retailing, and providing service-sector jobs in areas with better irrigation and more commercially valuable crops. Historically, the development of several towns in the northern and western part of the State was made possible by the expansion of sugar cooperatives and agro-processing activities.

Industrialization

Non-agricultural jobs have been generated and the economy of the town or selected growth centres have been boosted by industrial development around the Ahilyanagar city. Industrialization also creates indirect jobs in logistics, housing, retail and repair, finance and construction.

Transport Connectivity

The market and service centres are more likely to be found in settlements along the major transport corridors and regional transport routes. Better mobility also enables people to live in smaller towns and commute to bigger cities for work.

Administrative Functions

Public institutions, courts, hospitals, educational institutions, banking, and other formal sector activities are present in district/tahsil headquarters. The primacy of Ahilyanagar is largely due to its administrative function.

The Institute of Education and Health Services provides education and health services.

The distribution of higher order education and medical services is skewed towards the urban setting. Other activities within a school, such as student, employee, patient, and related service rentals, create demand for other services, such as rental housing, transportation, food services, and commercial establishments.

Pilgrimage and Tourism

Shirdi clearly shows the potential of religious tourism to create urban economic functions that exceed the proportion of the population in the city. The influx of tourists stimulates development in the tourism sector, the hospitality sector, transportation, real estate and municipal infrastructure.

Occupational and migration transformation.

Migration is only part of the urban growth process yet the findings of Indian research show that this should not be the only mechanism (Bhagat & Mohanty, 2009). There are also urban population growth components that are in-situ but not considered occupations, such as natural increase, reclassification of settlements, and expansion of municipal boundaries.

Environmental Constraints

There are significant drought prone areas in the district and the rainfall is irregular. Availability of water thus has significant implication on rural livelihood and urban expansion. Rapid population concentration can lead to: increase in stress on groundwater and municipal supply systems, if water and land management are not sustainable.

Discussions and planning implications

The spatio-temporal evidence indicates a slow urban shift which is localized and has a clear relation to the rural economy of the district.

The first larger perceptive is the rate of deceleration of total population growth. The decadal growth rate fell from approximately 24.35% during 1981-1991 to 19.80% during 1991-2001 and 12.44% during 2001-2011. Assumptions of uniform population growth should therefore not be made when planning.

Second, the district underwent a fast urbanization process in the 1990s and reached more or less stability since 2001. Urban population grew by more than 50% between 1991 and 2001 but only 13.55% during 2001-2011.

Third, the process of urbanization is a hierarchical process. The system is controlled by Ahilyanagar city, but this does not mean that the secondary towns lose their regional importance. Fourth, the district shows multiple centers. Sangamner, Kopargaon, Shrirampur, Shirdi, Rahuri and other towns are regional centres rather than 'suburbs' of Ahilyanagar city.

This development is similar to the so-called dispersed or subaltern urbanization that Denis et al. (2012) have referred to. It suggests that urban policy should not focus investment just on the largest city.

Poorly designed drinking-water, sewerage, and solid-waste management, limited access to affordable housing, poor public transportation, inadequate health infrastructure, limited digital connectivity, and poorly designed commercial infrastructure are all needed in small and medium towns. The smaller towns in the Indian urban system are also stressed by the National Institute of Urban Affairs (2017) due to the lack of infrastructure.

The district also needs to better coordinate between land use planning and provision of infrastructure. Adminstratively rural settlements can continue to serve an urban function even as they develop an urban employment base, urban density, urban building and urban land markets. The mismatches can result in governance holes. The urban and regional planning should therefore be able to identify the villages that have urban characteristics at periodic intervals and develop the strategies for infrastructure development before the size of the villages becomes too large to manage.

The other important issue is peri-urban expansion of the city of Ahilyanagar. Highway development and development along the edge of the villages can lead to ribbon development, dispersal of land use, traffic jams, poor drainage, and increasing land prices. While a metropolitan approach to regional planning might not yet be required, integrated planning between the municipal authority and neighboring rural authorities is growing more critical.

Availability of water should continue to be a key element of urban development strategy. The population growth and industrial development have to be thought of without detachment from the district's irregular rainfall and drought periods. As urban settlement expands, water efficient urban infrastructure, wastewater treatment and reuse, groundwater regulation, watershed management and protection of recharge zones should follow.

The connectivity between secondary towns should be strengthened instead of just radial connectivity with Ahilyanagar city. Improved inter-town connections can help to support a more balanced regional economy and minimise over-concentrations of jobs and services.

The district also needs new population evidence. The next Census is especially significant as the population will have been significantly changed since 2011, and this is a significant gap between censuses. Peri-urban settlements and growing villages will be assessed for their potential to have moved beyond urban boundaries, and for changes in the urban town hierarchy, in Census 2027.

Major Findings

- The study points out that the population has grown significantly in the Ahilyanagar district during 1991-2011 period, with the growth rate decreasing gradually over time.
- Total population rose from 3.37 million in 1991 to 4.54 million in 2011. Decadal growth rate of population went down to 12.44% in 2001-2011.
- The urban population increased from 533,481 in 1991 to 912,617 in 2011, while the level of urbanization rose from 15.82% to 20.09%.
- The most intense period of urban change was between 1991–2001. The rate of increase in urban population during the decade 1991-2001 is around 50.65% as compared to 13.55% during 2001-2011.
- The towns and cities grew in number over time from five in 1961 to nineteen in 2011.
- Spatial inequality of urbanisation continued. The number of urban settlements was the highest in nagar tahsil and there were several tahsils which did not have a formally defined town in 2011.
- Ahilyanagar Municipal Corporation was the most prominent urban centre with about 38.45% share of urban population in the district.
- Secondary towns like Shrirampur, Sangamner, Kopargaon, Rahuri, Shirdi, Jamkhed, Shrigonda were an important distributed urban network.
- The urban geography of the northern and western areas of the district were relatively robust when compared with many of the rural areas in the eastern side.
- The district was largely rural, indicating an urbanization process based on a dynamic rural-urban settlement network rather than on the complete urbanization of the district.

Conclusion

Spatio-temporal trend of population growth and urbanisation in the district of Ahilyanagar illustrates a complex shift in the settlement system from predominantly agrarian to more diversified regional economy, between rural and urban sectors.

During the period 1991-2011 the population grew by over one million people. However, the decadal growth rate has diminished and suggests a gradual demographic transition. Concurrently, urbanization rates increased from 15.82% to 20.09% of the population, and 17.97% of the economic functions were in urban areas, reflecting the long-term trend of urbanization.

The decade of 1991-2001 was especially significant because there was a significant growth rate between rural and urban populations. Since 2001, however, urban growth decreased dramatically. This demonstrates that the rate of urbanisation does not always follow a linear path and that district-level processes can vary from national and state processes.

Urbanisation is concentrated and dispersed in Ahilyanagar. It is also concentrated due to the presence of high proportion of urban population in Ahilyanagar city. Its dispersion is also due to the presence of a network of various independent secondary towns such as Shrirampur, Sangamner, Kopargaon, Rahuri, Shirdi, Jamkhed and Shrigonda which have functional significance in the region.

The district should not, therefore, be planned simply as a single urban area with a surrounding rural area. It needs to be understood as a regional settlement system, a system of settlements interconnected and which includes a dominant city, secondary towns, small urban centres, peri-urban settlements and large rural areas.

The future development strategies must reinforce the secondary towns, promote better water management, better environmental management, urban services to fast-growing settlements, better coordination of peri-urban land-use planning, better inter-town transportation, increase the employment potential outside the largest town, and urbanization and rural development.

The upcoming Census 2027 will be important to take the analysis beyond 2011. New population data at the settlement level, together with satellite images and GIS techniques, will enable the establishment of new urbanised areas corridors, the measurement of built-up areas growth, the analysis of land uses change, and the assessment of the nature of the district's emerging urbanised structure, whether it is more polycentric or more concentrated.

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Conflicts of interest

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