URBANIZATION IN INDIA: A SPATIAL-TEMPORAL ANALYSIS

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Abstract:

Both a resource drain and a sign of growth, urbanisation has been acknowledged. The latter factor is especially important in emerging nations since urbanisation is happening so quickly there. Numerous difficulties raised by rapid urbanisation might have both beneficial and harmful effects on the environment. Rapid urban population increase brought on by rural-to-urban migration and small-to-large city migration is causing issues including urban congestion, subpar housing, congested transportation, a lack of essential amenities, poor health, low educational attainment, and unemployment. Such issues in rich nations might worsen from their current chronic condition. Planning, management, governmental, and non-governmental organisations play a critical role in monitoring urbanisation as they adopt policies to maximise the use of natural resources, support growth, and lessen the impact on the environment. The goal of the current study is to comprehend the rate, trends, and geographical patterns of urbanisation in India from 1991 to 2011.

Keywords: Population, Urbanization, Growth & Spatio-temporal Analysis**,**

Introduction

Urbanization refers to the process of population concentration in urban areas, including the growth of cities and the increase in the proportion of a country's population living in urban areas. Here's an overview of the status of urbanization at the global level: Urbanization has been a prominent global trend over the past century. In 1950, only about 30per cent of the world's population lived in urban areas, but by 2021, it is estimated that more than 55per cent of the global population resides in cities. The rate of urbanization has been particularly rapid in developing regions, such as Africa and Asia. Many cities across the world have experienced significant growth in population and physical size. Megacities, defined as urban areas with

populations exceeding 10 million, have become increasingly common. Examples include Tokyo, Delhi, Shanghai, and São Paulo. The growth of these megacities presents various challenges in terms of infrastructure, housing, transportation, and resource management.

The pace and patterns of urbanization vary across different regions. Developed regions, such as North America and Europe, have already experienced high levels of urbanization, with a significant proportion of their populations residing in cities. Meanwhile, regions like Africa and Asia are currently undergoing rapid urbanization, driven by factors such as population growth, rural-urban migration, and economic opportunities in urban areas.

In 1900, just 13 per cent of the world's population lived in cities; this number rose to 29per cent in 1950 and to roughly 50 per cent by the 20th century's end (United Nation, 2005). The trend of urbanisation between industrialised and developing nations, however, may be observed to be quite uneven. As opposed to developing nations, where the bulk of people reside in rural regions, developed countries' populations are mostly urban. On the other hand, Asia and Africa are home to the majority of the developing world's urban populations. Following the industrial revolution, the process of urbanisation accelerated in the western world, causing the construction of transportation and communication infrastructure, which fuelled a rise in rural-to-urban migration.

Increasing since, rapid urbanisation leads to the haphazard and uncontrolled expansion of cities, urbanisation and urban agglomeration provide the greatest problem of the twenty-first century. Planning should be done in a sustainable way to provide all utility services in order to maintain this fast urban expansion. Western civilization's development of transportation and communication infrastructure led to an increase in rural-to-urban migration. Increasing The biggest issue of the twenty-first century is caused by fast urbanisation, which results in the unplanned and unrestrained growth of cities. Planning needs to be done sustainably to offer all utility services in order to maintain this rapid urbanisation. To make informed decisions about future planning, planners, administrators, and urban developers should be familiar with the current degree, trend, and pattern of urbanisation. In order to comprehend the degree, trends, and spatial patterns of urbanisation in India between 1991 and 2011, the current study effort uses Geographical Information System (GIS) technology.

Objective

The main objective of the present study is to clench the level, development, and geographical distribution of urbanisation in India from 1991 to 2011. The put some crucial recommendations for policymakers and planners to deal with the burden of population growth in major cities and unplanned urban development.

Database and Methodology

The census statistics from the years 1991 to 2011 provide the foundation of the current analysis. Numerous census volumes pertaining to rural-urban population distribution, directories of towns, general population tables, and cities have been used. For the purposes of monitoring and mapping, a state is used as the unit of research. Geographical Information System (GIS) technology is used to analyse and visualise the data that has thus been gathered. The spatial patterns emerging from the maps are analysed and interpreted by correlating the degree of urbanisation with various demographic and socio- economic variables. The formula for calculating the urban concentration using as under:

Urban Concentration = (Urban Population / Total Population) * 100

Decadal Differential = (Present Urban Population – Past Urban Population)

The thematic maps have been prepared by using ArcGIS 10.3 version software and data have been classified on basis of natural jerk method.

Urbanisation: A Global Context

By 2050, there will be 6.3 billion people living in urban areas throughout the world, up from 3.6 billion in 2011. The urban population of the globe will probably equal the size of the global population in 2002 by the middle of the century. Urban areas in less developed regions, where the population is anticipated to rise from 2.7 billion in 2011 to 5.1 billion in 2050, will account for the majority of the world's anticipated population expansion (United Nation, 2011).

Urbanisation in India

India now has the second-largest population behind China, and by 2050 it is expected to surpass China's population by 1.6 billion. With a population of 1210 million around the turn of the century, India has crossed the billion-person milestone (nearly four times its 361 million population in 1951). The population expanded overall from 23.84 crores in 1901 to 121 crores in 2011, however only 2.58 crores of that people lived in urban areas, up from 37.71 crores in 2011 (Figure 1). Between 1901 and 2011, the number of urban agglomerations/towns increased from 1827 to 7935. Up until 1971, just one fifth of the overall population was considered to be urban, indicating an extremely sluggish trend of urbanisation. The percentage of people living in cities rose from 17.29 per cent in 1951 to 31.66per cent in 2011 (Table 1). Rural to urban migration and fast industrialisation are to blame for the last decades' tremendous expansion. India had a 23.33 per cent urban population in 1981, and the census that year counted 1054 new towns as the primary driver of this growth.

Table 1: Trend of Urbanisation in India, 1901-2011

Census Years	Urban Population (In %)	Rural Population (In %)	Number of UA/Town
1901	10.84	89.15	1,827
1911	10.29	89.71	1,815
1921	11.18	88.82	1,949
1931	11.99	88.01	2,072
1941	13.86	86.14	2,250
1951	17.29	82.71	2,843
1961	17.97	82.03	2,365
1971	19.91	81.76	2,590
1981	23.33	76.66	4,029
1991	25.72	74.28	4,689
2001	27.78	72.22	5,161
2011	31.16	68.84	7,935

Source: Census of India, 2011.
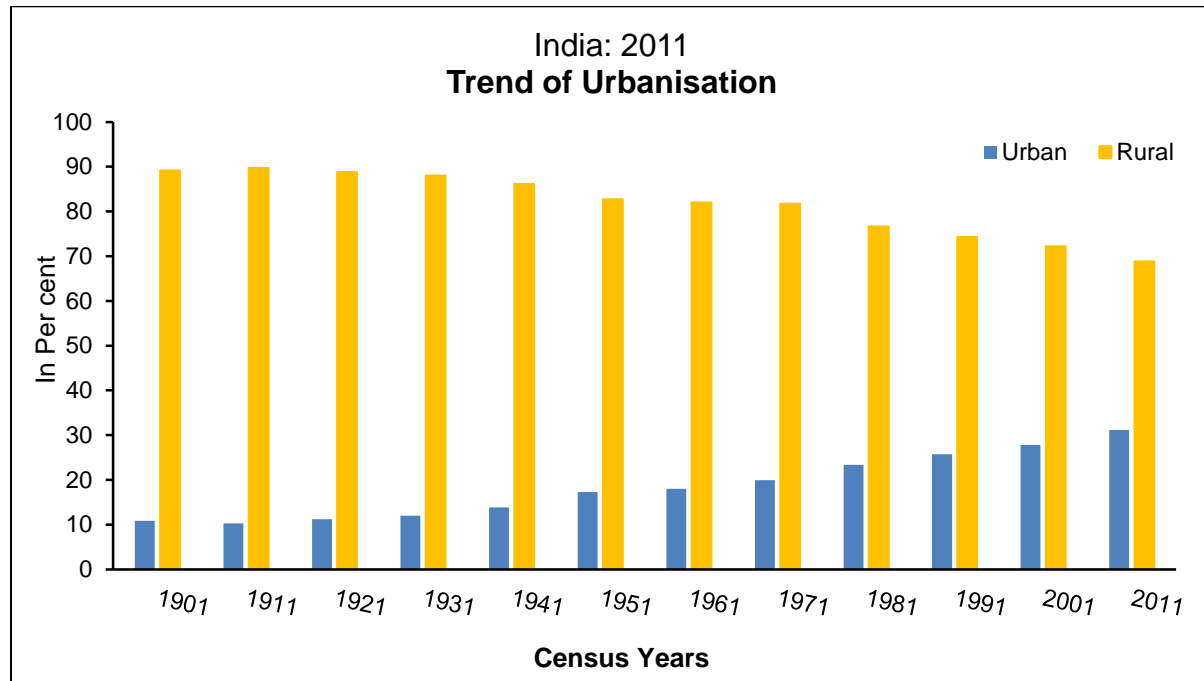
Source: Census of India, 2011.

Figure 1

It was reflected in the urban population's decennial growth rate, which was 46.14 percent between 1971 and 1981.It is now the highest decadal growth rate for the urban population that the Indian Census has ever noted. However, after peaking in the years 1971–1981, India's decennial growth rate began to decline in the years 1981–1991. Between 1981 and 1991, it was 36.47 per cent, and 25.72 per cent of the population lived in urban areas (Figure 1).

It reached 31.16 per cent in 2011, while the decadal growth rate from 2001 to 2011 was 31.80per cent, demonstrating the trend's persistence (Table 2 & Figure 1). In India, there are variances in the degree of urbanisation and the decadal growth rate of the urban population, as well as intrastate variations.

Decadal Growth Rate of Urbanization

The decadal growth rate of urbanization in India refers to the rate at which the urban population of the country has been increasing over a decade. According to that census, the decadal growth rate of urbanization in India between 1901 and 2011 was approximately 0.35 per cent to 31.80 per cent respectively.

Table 2: Decadal Growth Rate of Population, 1901-2011

Census Years	Total Population (in %)	Urban Population (in %)
1901-1911	5.75	0.35
1911-1921	-0.31	8.27
1921-1931	11.00	19.12
1931-1941	14.22	31.97
1941-1951	13.31	41.42
1951-1961	21.64	26.41
1961-1971	24.80	38.23
1971-1981	24.66	46.14
1981-1991	23.87	36.47
1991-2001	21.54	31.13
2001-2011	17.64	31.80

Source: Census of India, 2011.
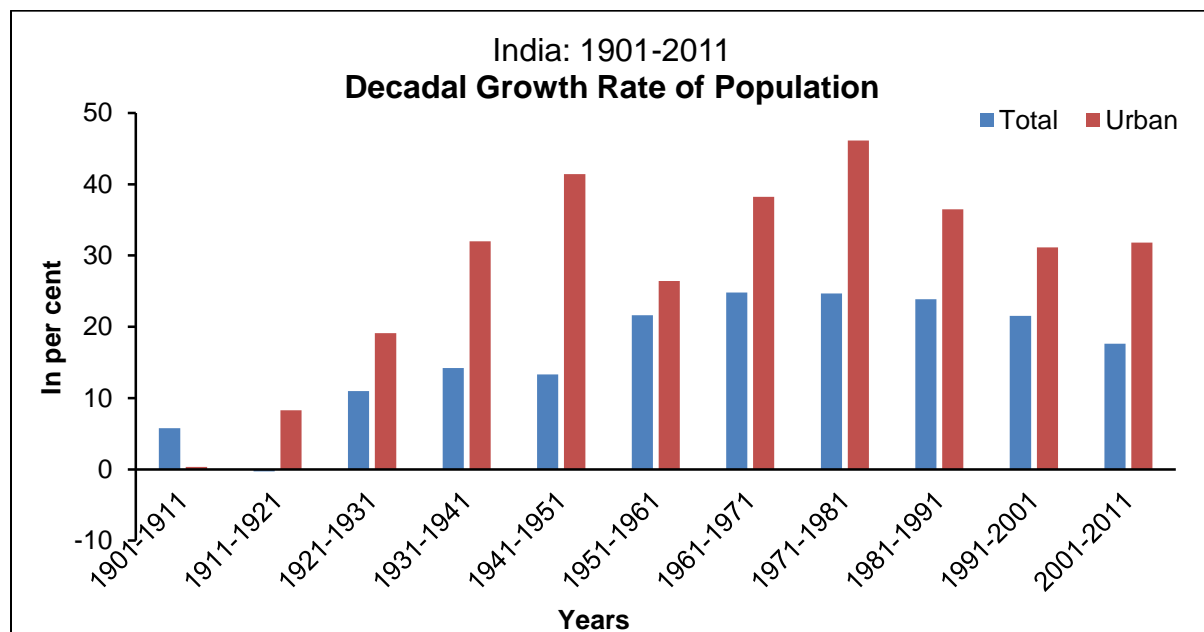
Source: Census of India, 2011.

Figure 2

It's important to note that in the last hundred years urbanization has been increased approximately 30 per cent. During 1931-1941, level of urbanization was below 20 percent in India. In the next decade, rate of urbanization has been changed with almost 10 per cent. Which means urban population have been increased by one per cent annually. To obtain the latest

decadal growth rate of urbanization in India. India had experienced highest urban concentration of population during 1971-81 with (46.14 per cent). After 1981, India has faced sharp declined in the urban concentration. During 1981-91, level of urbanization has been declined by almost 8 per cent. The level of urban population has started gradually increasing since last decade (Table 2 & Figure 2).

Level of Urbanisation in India

The eight most developed states—Goa, Mizoram, Tamil Nadu, Kerala, Maharashtra, Gujarat, Karnataka, and Punjab—have a disproportionately high concentration of urban residents and account for roughly half of the nation's urban population.

With regard to the degree of urbanisation, there were significant geographical differences throughout the states and union territories. Goa is the most urbanised state, with 62.17 per cent of its inhabitants living there, followed by Mizoram (51.51 per cent), Tamil Nadu (48.45 per cent), and Kerala (62.45 per cent). (47.72 per cent). Himachal Pradesh, which has a 10.04 percent urban population, is the state that falls behind, followed by Bihar (11.3 per cent), Assam (14.03 per cent), and Orissa (16.68 per cent). Other states with lower rates of urbanisation than the national average include Uttar Pradesh, Rajasthan, Madhya Pradesh, Chhattisgarh, and Jharkhand.

Only 15 states and union territories, however, exhibit an increase in the urban population growth rate between 2001 and 2011 as compared to 1991 to 2001, which is a significant change in the national trend of dropping urban population growth rate. India's spatial patterns of population concentration in cities and towns is dependent on a variety of elements. The physical environment, beginning population size, economic structure, and functional qualities, among other things, are the main factors that influence the increase of the population in urban centres. A region's total urban expansion is a result of rapid industrialisation, job opportunities, transportation, and communications infrastructure. Therefore, the geographical pattern of urbanisation may be a useful indicator of a region's progress. The states may be categorised into five groups based on their level of urbanisation, and the proportion of each group's urban residents to the overall population is shown below.

i. Areas of very high concentration (> 80 per cent)

ii. Areas of high concentration (60-80 per cent)

iii. Areas of medium concentration (40-60 per cent)

iv. Areas of low concentration (20-40 per cent)

v. Areas of very low concentration (< 20 per cent)

Using the five stages of urbanisation mentioned above, an attempt has been made to spatially map out urbanisation in India from 1991 to 2011 for the previous census.

Areas with very high degree of urbanisation

In the nation, there is a lot of variety in the geographic patterns of urbanisation. Due to improved transportation, communication, and city planning, more than 80 per cent of the population in the two union territories of Chandigarh and Delhi has resided in urban areas over the past three censuses. Numerous regions in India had a relatively high level of urbanisation in 1991 (Table 3).

In 1991, there was a significant level of urbanisation in the Bengaluru Metropolitan Area, which is focused on the city of Bengaluru (also known as Bangalore). Bengaluru is a significant centre for IT and technology and is known as India's "*Silicon Valley*." In 1991, there was also a considerable urbanisation taking place in the Hyderabad Metropolitan Area, which includes the city of Hyderabad. Hyderabad is well-known for its pharmaceutical, IT, and software industries, among other industries. These are only a few instances of places in India in 1991 that had a high level of urbanisation. For a current knowledge of urbanisation in India, more recent data should be reviewed since it is crucial to remember that patterns and degrees of urbanisation may have altered in the years since then.

Areas with high degree of urbanisation

According to the 2011 Census of India, Goa has the highest percentage of residents who live in urban areas (62.17 per cent), making it the most urbanised state in the country. Because of their advantageous position alongside well-built highways and railway lines and high literacy rates, three union territories—Pondichery, Lakshadweep, and Daman & Diu—were placed in this category during the 2011 census period.

Areas with moderate degree of urbanisation

According to the 1991 Census of India, this group includes the states of Goa and Mizoram as well as the union territories of Daman & Diu and Lakshadweep (Map 3). Maharashtra and Tamil Nadu were included to this category in 2001.

Table 3: Levels of Urbanizations in Haryana, 1991-2011

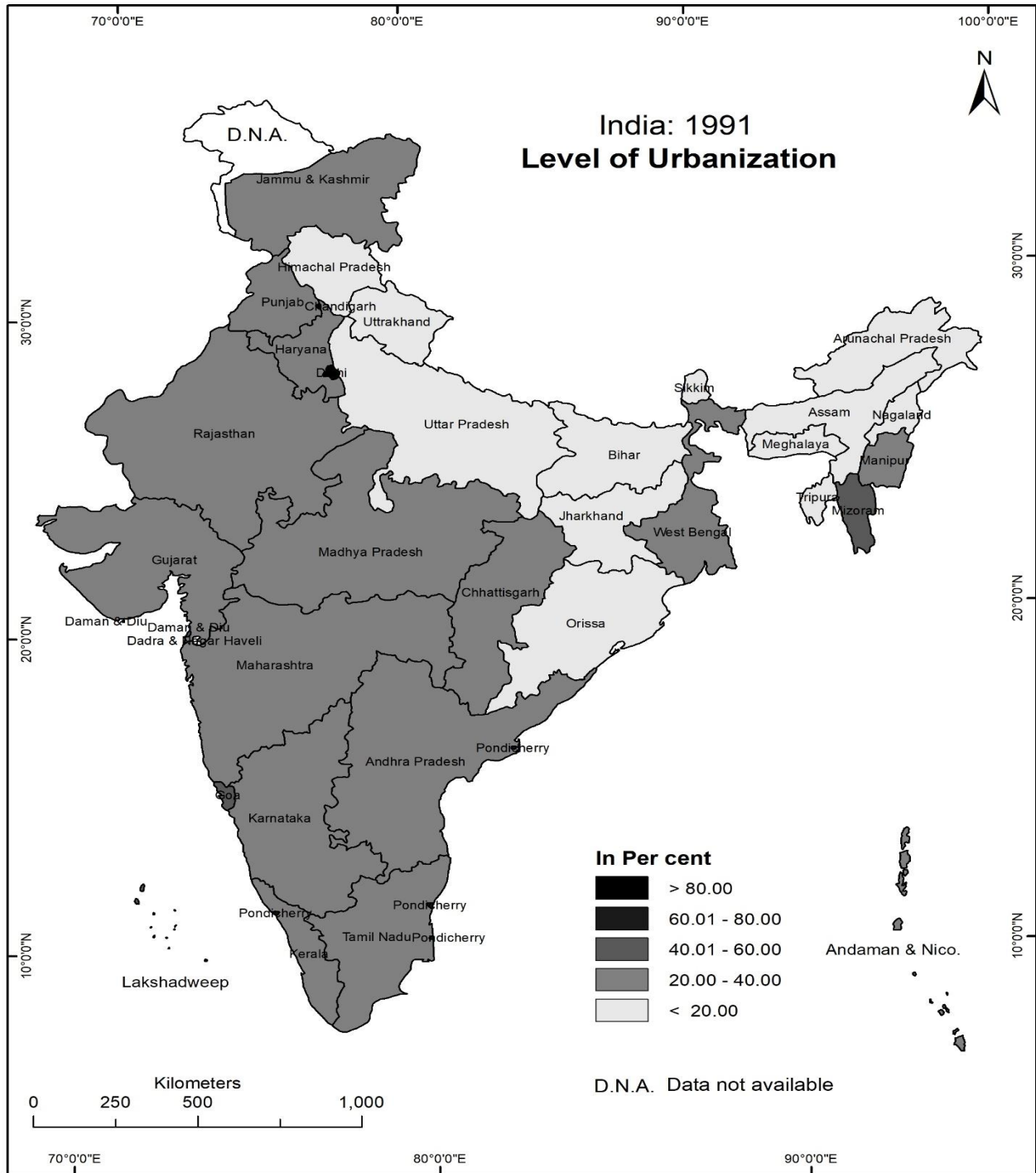| Sr. No.	States	1991	2001	2011
1.	Andhra Pradesh	26.89	27.30	33.49
2.	Arunachal Pradesh	12.80	20.75	22.67
3.	Assam	11.10	12.90	14.08
4	Bihar	13.14	10.46	11.30
5.	Chhattisgarh	DNA	20.09	23.24
6.	Goa	41.01	49.76	62.17
7.	Gujarat	34.49	37.36	42.58
8.	Haryana	24.63	28.92	34.79
9.	Himachal Pradesh	8.69	09.80	10.04
10.	Jammu & Kashmir	22.89	24.81	27.21
11.	Jharkhand	DNA	22.24	24.05
12.	Karnataka	30.92	33.99	38.57
13..	Kerala	26.39	25.96	47.72
14.	Madhya Pradesh	23.18	26.46	27.63
15.	Maharashtra	38.69	42.43	45.23
16.	Manipur	27.52	25.11	30.21
17.	Meghalaya	18.60	19.58	20.08
18.	Mizoram	46.10	49.63	51.51
19.	Nagaland	17.21	17.23	28.97
20.	Orissa	13.38	14.99	16.68
21.	Punjab	29.55	33.92	37.49
22.	Rajasthan	22.88	23.39	24.89
23.	Sikkim	09.10	11.07	24.97
24.	Tamil Nadu	34.15	44.04	48.45
25.	Tripura	15.30	17.06	26.18
26.	Uttar Pradesh	19.84	20.78	22.28
27.	Uttarakhand	DNA	25.67	30.55
28.	West Bengal	27.48	27.97	31.89

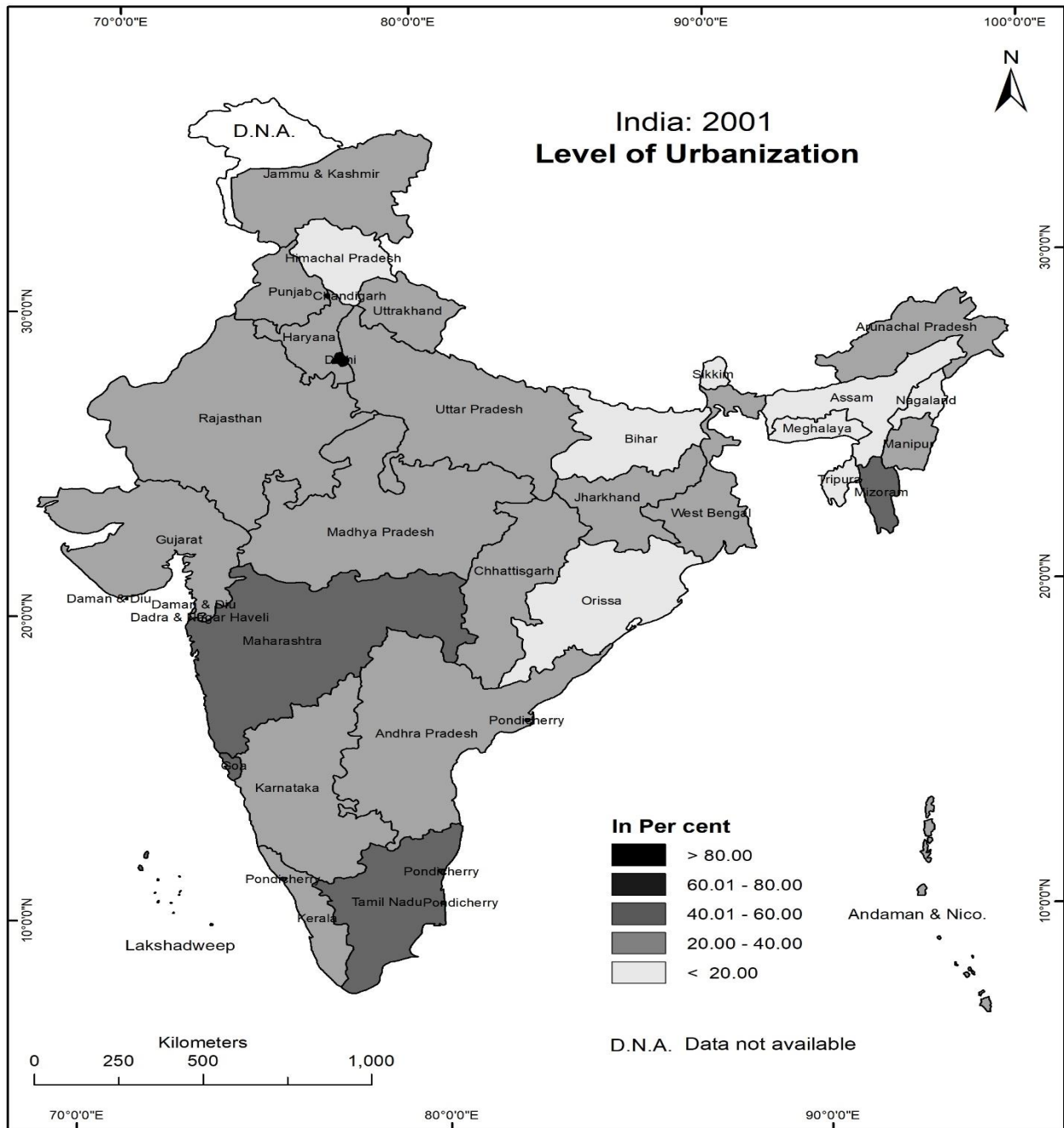|	Union Territories			
1.	Andaman & Nico.	26.71	32.63	35.67
2.	Chandigarh	89.69	89.77	97.25
3.	Dadra & Nagar H.	08.47	22.89	46.62
4.	Daman & Diu	46.80	36.25	75.16
5.	Delhi	89.93	93.18	97.50
6.	Lakshadweep	56.31	44.46	78.08
7.	Pondicherry	64.00	66.57	68.31
	All India	**25.73**	**27.81**	**31.16**

Source: Census of India, 2011.

Note: Data not available (DNA)

Five states and one union territory exist in regions with a moderate degree of urbanisation, according to the 2011 Census of India, as a result of the growth of the industrial, IT, and agro-based industries.
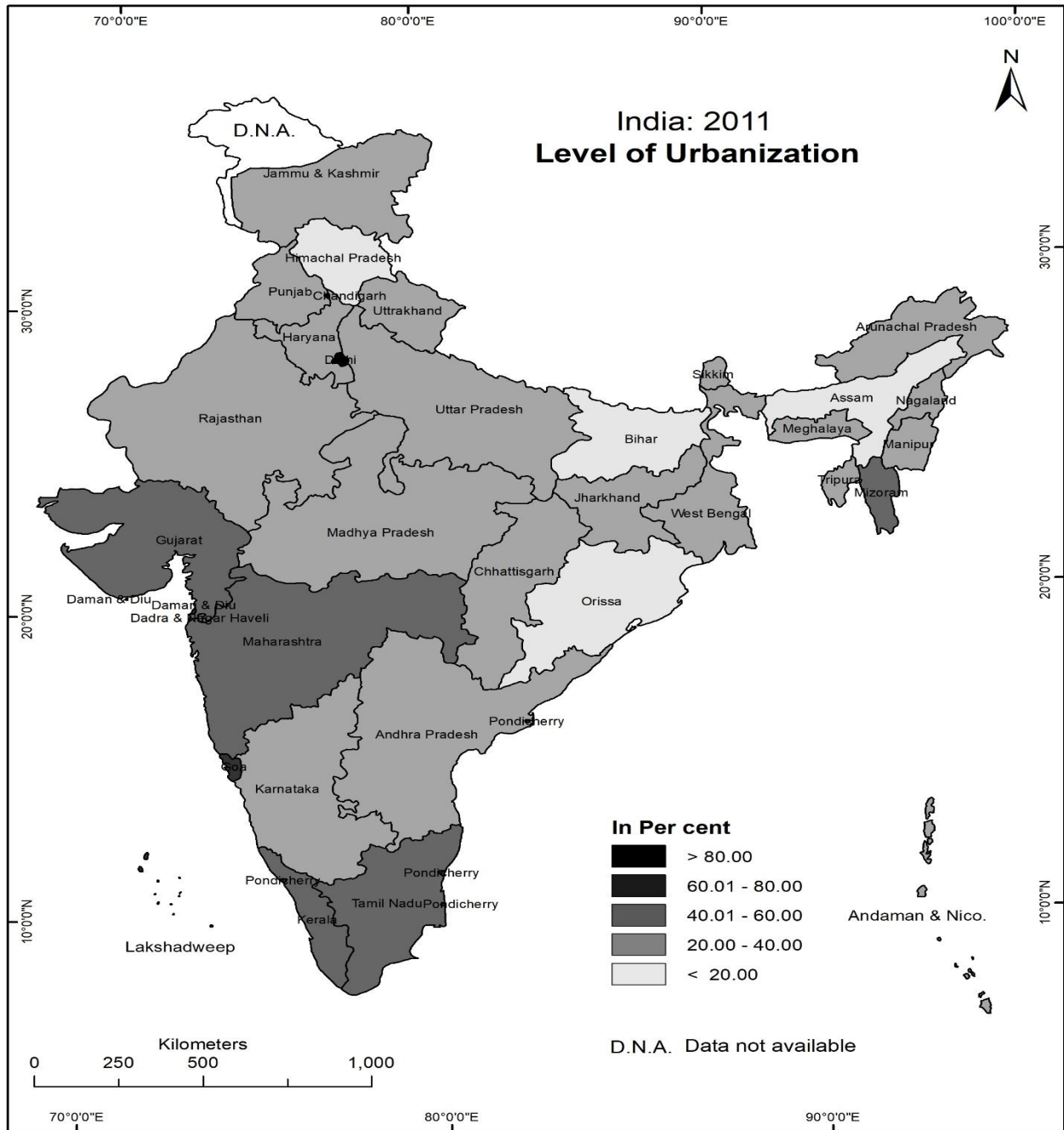
India: 1991
Level of Urbanization

In Per cent

⬛	> 80.00
⬛	60.01 - 80.00
⬛	40.01 - 60.00
⬛	20.00 - 40.00
⬜	< 20.00

D.N.A. Data not available

Source: Census of India, 1991.

Map 1

Source: Census of India, 2001.

Map 2

Source: Census of India, 2011.

Map 3

Areas with low degree of urbanisation

There are 13 states and 1 union territory in this category, according to the 1991 Indian Census (Map 2). In this group are 18 states and 1 union territory, according to the 2011 Census of India. These states and the union territory of Andaman and Nicobar include Andhra Pradesh, Arunachal Pradesh, Chattisgarh, Haryana, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Punjab, Rajasthan, Sikkim, Tripura, Uttar Pradesh, Uttrakhand, and West Bengal.

Areas with very low degree of urbanisation

There are ten states and one union territory in India that have a very low level of urbanisation, according to the 1991 Census of India. Arunachal Pradesh, Uttar Pradesh, and Dadra & Nagar Haveli have been eliminated from this group of nine states in 2001. 2011 Census of India data indicates that 4 states fall under this category (Map 3). The least urbanised states in the nation are Assam, Bihar, Himachal Pradesh, and Orissa, with less than 20 per cent of the total population living in urban areas. Maharashtra (14.36 per cent) has the highest concentration of the nation's urban population, followed by Uttar Pradesh (12.07 per cent), Tamil Nadu (9.61 per cent), West Bengal (7.84 per cent), and Andhra Pradesh (7.27 per cent), which together account for more than half (51 per cent) of the nation's total urban population. Less than 1.5 per cent of India's entire urban population resides in Sikkim, Arunachal Pradesh, Nagaland, Mizoram, Tripura, Himachal Pradesh, Goa, Manipur, and Meghalaya combined. Delhi, Chandigarh, and Pondicherry are three union territories that are noteworthy since they collectively house 5per cent of the nation's metropolitan population (Map 3).

Suggestions for Urban Planner and Different Stakeholder for dealing with urbanization

Urbanization poses numerous challenges and requires collaboration among various stakeholders to effectively manage its impacts. Here are some suggestions for urban planners and different stakeholders for dealing with urbanization:

i. **Urban Planners:**

Conduct comprehensive urban planning: Develop long-term urban development plans that consider population growth projections, infrastructure needs, land use patterns, and

environmental sustainability. Focus on sustainable development: Incorporate sustainable practices in urban planning, such as promoting mixed land-use development, designing walkable neighborhoods, investing in public transportation, and preserving green spaces. Enhance infrastructure planning: Anticipate and address infrastructure demands by improving transportation networks, water supply systems, waste management facilities, and energy infrastructure to support growing urban populations. Promote affordable housing: Implement policies and strategies to ensure the availability of affordable housing options for all segments of society, considering factors like income levels and social inclusion. Foster community engagement: Involve local communities in the planning process through participatory approaches, encouraging their input and incorporating their needs and aspirations into urban development plans.

ii. Government and Policy Makers:

Implement supportive policies: Develop and enforce policies that promote sustainable urban development, affordable housing, efficient transportation systems, and the protection of natural resources. Strengthen governance and coordination: Improve coordination between different government agencies and departments responsible for urban planning, infrastructure development, housing, and environmental management to ensure integrated and effective decision-making. Provide financial incentives: Offer incentives to encourage private sector investment in urban infrastructure, affordable housing, and sustainable development initiatives. Prioritize resource allocation: Allocate adequate resources for urban development projects, infrastructure upgrades, and provision of essential services in urban areas.

iii. Private Sector:

Invest in sustainable infrastructure: Consider the long-term sustainability of infrastructure projects, incorporating environmentally friendly design, energy efficiency measures, and smart technologies. Collaborate with local authorities: Work closely with urban planners and local governments to align private sector investments with urban development goals and ensure responsible and sustainable urban growth. Provide affordable housing options: Contribute to addressing the housing needs of urban populations by developing affordable housing projects or

partnering with government initiatives in this area. Support social and community initiatives: Engage in corporate social responsibility activities that support local communities, including initiatives related to education, health, and community development.

Conclusion

For the first time since independence, the urban population rose faster than the rural population, growing by 91 million people from 286 million in 2001 to 377 million in 2011. After this notable urban population expansion, there is a net rural-urban classification and a rural-to-urban migration. Numerous new settlements have sprung up during the last 10 years, dramatically speeding up urbanisation. Although the share has decreased, the natural rise in urban development still makes a considerable absolute contribution (about 40 million people), illustrating the scale of the urban population. Its repercussions include things like a lack of services for reproductive and child health, as well as poor urban infrastructure and public amenities. The urbanisation of the nation is highly unequal. Extreme eastern and northern sections of states are more urbanised than their western and southern regions, which have the least urbanisation nationwide.

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