

IMPACTS OF URBANIZATION ON ENVIRONMENT

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ABSTRACT

Urbanization refers to general increase in population and the amount of industrialization of a settlement. It includes increase in the number and extent of cities. It symbolizes the movement of people from rural to urban areas. Urbanization happens because of the increase in the extent and density of urban areas. Due to uncontrolled urbanization in India, environmental degradation has been occurring very rapidly and causing many problems like land insecurity, worsening water quality, excessive air pollution, noise and the problems of waste disposal. This paper emphasizes on the effect of urbanization on environmental components mainly climate, biosphere, land and water resources. A case study of urbanization in India and metropolitan cities have been carried out leading to conclude on the existing causes of damage to the environment due to urbanization and preventive measures to keep a check on them. Although it is impossible to restrict urbanization it has to be ensured that urbanization proceeds in the right path causing minimum impact on environment.

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INTRODUCTION

Urbanization is a process that leads to the growth of cities due to industrialization and economic development, and that leads to urban-specific changes in specialization, labor division and human behaviors. The population is growing at the rate of about 17 million annually which means a staggering 45,000 births per day and 31 births per minutes. If the current trend continues, by the year 2050, India would have 1620 million populations. Due to uncontrolled urbanization in India, environmental degradation has been occurring very rapidly and causing many problems like shortages of housing, worsening water quality, excessive air pollution, noise, dust and heat, and the problems of disposal of solid wastes and hazardous wastes.

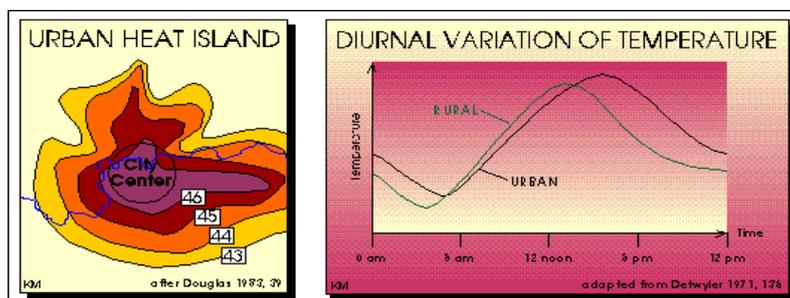
IMPACTS OF URBANIZATION ON VARIOUS COMPONENTS OF ENVIRONMENT

Probably most of the major environmental problems of the next century will result from the continuation and sharpening of existing problems that currently do not receive enough political attention. The problems are not necessarily noticed in many countries or then nothing is done even the situation has been detected. The most emerging issues are climate changes, freshwater scarcity, deforestation, and fresh water pollution and population growth. These problems are very complex and their interactions are hard to define. It is very important to examine problems through the social-economic-cultural system. Even the interconnections between environmental problems are now better known, we still lack exact information on how the issues are linked, on what degree they interact and what are the most effective measures. One problem is to integrate land- and water use planning to provide food and water security (UNEP 1999).

[A] IMPACTS ON THE ATMOSPHERE AND CLIMATE

1. The creation of heat island

Materials like concrete, asphalt, bricks etc absorb and reflect energy differently than vegetation and soil. Cities remain warm in the night when the countryside has already cooled.



2. Changes in Air Quality

Human activities release a wide range of emissions into the environment including carbon dioxide, carbon monoxide, ozone, sulfur oxides, nitrogen oxides, lead, and many other pollutants.

3. Changes in Patterns of Precipitation

Cities often receive more rain than the surrounding countryside since dust can provoke the condensation of water vapor into rain droplets.

[B] IMPACTS ON THE LITHOSPHERE AND LAND RESOURCES

1. Erosion and other changes in land quality

Rapid development can result in very high levels of erosion and sedimentation in river channels.



2. Pollution

Pollutants are often dispersed across cities or concentrated in industrial areas or waste sites. Lead-based paint used on roads and highways and on buildings is one such example of a widely dispersed pollutant that found its way into soil. Burying tremendous amounts of waste in the ground at municipal and industrial dumps.

[C] IMPACTS ON THE HYDROSPHERE AND WATER RESOURCES

1. Flow of Water into Streams

Natural vegetation and undisturbed soil are replaced with concrete, asphalt, brick, and other impermeable surfaces. This means that, when it rains, water is less likely to be absorbed into the ground and, instead, flows directly into river channels.

2. Flow of Water through Streams

Higher, faster peak flows change stream channels that have evolved over centuries under natural conditions. Flooding can be a major problem as cities grow and stream channels attempt to keep up with these changes.

3. Degraded Water Quality

The water quality has degraded with time due to urbanization that ultimately leads to increased sedimentation there by also increasing the pollutant in run-off.

[D] IMPACTS ON THE BIOSPHERE

1. Modification of Habitats

The fertilizers that spread across lawns finds its way into water channels where it promotes the growth of plants at the expense of fish. The waste dumped into streams lowers oxygen levels during its decay and cause the die-off of plants and animals.

2. Destruction of Habitats

There is also complete eradication of habitats as an outcome of urbanization and native species are pushed out of cities.

3. Creation of New Habitats

New habitats are also created for some native and non-native species. Cities also create habitats for some species considered pests, such as pigeons, sparrows, rats, mice, flies and mosquitoes. Urbanization has, for example, eliminated many bat colonies in caves, but has provided sites such as bridges for these species to nest.

URBANIZATION IN INDIA AND METROPOLITAN CITIES-A CASE STUDY

(i) Pattern and Trend of Urbanization in India during 1901-2001

The pattern and trend of urban population and number of towns in India during 1901 to 2001 shows that total urban population has increased more than ten times from 26 million to 285 million (Mohan.R,1996) whereas total population has increased less than five times from 238 million to 1027 million from 1901 to 2001.

Table 1: Pattern and trend of urbanization in India, 1901-2001¹

<i>Cen- sus Years</i>	<i>Number of Towns²</i>	<i>Urban Population (in millions)</i>	<i>Percent Urban</i>	<i>Annual Expo- nential Growth Rate</i>	<i>Rate of Urbani- zation</i>
1901	1916	25.9	10.8	-	-
1911	1908	25.9	10.3	0.0	-0.46
1921	2048	28.1	11.2	0.8	0.87
1931	2220	33.5	12.0	1.7	0.71
1941	2422	44.2	13.8	2.8	1.50
1951	3060	62.4	17.3	3.5	2.54
1961	2700	78.9	18.0	2.3	0.40
1971	3126	109.1	19.9	3.2	1.06
1981	4029	159.5	23.3	3.8	1.72
1991	4689	217.6	25.7	3.1	1.02
2001	5161	284.5 ³	27.8	2.7	0.82

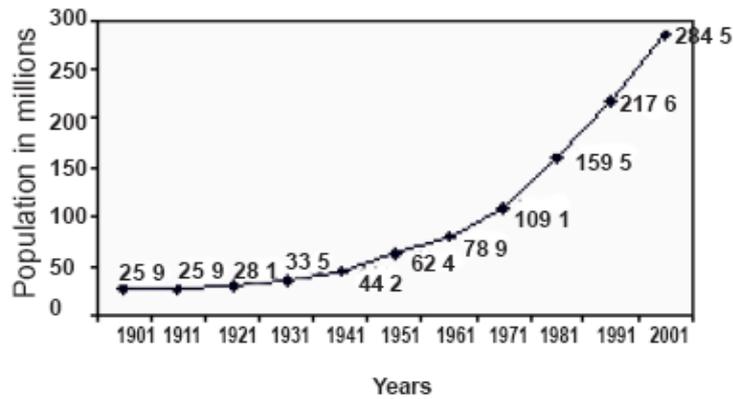


Fig. 1. Growth in the size of urban population in India, 1901-2001

(ii) Percentage of Urban Population in India by Size-Class of Urban Centres, 1961-1991

Table 2: Percentage of urban population in India by size-class of urban centers, 1961-1991¹

Size Class	1961	1971	1981	1991
Class I (100 000+)	51.4 (102)	57.2 (148)	60.4 (216)	65.2 (296)
Class II (50000-100000)	11.2 (129)	10.9 (173)	11.6 (270)	11.0 (341)
Class III (20 000-50 000)	16.9 (437)	18.0 (558)	14.4 (738)	13.2 (927)
Class IV (10 000-20 000)	12.8 (719)	10.9 (827)	9.5 (1053)	7.8 (1135)
Class V (5000-10 000)	6.9 (711)	4.5 (623)	3.6 (739)	2.6 (725)
Class VI (< 5000)	0.8 (172)	0.4 (147)	0.5 (229)	0.3 (185)
Total	100 (2270)	100 (2476)	100 (3245)	100 (3690)

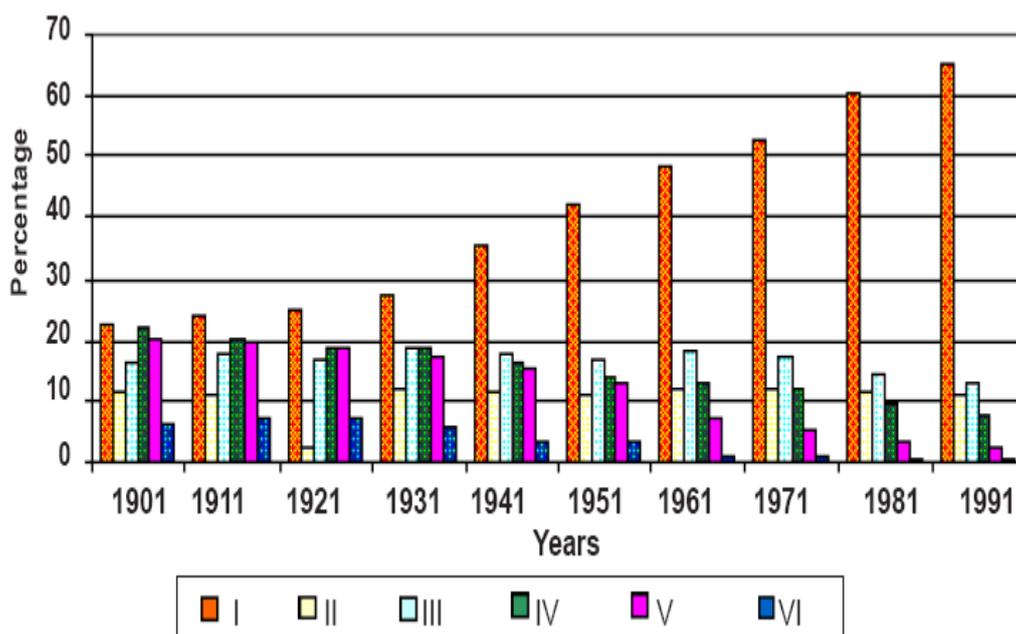


Fig. 2. Percentage growth of urban population by size-class of Towns in India, 1901-1991

(iii) Growth in the Number of Million Plus (1,000,000 Population or More) Cities in India during 1901-2001

Table 3: Growth in the number of million plus (1,000,000 population or more) cities in India 1901-2001¹

Cen- sus years	Number of cities with popu- lation more than one million	Popu- lation (in million)	Percent increase	Population of million cities as percent of India's	
				Total Popu- lation (in million)	Urban popu- lation (in million)
1901	1	1.51	-	0.6	5.8
1911	2	2.76	82.8	1.1	10.7
1921	2	3.13	13.4	1.3	11.1
1931	2	3.41	8.95	1.2	10.2
1941	2	5.31	5.71	1.7	12.0
1951	5	11.75	21.3	3.3	18.8
1961	7	18.10	54.0	4.1	22.9
1971	9	27.83	53.8	5.1	25.5
1981	12	42.12	51.3	5.2	26.4
1991	23	70.67	67.8	8.4	32.5
2001	35	107.88	52.8	10.50	37.8

There was only one million plus city (Kolkata) in 1901 in India. It became two in 1911 (Mumbai added) and was constant during 1911 to 1941. Million plus cities increases to five in 1951 and continuously increased after this decade and became 23 in 1991 and currently it is 35 in 2001 census. Total population also increased in the million plus cities from 1.51 million in 1901 to 107.88 million in 2001, almost a fifty fold increase.

IMPACT OF URBANIZATION ON THE ENVIRONMENTAL QUALITY IN THE METROPOLITAN CITIES

(i) Slum Situation in India and its Metropolitan Cities

Total slum population in India according to size/class of towns during 1991 shows that 41% of the total slum population was residing in million plus cities, where 27% of total population of India resides.

Table 4: Percentage of slum population in the four Metropolitan cities of India, 1981-2001

Metropolitan Cities	1981	1991	2001
Greater Mumbai (UA)	30.8	43.2	48.9
Kolkata (UA)	30.3	36.3	32.6
Delhi Municipal Corp. (UA)	18.0	22.5	18.9
Chennai (UA)	13.8	15.3	17.7

Sources: Census of India 1981, 1991 and 2001

(ii) Status of Municipal solid waste generation and collection in Metropolitan Cities of India

Mumbai generates the largest amount of Municipal solid waste in 1996, which is 5355 tonnes/day followed by Delhi (4000 tonnes/day), Kolkata (3692 tonnes/day) and Chennai, which is 3124 tonnes/day (Sunil Kumar, et al., 2009). But if we consider the per capita generation of solid waste, it is largest in Chennai, which is about 700 gms/day. The lowest per capita waste generation is in Kolkata, which is about 350 gms/day.

Table 5: Status of Municipal solid waste generation and collection in Metropolitan Cities of India, 1996

<i>Metro-politan cities</i>	<i>Municipal Solid Waste¹ (tones/day)</i>	<i>Per capita Generation¹ (Kg/day)</i>	<i>Collection in percent²</i>
Mumbai	5355	0.436	90
Kolkata	3692	0.347	-
Delhi	4000	0.475	77
Chennai	3124	0.657	90

Source: ¹Central Pollution Control Board, Status of Solid Waste Management in Metro Cities India, 1998

² World Resources, 1996-97

(iii) Growth in motor vehicles in India and in Metropolitan Cities:

Within 10 years from 1990 to 2000 there has been almost a three-fold increase in the number motor vehicles in India. On an average 10% increase has been found in each year, which is a serious concern for air pollution.

Table 6: Growth in motor vehicles in India, 1990-2000

<i>Years</i>	<i>Number of vehicles (in thousands)</i>	<i>Percent increase</i>
1990	19152	-
1991	21374	11.6
1992	23507	10.0
1993	25505	8.5
1994	27660	8.4
1995	30287	9.5
1996	33850	11.8
1997	37231	10.0
1998	43159	15.9
1999	48240	11.8
2000	53100	10.1

Source: Center for Pollution Control Board, Ministry of Environment and Forests, Government of India, New Delhi, 2000

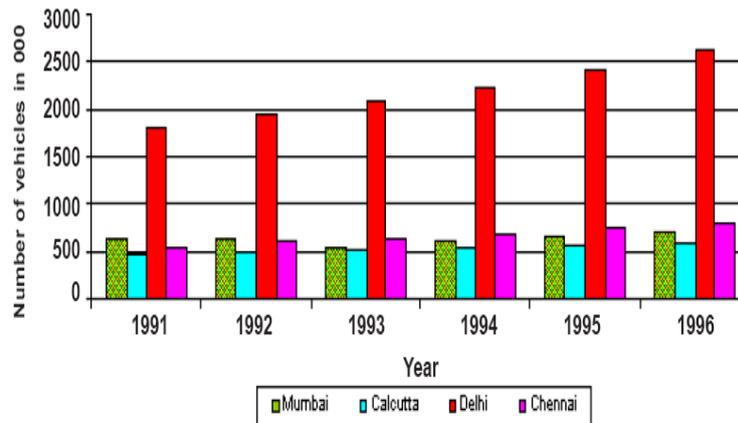


Fig 3. Growth (in numbers) in motor vehicles in four metropolitan cities in India, 1991-1996

(iv) Waste Water Generation, Collection and Treatment in Metropolitan Cities

Water resources are diminishing not just because of large population numbers but also because of wasteful consumption and neglect of conservation. With rapid urbanization and industrialization, huge quantities of wastewater enter rivers.

Table 7: Waste water generation, collection and treatment in Metropolitan Cities of India, 1997-98

Metropolitan cities	Volume of wastewater generated (mld)			Wastewater collected			Treatment		Mode of disposal
	Domestic	Industrial	Total	Volume (mld)	Percent	Capacity (mld)	Pri-mary	Sec-on-dary	
Mumbai	2228.1	227.9	2456.0	2210.0	90.0	109.0	Y	Y	Sea
Kolkata	1383.8	48.4	1432.0	1074.9	75.1	-	-	-	Hugli river Fish farm
Delhi	1270.0	-	1270.0	1016.0	80.0	981.0	Y	Y	Agriculture Yamuna river
Chennai	276.0	-	276.0	257.0	93.1	257.0	Y	Y	Agriculture Sea

Note: Y-Yes Source: Control of Urban Pollution Series: Cups/42/1997-98, CPCB, 1997

CONCLUSIONS

- From this we can conclude that some causes of damage to the environment due to urbanization lies in the legislation and the regulating agencies if the country.
- Failure of governance in today's cities has resulted in the growth of informal settlements and slums that constitute unhealthy living and working environment.
- Serious attention should be given to the need for improving urban strategies, which promote efficiency in resource use.
- Vehicular pollution control in metropolitan cities and other cities deserves top priority.

- Urgent attention should be given to reduce the generation of solid waste at the sources through mandatory standards and regulation fee and tax incentives, and education and voluntary compliance.
- In case adequate steps are not taken to prevent pollution and to improve the quality of life by providing more social amenities, the life of the urban dwellers of India may become more miserable this may be the cause of health hazards and worst devastation.

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