National Journal of
Environmental Law

ISSN: 2581-6683
Volume 4, Issue 2, 2021
DOI (Journal): 10.37591/NJEL

http://lawjournals.celnet.in/index.php/jel/index

Case Study NJEL

Sprawling Population Growth leading to Unimaginable levels of Pollution: Case Study-Kanpur

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Abstract

Kanpur has been in the news recently, but for all the wrong reasons. Once known as the Manchester of India having many flourishing industries, is now struggling for its existence. Major reason for city's downfall is the sprawling population without adequate infrastructure causing rampant pollution. According to 2011 census the total population of Kanpur was 45.81 lakh. The population growth at this increased rate is a lot to take for the city considering the stagnant infrastructural development. Also, according to the World Health Organization (WHO) global air pollution database released in Geneva, India has 14 out of the 15 most polluted cities in the world in terms of PM 2.5 concentrations and the worst being Kanpur with a PM 2.5 concentration of 173 micrograms per cubic meter. The tragedy that has over taken Kanpur has many contributors. The leather industry, municipal corporation as well as bad political influence have led to such sad state of affairs. The increase in population is creating a lot of pressure on the resources of the city. Seeing the amount of money involved in the leather industry, more and more people of attracted to the industry without understanding the veracity of the harm caused to the environment. Further, though the trees are cut at a high rate in order to accommodate the increasing population however, such is done without having a planned layout. The research paper delves in to the interplay between sprawling population and environmental condition in the present district of Kanpur by considering various factors that has contributed in placing them in direct connection.

Keywords: Population, Pollution, Industrialization, Economy, Urbanization

INTRODCUTION

Urbanization in India is mainly unplanned. Planning is a minuscule component of the overall process of urbanization. The process is mostly fragmentary and emerges as an aggregation of mostly institutionally unregulated acts of individuals who are choosing to be city or town dwellers under certain economic and socio-cultural influences. The changes in the Indian society are so wide and sweeping that individual is giving in to the demands of urbanization. Unplanned form of urbanization is a low-cost variant while the planned one is high-cost version.

In this paper we will be discussing various phases of urbanization which has taken a toll on the environmental conditions of Kanpur city situated in state of Uttar Pradesh. Kanpur city is the largest urban agglomeration of U.P. and is the industrial metropolis of north India. Apart from playing a stellar role in the development of the country as a whole, Kanpur has also been instrumental in making an unforgettable contribution to the Indian freedom struggle. The district of Kanpur covers an area of 3005 sq km of which the city proper makes up 1300 sq km. Kanpur is famous for leather and textile goods of superior quality. It is now one of the main industrialized cities. Kanpur city is

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Received Date: May 08, 2021
Accepted Date: October 12, 2021
Published Date: January 12, 2022

Citation: Kanishka Mishra. Sprawling Population Growth leading to Unimaginable levels of Pollution: Case Study-Kanpur. National Journal of Environmental Law. 2021; 4(2): 21–37p.

famous for leather, wool, cotton, vegetable oil mills, chemical works and sugar refineries. Formerly known as Manchester of the country, Kanpur is the biggest city of the State of Uttar Pradesh and is main centre of commercial, industrial and educational activities. The percentage of the workforce involved in the primary, industrial and service sectors are 4 percent, 31 percent and 65 percent respectively. The city is bound between two rivers, the Ganges in the North and the river Pandu in the south. It is a linear pattern of settlements developed between rivers and the railway lines. City is well connected with road and railway routes to rest of India. Since it is the largest and most populous city of Uttar Pradesh and hence it also holds a significant role in deciding the state‘s political footings. Despite having such a strategic location, the district has unable to cope up with the developmental pace of other cities with relatable demographics. To add on to the misery, the pollution level is at all time high and there are no chances of restoration unless serious efforts are taken up.

HISTORICAL SIGNIFICANCE

Kanpur origin until the thirteenth century was shrouded in the mist. Though no reference to Kanpur is found in history, two of its suburbs, Jajmau, which dates back to the Vedic age and Bithoor, where Lord Brahma performed the Ashvamedh Yajna and where the famous sage Valmiki has written the Sanskrit epic Ramayana, can be traced back to legendary times. It is traditionally believed that Kanpur derived its name from Kanhaiyapur, the town of Kanhaiya. By another tradition, Kanpur is supposed to have derived its name from Karnpur and is associated with Kama, one of the greatest heroes of the epic Mahabharata.

The region covered by the present district of Kanpur was once included in the ancient kingdom of Panchala which extended from the Himalayan mountains in the north to the chambal river in the south. Kanpur’s first mention was found in 1207 AD when Raja Kanti Deo of Prayag was attached to the throne of Kannauj and established the village Kohna, which later came to be known as Kanpur. Kanpur continued its association with Kannauj during the reins of Harsha Vardhan, Bhoj, Mihir, Jai Chand and early Muslim rulers. Later it came under the Jaunpur rulers and the Sur Dynasty. The first mention of Kanpur was made in 1579 during Sher Shah's regime. From 1773 to 1801, it was part of the Oudh kingdom.

Up to the 1st half of the 18th century Kanpur continued to survive as an insignificant village. Its fate, however, took a new turn soon after. In May 1765, Shuja-ud-daula, the Nawab Wazir of Awadh, was defeated by the British near Jajmau. It was probably at this time that strategic importance of the site of Kanpur was realized by the British. European businessmen had by this time gradually started establishing themselves in Kanpur. In order to ensure protection to their lives and property the `Awadh local forces were shifted here in 1778. Kanpur passed into British hands under the treaty of 1801 with Nawab Saadat Ali Khan of Awadh. This forms a turning point in the history of Kanpur. Soon Kanpur became one of the most important military station of British India. It was declared a district on 24th March 1803.

At that time British infantry lines and the parade grounds were established in the south of Parmat. Indian infantry too occupied the space in Kanpur. The Company Bagh was laid in 1847 and the construction of the Ganga canal was commenced in 1854. Kanpur has become an important centre during the great revolt of 1857. It was the time when Nana Saheb Peshwa succeeded in liberating the city from the British for a short period. Sati-Chauraha Ghat (Cantonment) from where the British were to leave Kanpur was a scene of a terrible conflict and consequently came to be known as Massacre Ghat; so was Bibi Ghar where some British families were taking shelter. Besides military importance, Kanpur has also made significant contribution in the literature and fine arts. The legendary Birbal, a minister in the court of Akbar and known for his wit and wisdom was born in a village, Takuapur, of Kanpur District. Various acclaimed writers and poets of Hindi literature belonged to this area. Kanpur had been the centre of patriotic Hindi magazines and newspapers such as Brahman, Saraswati, Vishwamitra, Veer Arjun and Pratap.

Kanpur owes its position to the rapid industrialization which it underwent during the period 1919-50 and although the pace of growth slowed down in the succeeding two decades, concentration of industries in the areas of urban agglomeration continued to grow. The industrial base of Kanpur was laid in mid - century with the location of the British Army Camp and establishment of woolen and cotton textile mills. World War II caused tremendous increase in the demands of Kanpur's products and its population doubled in the period between 1931-47. During the post war and post-independence period, its industrial growth declined and industrial employment decreased from a peak of 1,16,000 factory workers in 1945 to less than 62,000 in 1955. Between 1955 and 1965, industries grew rapidly, especially small-scale ones, light engineering, re-rolling, casting, manufacture of agricultural implements, chemicals, paints etc.

INDUSTRIAL EXPANSION

Brief Introduction

Kanpur, a city once known as the Manchester of East, now fights hard for its own existence. All the cotton mills, the backbone of the city's traditional economy, have been wiped out and the remaining industries are in their last stages of survival. But as every cloud has a silver lining, the city is now creating its new identity as a leather city along with the soap industries and hosiery industries blossoming within the city. Kanpur was one of the main centers of Industrial Revolution in India.

The waves of industrialization reached the city in 1858. The first major industry, the Harness and Saddlery, was established in 1860. Other mills such as The Elgin Mills, The Cawnpore Woolen Mills (Lal Imli at present) and the Victoria Mills were set up in 1864, 1870 and 1885 respectively. After the First World War, several mills, the Swadeshi, the JK and the Lakshmi Ratan Cotton Mills were established. The first re-rolling mill of India was established in 1928 by the Singh Engineering Work. The Second World War gave fresh impetus to industrial complex. In the post-independence years, Kanpur has changed from a town of mill owners and mill workers to that of a city consisting of large middle-class population of entrepreneurs and artisans. To cope with the industrial growth a second thermal power station was built at Panki in 1966 for augmenting the older riverside power station. Panki now produces a total of 284 MW of power.

Presently it is the 5th largest city in country and counted as 7th largest city in the world. Manchester of East Like Manchester in England, Kanpur spearheaded the Industrial Revolution in India with its cotton mills. Around 19th Century, Sir John Burney Alllens established a group of industries. National Textile Corporation (NTC) and British India Corporation (BIC) by jointly combining nine textile industries viz: Swadeshi Cotton Mill, Allign Mill-I, Allign Mill-II, Kanpur textile, Meur Textile, Arthan Mill, Lal imli mill and Laxmi Ratan Cotton mill. In the beginning of 20th Century, Lala Kamlapat laid the stone of JK cotton mills and JK Iron etc. The British added another feather in its crown by establishing a number of factories like: Hinduatan Aeronautics Limited, Indian ordnance factories. Currently, the city is considered as a hub of leather industry with many tanneries located in the stretch of jajmau and unnao. A large amount of leather is exported overseas and thus, the industry has an important role in state's revenue.

Industrial Areas in Kanpur

Mainly 10 industrial areas exist in Kanpur. They are as follows:

1. Panki Industrial Area Site No. 1 to 5 Panki, Kanpur.
2. Dada Nagar Co-operative Industrial Estate, Dada Nagar Area-235 acres
3. Govt. industrial Estate, Fazalganj
4. Shikshit Berojgar Industrial Asthan Panki
5. Uptron industrial Estate, Panki
6. Industrial Area, Rooma
7. Kanpur Mahayojna
8. Jajmau

9. Saresh Bagh
10. Fazalganj

Type of Industries

Heavy / Medium Scale Industries

There are many heavy and medium scale industries which are engaged in the production of defence items, industrial machines, LMS (Two Wheelers), leather, cloth industries. It has been observed that out of total 83 heavy/medium industries, 38 are currently working whereas 45 industries have been closed. As far as their ownership is concerned, 3 are of central government, 6 are of defence, one is of state government and twenty-eight are private industries. Up to March 2005, total heavy scale industrial units are 83 and investment made is 873.88 crores. These industries provide the employment to total 65563 people.

Small Scale Industries

A large number of small-scale industries have been established recently. Out of total small-scale industries, number of registered units are 12,241 as against 7033 in March 1998. It has been observed that almost same number of unregistered units exist. Out of total registered units, existing operative units are 10,967 whereas 5186 i.e., 47 percent are either sick or closed. The investment made in small-scale industries is 354.82 crores. Upto March 2005, total people employed in small scale industries were 54807 whereas it was 33676 up to March 1998 which shows that there is an increase of 61 percent in last seven years. The turnover of small-scale units for 2005-06 is 20 crores.

Recent Industrial Shift

Over a period of time, the industrial profile of Kanpur has undergone a drastic change. On one hand, total number of industries such as textile, rayon, metal, select chemicals industries has declined. Textile and Jute industries have been closed long time back. National Textile Corporation and U.P. Spinning Mills are also closed recently. Recently, some of the important industries were closed down which include Elgin mills, JK Industrial plants (Cotton & Spinning mills, Rayon, Tube Works), Kanpur Chemical Works, Kanpur Jute Udyog, Tannery Corporation, Kanpur Textiles, Swadeshi Cotton Mills. Some of the major industries which closed in recent past are: Duncans industry employing 1200 staff and works and disbursing Rs. 1.25 crores as monthly wages were closed almost three years back.

LML Ltd., which was manufacturing and marketing two wheelers under the name of LML Vespa, has also gone for lock out. It was employing 5000 workers and their ancillary units (almost 50 nos.) were giving employment of almost 5000 workers and LML with the ancillary units together used to disburse Rs. 5 to 10 crores as monthly wages. With the disclosure of LML Ltd. and Duncons, there is a setback to industry in Kanpur.

The reasons for close down of industries were mainly:

1. Usage of outdated techniques
2. Inability to accept newer and more efficient technologies
3. Change in policies of the Government which lead to uncompetitiveness of certain existing units i.e. recent closure of fertilizers unit of Duncan‘s industries
4. Inefficiency especially in public sector companies
5. Labour unrest and
6. Technological obsolescence

On the other hand, industries such as leather, light engineering and food processing etc. have grown. Small scale and cottage industry (hosiery etc.) have also mushroomed. As per the discussions, mainly following industries are flourishing: Rice, Dal, Oil, Spices, Flour Mills, Pan Masala, Cattle Feed, Hosiery, Ready made Garments, Finished Leather, Shoes & Chappals, Purses and Belts, Steel

Elmira's and Boxes, Agricultural implements, Engineering Workshops, Auto parts, Plastic Goods, Polyethylene Bags, Grease, Refining of lubricants, Surgical Bandage & Tapes, Medicines – Allopathic, Ayurvedic, Homeopathic, Soaps and detergents, Soaps and detergents, Packaging, Defence items, Rubber chappals, Packaging Amul, Canaspati, Oil, Sugar (Ghatampur), Industrial Machines, Ball point pens, Newspapers (Printing Press), Rolling Mills, Woolen Mills; H.A.L., Artificial Limb Factory; Water and Industrial Pumbs, Cold drinks, Paints and thinners, Tanneries. In Kanpur, recent investments in industries have gone down as compared to its hinterland towns i.e. Agra, Allahabad, Chitrakoot Dham, Lucknow, Barrelly, Jhansi etc.

The main reason for the decline in industrial growth is the change in the basic factors that lead to urban growth. In Kanpur, before the economic reform starts, the growth was determined mainly by its proximity to raw material, market, availability of manpower etc. In current scenario, growth is determined by investment made in the city. The need is felt to attract the investments for fuelling economic growth. There has been no significant change in the employment in defence establishments. However, the tanneries provide employment to 30,000 to 50,000 workers in Jajmau and generated further employment in purchase and marketing and business in suppliers of chemicals used in tanning.

Rise of Leather Industry

Phases of Growth of Leather Industry in Kanpur One can identify three distinct phases of industrial growth in India as well as in Kanpur since the planning era. The first phase is a phase of rapid growth. The second phase of slow growth and the third phase is a phase of recovery and revival. (1) Fast growth Phase (1951-65) - The first Prime Minister of India, Mr. Nehru believed that India needed a change and for which India had to change from agricultural to an industrial economy. He started the Central Public Sector Units, and the government invested in it. (2) Slow growth Phase (1965- 80s) - Mrs. Indira Gandhi believed in a socialist economy. The government started taking over all the big and small companies and made all sectors public. The economy of this phase can be described in three words i.e. Privatization, License and Protection. (3) High growth Phase (since 1991) - The then Prime Minister, Mr. Narsimha Rao realized the need to change the economy urgently and introduce new reforms. Thus, the new economy was shifted from the old one to having three new features i.e., Privatization, Globalization and Independence. Export import business and trade created boom in the economy and foreign countries started investing in the ever-growing consumer market of India. The trends of the three economy phases can also be seen in leather industry:

Fast growth phase

There were several factors that influenced the industrial growth during this period. These factors emerged in the changed political context after the country's independence. During this period, total sixteen tanneries were established at Kanpur. Most of the tanneries and leather manufacturing units were established by the local investors. The government provided resources and facilities for the private sector to start industry on its own or jointly with the government. The government help was extended in several ways and in many forms, such as establishment of public financial institution to provide capital large protection to domestic industry through high import duties.

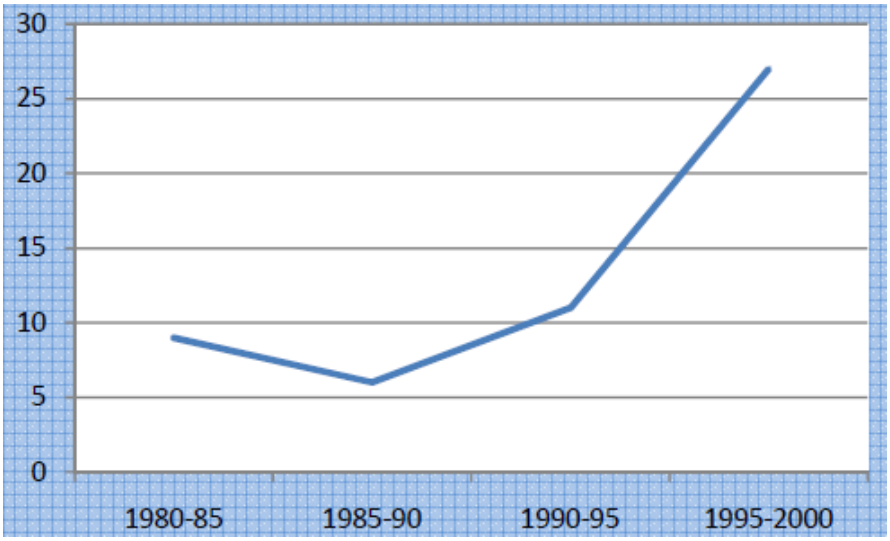
Slow growth phase

Total 8 tanneries and leather manufacturing units were established during this period. Among the varied factors that have obstructed industrial production, we may list the following important ones- The 1965 and 1971wars with Pakistan; the steep rise in oil prices in 1973; and the droughts in 1965 and 1966. Their upheavals affected industries growth in various ways: war for instance, curtailed transport reduced raw material supplies, etc. Oil crises pushed up the prices too suddenly, thereby curtailing market and drought reduced agricultural production.

High growth phase

During the period of 1976-2005, 60 new tanneries were established. An explanation for the industrial recovery in this period is given in terms of the stimulus provided by the new policy initiatives, which began in the late 1970's and gained momentum after 1984, particularly since 1991.

One consequence of the new economy policy in its expansionary effort was the demand and rising of profits in private sector. The industry growth since the 1980 has moved on to higher paths after a long declining trend. The factors behind it were, the supply of infrastructure services like electricity, transport and goods like coal, cement etc. Another measure to help boost industry product is to ensure the easy availability of raw material and other inputs. The Post-Independence Growth of Leather Industry in Kanpur is illustrated in Graph 1 below:



Graph 1. Post-Independence growth of leather industry.

Export

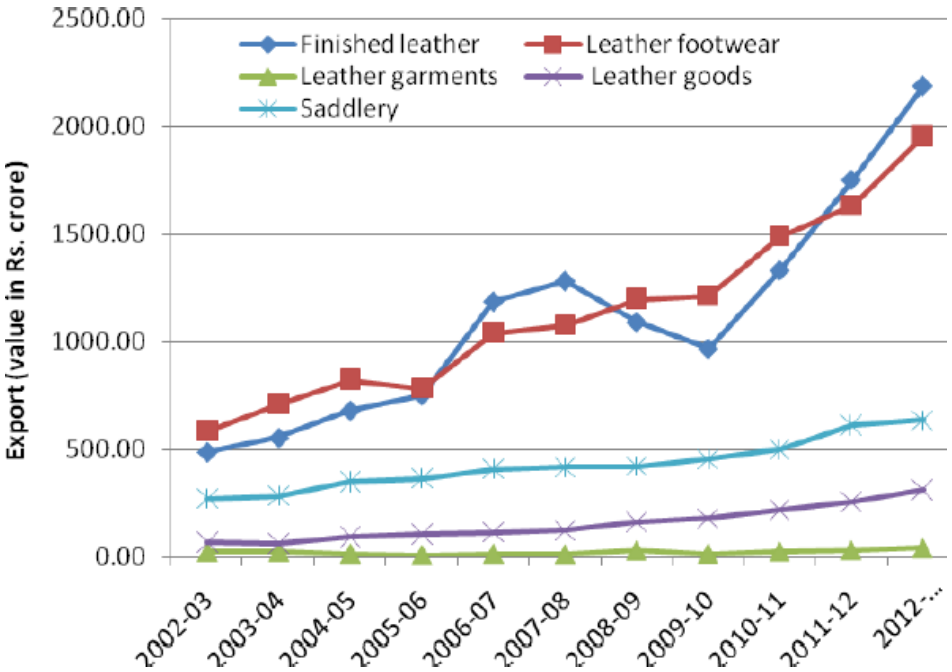
Kanpur is the only center in India where saddle products are manufactured. The export of saddle product from Kanpur is about Rs. 95 crores.

The Council of Leather Export (CLE), established in 1985 to promote the export of leather and leather goods. It has also been endeavoring to provide necessary impetus to the industry towards modernization, technology up gradation and training. The council in association with various international bodies is sending technology persons for training from time to time [1]. It has also obtained services of export from abroad particularly, from designing and product development. It has improved its publicity efforts significantly and is bringing out special catalogue general Finesse for the benefit of importers abroad. The council also remains in close touch with all segments of the industry by interacting with them. 22 Leather industry has brought a ray of new hope in the times of recession. There is almost 18% increase in the export of leather and leather goods in 2008, then the previous year. 23 Export in 2007—93380.23 million Export in 2008—110601.21 million According to the report of CLE, the role of leather garment and leather goods is significant in increasing the exports (Table 1).

Subsequently there is a significant rise of export from 2008-2012 as well as stated in the Graph 2 below:

Table 1. Export of different leather items in 2008.

Leather items	Export %
Leather garments	34.16
Leather goods	28.69
Leather footwear	20.31
Finished leather	5.57
Saddles	3.39



Graph 2. Export trend of leather products of Kanpur leather cluster.

Current Situation

Inadequate Environmental Compliance

Even though the leather industry has contributed brings a lot of revenue to the state, however, the conditions in which the industry is working is deplorable. The chemical effluents released from these tanneries have had an immense adverse impact on the quality of water of Ganga as well the soil of the area. Till date there is no proper system of discharge or treatment of such effluents and common effluent treatment plans set up with the government's aid and combined efforts of the tannery association [2] are still not sufficient to make any significant improvement in the disposal system.

Table 2. Status of the common effluent treatment plants of the Kanpur leather cluster [3].

Details	Jajmau	Unnao
No. of tanneries proposed	354	21
No. of tanneries actually connected	400	25
Inflow of effluent planned (MLD)	36 (27 (sewage) + 9 (effluent)) (3:1)	4.5
Inflow of effluent actually take place (MLD)	4 to 5 time more than actually planned	NA*

***NA= Not available*

The careless attitude of the tannery owners [4] and the Government and under capacity of common effluent treatment plants (see Table 2) has led to dumping of polluted water into the Ganga river. This poor environmental compliance has been degrading the water quality of the Ganga and making it more vulnerable towards protests by environmentalist and NGOs and also calling international attention. However, the factor that the leather industry has provide employment to huge section of population in Kanpur makes it difficult to completely close these industries even after interference by Supreme Court. But there surely is a need to implement strict measures to minimize the harm caused to the environment.

SPRAWLING OF POPULATION; INFRASTRUCTURAL BOTTLENECKS; DEVELOPMENTAL CONSTRAINTS

Indian urban population is not evenly distributed across cities. This is very typical of India. A few metro cities are extremely populous and have an enormous concentration of people that is unrivalled

by any other city in that region. Take for example Delhi that is estimated to have more than 16 million people. No other city in the northern India has such a large population—similarly, Mumbai in the west, Kolkata in the east and so forth. On the whole there are 4368 towns in India (as in 2001). Cities with more than a million people are 393 or just 8 percent of the towns have 69 percent of the urban population (in 2001). The remaining population is distributed in 3979 towns and cities. Such a large concentration of people is also an opportunity for organizing services and resource utilization more efficient. This can make cities more resource efficient, and mobility more energy efficient and less pollution intensive. It is more cost effective to provide basic services and infrastructure in densely rather than sparsely populated cities.

It is, however, the middle rung cities that are growing faster than big metros today. These cities will require more serious attention in terms of early planning. Kanpur, represents the dilemma of the middle rung cities of India. While the mega metro cities have an acknowledged pollution and transport crisis that has attracted major planning efforts, and extensive investment, the burgeoning medium cities largely remain neglected. They are also reaching a crisis point but there are no immediate effective policies to put them on a sustainable growth path at the early stages of motorization and growth. These cities will now need special attention as haphazard growth in these cities can lock up enormous pollution and carbon in the future. The new infrastructure investments in these cities and planning will have to be influenced with proper guidelines.

Kanpur is neither a state capital nor a mega city. But it is the largest city in the state of Uttar Pradesh. It is spread over an area of 260 sq km with a population of 25.51 lakh (about 2.5 million). The population is expected to increase to 48 lakhs (about 4.8 million) by 2030 which amounts to adding a whole new Kanpur in 30 years. Even though it had originally grown as an industrial town, manufacturing is shrinking in this city [5]. According to its City Development Plan, out of 83 heavy industries 38 are still functioning while 45 units have closed. There are 12,240 small scale units. But 47 percent are sick or closed. Its future growth is expected to be based on trade and commerce. Its land-use is now dominated by residential and commercial use. Area under industrial use is only 5.5 percent. Its population is heavily concentrated in the city core. The population density in its core is six times more than its outer area (See map: Kanpur: Inner and outer city area). As the core area begins to get saturated with no redevelopment plans the city is expanding along its radial pattern of road network. This includes two National Highways namely, NH-25 (Kanpur-Lucknow Road) and NH-2 (connecting Kanpur to Kolkata in East and Kanpur to Delhi in the North). Grand Trunk road, Hamirpur road and bypass roads are other major arterial roads in the city. Parwathy Bangla Road, Mall Road, Dad Nagar Road, Jawahar Road, Eye Hospital Road, Prithviraj Chauhan Road and Panki Road are some of the major sub-arterials roads within the city. A Kanpur Nagar Nigam Study during 2003 revealed tremendous increase in vehicular traffic on these roads and increased emissions. Even though the city is growing the economic profile of the population shows that nearly 60 percent of the city population lives in slums. The city will have to cater to their mobility needs and make the growth inclusive. Moreover, the green spaces, the lungs and the sink of the city are nearly exhausted inside the city that can get further eroded if car centric growth is encouraged.

The increasing population brings in to picture the increasing number of vehicles in the district. A survey reveals that Kanpur has the highest number of vehicles in the state—1.6 million vehicles registered with the regional transport office (RTO). Nearly 200 vehicles are added to the existing number of registered vehicles every day. However, the road network and transport facilities have not developed to the same extent to absorb the vehicular pressure. Not only this, the city's poor infrastructural and waste management plans have led to a stagnant progress in terms of its development.

Road and Transportation Planning

With the high population growth and changing travel & traffic characteristics, transportation problems are aggravating in the city of Kanpur. The yawning gap between demand and supply of

transport infrastructure is steadily increasing. The capital-intensive transport infrastructure development is imperative for medium and long-term solutions. Kanpur is facing the problem of regulating inter-city traffic together with the city traffic. The railway network passing through the city has resulted in a large number 16 of rail level crossings. The congestion is evident all along the G.T. Road and at all those places where the railway network cuts the road network. In the past, some remedial measures were exercised by constructing six Roads Over Bridges (Murray Crossing, Jhakkarkati, Narender Mohan Setu, Govind Puri, Dada Nagar and Panki) and a by-pass on the southern end of the city to ease the traffic congestion. The spurt in city population and motorized vehicles (3.3 lakh to 5.4 lakh) has compounded the problem further. The problem of pollution and air quality deteriorating, when the rail level crossings are closed, beside generating long queues of traffic leading to congestion and traffic jams are some of the major problems. Moreover, the focus of this section is to review the current status of transportation system, road network in Kanpur.

Existing Transport System in Kanpur

The city is predominantly dependent upon private buses and tempos for the intra-city passenger travel. There are approximately 80 private buses and 980 auto rickshaws and tempos plying in the city. Earlier, there were city buses operated by U.P.S.R.T.C. to cater to the need of commuters which have been withdrawn subsequently. Recently U.P.S.R.T.C has ordered 108 new CNG buses to replace old fleet of buses. One mother station and 7 daughter stations are under construction and 1000 new CNG taxi permit has been given. There are approximately 5,000 cycle-rickshaws in the city, commonly used for making short trips. In the absence of adequate public transport system, the people are forced to depend upon their personalized modes to sustain in the growing economic activities. The growth of scooter/motorcycles has been phenomenal during the last decade. Motorized two wheelers grew from 2.7 Lakhs in 1999 to 4.5 Lakhs in 2006. Goods Transport System: Although intra -city goods transportation by light commercial vehicles is allowed within inner CBD circle, their operations and movements augments the congestion in main market area and slow down the traffic movement. In Kanpur city, major share and maximum growth is observed in two wheelers. Out of total vehicles, in 2006 83 percentage two-wheelers, 13 % Cars, 4 % of trucks were registered whereas it was 79% two-wheelers, 18% cars and 1% each for Auto, Bus and Trucks in 1995.

Housing and Water Supply

Out of total houses, still 33 percentage houses are not covered by electricity, 17 percentage by safe drinking water and 36.5 percentage by toilet. Table 3 reveals that still 10 percent houses are not covered by any of basic services. The access to basic utility services for the existing housing stock is presented in the Table 3 below:

Table 3. Access to basic services.

Proportion of houses having electricity, safe drinking water and toilet	% age to total
Electricity	66.38%
Safe drinking water	82.39%
Toilet	63.61%
Electricity and safe drinking water	59.63%
Toilet and safe drinking water	57.82%
Electricity and Toilet	58.40%

Further, there is an urgent need for speedy development of new planned housing schemes and providing better linkage between inner core city and new planned schemes so that the inner core city can be decongested.

In case of water supply system, the main source of surface water in the city is from the catchments of Ganga River and Pandu River. The total water supply requirement is 600 mld but only 385 mld of

potable water is being supplied. The total supply from treatment plants is about 255 mld water (210 mld raw water from Bhaironghat pumping station and 45 mld from Lower Ganga Canal) and approximately 130 mld water is drawn from groundwater comprising of 80 mld from tube wells (about 135) and 50 mld from hand pumps (about 9830). The availability of water is adequate but distribution system needs improvement. Main issues are that numbers of connection is not increasing due to excess use of ground water, low pressure and unreliable service, low utilization due to old and leaky system, Inadequate funds for O&M. The need is felt to expand distribution as demand of 464 mld will rise to 860 mld by 2031. The emphasis will be on improving water supply distribution for the inner core in phase 1 (Rs 319 cr). This will comprise of replacing old and leaky pipes in inner core area, renovation of the zonal pumping stations and improving capacity, providing for inter-connection of various water treatment plants to balance shortfall in capacities. Additional WTPs and feeder mains to connect to outer colonies will be considered in phase 2 (Rs 694 cr).

Waste Production

Urbanization directly contributes to waste generation, and unscientific waste handling causes health hazards and urban environment degradation. Municipal Solid Waste (MSW) is defined to include refuse from the households, non-hazardous solid waste discarded by the industrial, commercial and institutional establishments, market waste, yard waste and street sweepings which are collected by the municipal authorities for disposal. As the result of rapid increase in production and consumption, urban society rejects and generates solid material regularly which leads to considerable increase in the volume of waste generated from several sources such as, domestic wastes, commercial wastes, institutional wastes and industrial wastes. Wastes that arise from a typical urban society comprises of garbage, rubbish (package materials), construction and demolition wastes, leaf litter, hazardous wastes, etc. MSW is only a relatively small fraction of all the solid waste that is generated in an advanced urban economy. Modern urban living brings on the problem of waste because of everything in packaging and fast-food products which increases the quantity of waste and changes its composition with each passing day as is clear from Table 4.

Table 4. Representing states, regions and quantities of waste generated in cities of India.

S. No.	City	State/Union Territory	Region	Class of the city	Number of dumpsites	Quantum of waste generated (TPD)	Quantum of waste supplied to the landfill	Waste supplied to the dumpsite
							(TPD)	(%)
1	Agartala	Tripura	North-eastern	Class I	1	200	100	50
2	Ahmedabad	Gujarat	Western	Class I	1	2300	1800	78
3	Asansol	West Bengal	Eastern	Class I	2	250	230	92
4	Chandigarh	Union Territory and capital of Punjab and Haryana	Northern	Class II	1	400	300	75
5	Delhi	Delhi	Northern	Class I	3	6800	6400	94
6	Faridabad	Haryana	Northern	Class I	4	450	375	83
7	Greater Mumbai	Maharashtra	Western	Class I	4	6500	6500	100
8	Guwahati	Assam	North-Eastern	Class I	1	350	150	42
9	Indore	Madhya Pradesh	Central	Class I	1	600	325	54
10	Jaipur	Rajasthan	Western	Class I	2	1100	990	90
11	Jamshedpur	Jharkhand	Eastern	Class I	2	280	240	85
12	Kanpur	Uttar Pradesh	Northern	Class I	1	1500	1200	80
13	Kochi	Kerala	Southern	Class I	1	250	25	10
14	Kozhikode	Kerala	Southern	Class II	1	300	50	16
15	Lucknow	Uttar Pradesh	Northern	Class I	No designated	1198	1050	87

Source: FICCI generated Survey.

A part from solid waste generated by households, commercial establishments and institutions, Kanpur also has a number of industries and other businesses that generate different type of waste such as biomedical waste, sludge, buffing and other waste produced by tanneries in Jajmau area, industrial waste produced by textile, rubber and other industries operating in the city etc. The main issues are outdated equipment causing unreliable service, inadequate bins, no segregation of waste and proper composting/SWM disposal arrangement, non-operative treatment facilities of tannery waste. The strategy would be introducing house to house collection and user charge, improving reliability by replacing old equipment, improving efficiency by transfer stations and providing tricycles, provide for a Treatment/composting plant, outsource an integrated SWM and conservancy service on PPP basis.

Kanpur is a typical growing city in India, beset with enormous infrastructure bottlenecks. As discussed above the sewerage system needs to be entirely redone, the system, which was originally designed to cater to a population of 3–4 lakhs, now serves a population as large as 3.6 million. Water supply in the city is very poor, which forces most people to go in for their own boreholes. Some key points which were expressed repeatedly by the citizens were (a) general dissatisfaction with the response of KNN to grievances of the citizens (b) grave concern about the quality of water and its contamination with sewage water (c) Poor state of environmental sanitation and Solid Waste Collection, particularly in the inner core area (d) lack of transparency and harassment at the hands of clerks and petty officers (e) poor state of transport. Overcoming the resulting traffic bottlenecks would require the construction of around 10–11 flyovers. There is also the problem of poor drainage facilities, causing water- logging and the deterioration of the road network. Thus, Kanpur‘s need for immediate improvement of its infrastructure cannot be overemphasized.

Under the Amrut Smart City project Kanpur, Lucknow, Allahabad, Jhansi, Faizabad and Varanasi are the city‘s proposed to be developed as smart cities as per the Union Cabinet. Let‘s hope that this would bring a major transformation and prove to be a sustainable mode of urbanization.

ENVIRONMENTAL DYSTOPIA

Brief Introduction

Among the major causes of pollution in Kanpur are industrial sector, vehicles, road dust and domestic cooking. The industrial sector is the biggest cause of air pollution in Kanpur. The constant disposal of hazardous effluents in the river Ganga by tanneries has resulted in tremendous harm to the river and soil quality within the vicinity. Even after years and years of litigation against such disposal and irregulated working of the tanneries, no material solution is attained. The efforts taken up by the authorities are much in vain as can be seen from the WHO report, 2018 wherein Kanpur tops the list of most polluted cities in the world. The rampant pollution has contaminated ground water sources. There are reports of increasing deformaties among new born babies and the farmers are complaining that their fields are turning toxic.

It has been revealed by a survey of ten major cities of India by the National Environmental Engineering Research Institute (NEERI), Nagpur that there has been a substantial increase of the suspended particulate matter (SPM) in the air, which suggests the presence of dust and carbon particles coated with toxic gases. The highest level of SPM is reported to be in Delhi and Calcutta. It is as high as 460. The other metropolises, which cross the maximum, prescribed for SPM by WHO (200 micrograms per cubic meter of air) are Kanpur, Nagpur, Jaipur, Mumbai and Ahmedabad [6]. The high levels of air pollution in these cities are largely attributable to incomplete combustion of diesel and leaded petrol, particularly in case of two- and three-wheelers, which use inefficient two-stroke engines and indirect fuel injection. The study has revealed that the SPM levels in the residential areas of all industrial cities have reached a critical level. Rapid urbanization together with other associated problems of shelter and provision of infrastructural facilities has caused a pernicious effect on the eco-stability of the country.

Yet, another serious problem is related to treatment of sewage collection and disposal of waste materials. Hardly any city in India has 100 percent sewage collection treatment and waste disposal facilities. Incidentally, of all the capital cities of different states and union territories Patna (the capital city of the State of Bihar) is considered to be the worst of all. The untreated and partially treated wastewater ultimately contaminates rivers, lakes and reservoirs causing manifold pollution problems. Rivers passing through cities such as Ganga, Yamuna, Krishna, Kaveri, Godavari, Hoogly, Damodar, Kshipra, Gomti, Mahanadi, Narmada, Tapti, Betwa, etc. are reported to be heavily polluted. Urbanization had also enhanced the solid waste problem in the country [7]. With the present culture of use and throw and increasing use of biodegradable packing material, the quantity and composition of waste is likely to change in the coming decades.

Indian cities also have serious problem of noise pollution. It is considered to be a very big health hazard. Noise affects man physically, psychologically and socially. Intense noise or long stay in a noisy environment can cause permanent reduction of hearing sensitivity by damaging sensory organs of the inner ear. It can also influence blood circulation, cause stress and other psychological effects and could also be an accident risk by drowning warning signals.

Air Pollution [8]

Cities can draw up effective pollution control plans if they know how much, at what rate and speed different polluting sources are contributing to the total air pollution load in the city. But in most cities of India it is not yet possible to arrive at a reliable source-wise pollution load estimates. Only in a few cases the air quality regulators and the experts have begun to use these assessment techniques though these are still limited in scope.

More recently, Kanpur was included in the Air Quality Assessment, emission inventory and source apportionment studies that were carried out in six major cities under the aegis of the Union Ministry of Environment and Forests and the Central Pollution Control Board. This has looked at:

i. Air quality and detailed chemical characterization of fine particulates (PM10 and PM2.5),
ii. Emission inventory of different pollution sources,
iii. Contribution of different sources to ambient air quality,
iv. Application of dispersion model to get air quality profile and impact of various control options and
v. Formulation of action plans and control strategies based on findings of the study.

Vehicles

The relative contribution of vehicles to total particulate pollution is lower than industry but its contribution to the total nitrogen oxide pollution is higher. From public health perspective vehicles pose a special problem because vehicle emissions take place in the breathing zone of people, and they contribute significantly to human exposure. People living or working in close proximity to high traffic roadways or in vehicles are subject to particularly high levels of exposure. The US based Health Effect Institute scientists point out that in densely-populated developing Indian and Asian cities, as much as 50 percent of the population lives or works near the roadside. Air pollution data show a marked gradient among local, regional, and roadside levels. Roadside levels of respirable suspended particulates, NOx and NO2 are reported to be much higher than the ambient levels. According to their studies exposure to the vehicular pollution is the highest within the 50 to 500 to upto 1500 m of the roadways. Vehicles contribute 20 percent of the PM10 and 47 percent of NOx whereas industry contributes 33 percent of PM10 and 43 percent of the NOx. Vehicles also emit 65 percent of the carbon monoxide, and 11 percent of sulphur dioxide. This requires stringent action to achieve clean air. 29 Among vehicular sources two wheelers are contributing maximum to the total load. However, the studies have not yet assessed the extent of exposure to the vehicular fumes that is always higher for most people travelling on roads and living close to the roadways. Industry: According to the CPCB report: Air Quality Trends and Action Plan for Control of Air Pollution [9] from Seventeen

Cities, Sept 2006, major particulate pollution in the industrial sector is from use of coal followed by wood and related fuel. There are several small and medium scale units which are using high sulfur fuel oil that cause air pollution.

Industry

According to the CPCB report: Air Quality [10] Trends and Action Plan for Control of Air Pollution from Seventeen Cities, Sept 2006, major particulate pollution in the industrial sector is from use of coal followed by wood and related fuel. There are several small and medium scale units which are using high sulfur fuel oil that cause air pollution.

Water Pollution

Kanpur is the most populated town along the river Ganga in UP. Officially the population of the city is enumerated to be 25, 51337 (2001 census) with current unofficial estimate putting it over 4 million. The decadal growth rate of population has increased from 26.5% in 1981-1991 to 35% in 1991-2001. In terms of population, Kanpur is the second largest city of North India, the largest being Delhi. 60% of the water requirements of the city are met from the river Ganga, which is badly polluted from various point and non- point pollution sources. Kanpur generates approximately 400 million litres per day (MLD) of sewage that is discharged through dozens of drains that finally opens in to the river. The stretch of Ganga near Kanpur is especially vulnerable because of inadequate discharge and flow. The Ganga in Kanpur is always strewn with human corpses and animal carcasses in addition to nonbiodegradable polybags. Further a number of Dhobi Ghats (5) operating permanently in the river bank contributes substantially to water pollution. Actions the stretch of river Ganga passing along Kanpur (south bank) and Unnao (north bank) is getting polluted from both sides. Although pollutants/sewerage released from Kanpur side is getting treated, no pollution control efforts are being made from Unnao side. Installation of STP‘s is urgently required to prevent pollution of Ganga water from north bank side.

Due to their immanent propensity to damage the environment, tanneries have always been under the watchful eyes of the Supreme Court.

M.C. Mehta v. Union of India (Kanpur Tanneries matter) was perhaps one of the earliest cases where the activities of tanneries were brought to the attention of the Supreme Court. This case was a public interest litigation presented before a Division Bench of the Hon‘ble Supreme Court comprising of E.S. Venkataramiah and K.N. Singh, JJ. The petitioner M.C. Mehta, who was an active social worker had filed this petition inter alia for the issue of a writ/order/direction in the nature of mandamus to the respondents restraining them from letting out the trade effluents into River Ganga until the time they put up necessary treatment plants for treating the trade effluents in order to arrest the pollution of water on the said river. It was the complaint of the petitioner that neither the Government nor the people were giving adequate attention to stop the pollution of River Ganga. It was therefore sought that steps should be taken for the purpose of protecting the cleanliness of the stream in River Ganga. It was contended that the trade effluent discharged from tanneries was ten times noxious when compared with the domestic sewage water which flows into the river from any urban area on its banks and was thus a major source of pollution of River Ganga. There was not much dispute on the question that the discharge of the trade effluents from these tanneries into River Ganga had been causing considerable damage to the life of the people who used the water of River Ganga and also to the aquatic life in the river. However, the tanneries of Kanpur had presented that due to lack of physical facilities, technical knowhow and funds, it had not been possible for most of them to install adequate treatment facilities. It was pleaded on behalf of a few tanneries that if some time was given to them to establish the pre-treatment plants they would install them. It was, however, submitted by all of them that it would not be possible for them to have the secondary system for treating waste water as that would involve enormous expenditure which the tanneries themselves would not be able to meet. In his judgment Venkataramiah, J., held that the State was under a constitutional duty to

protect and improve the environment and to safeguard the forests and wildlife of the country. In the opinion of the Court, it was a fundamental duty of every citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife, and have compassion for all living creatures. As a result, there was a statutory prohibition against the use of any stream or well for the disposal of polluting matter. This meant that no person could knowingly cause or permit any poisonous, noxious or polluting matter to enter, directly or indirectly, into any stream; or, knowingly cause or permit to enter into any stream any other matter which may tend, either directly or in combination with similar matters to impose an obstruction on the proper flow of the water of the stream. The Court further held that it was the duty of the State Government, through the State Boards, and the Central Government to use the powers conferred upon them by statute to take all such measures as it deemed necessary or expedient for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution. In cases of this nature, the Court could issue appropriate directions if it found that public nuisance or other wrongful acts affecting or likely to affect the public are being committed and the statutory authorities, who are charged with the duty to prevent such activities, are not taking adequate steps to rectify the grievance. Finally, it was said that just like an industry which cannot pay minimum wages to its workers, cannot be allowed to exist, a tannery which cannot set up a primary treatment plant couldn‘t be permitted to continue to be in existence. This is because the adverse effects on the public at large which are likely to ensue by the pollution of the Ganga would be immense and would outweigh any inconvenience that may be caused to the management and the labour employed by it on account of closure of the tanneries. Thus, the financial capacity of the tanneries was to be considered as irrelevant while requiring them to establish primary treatment plants. It was, therefore, directed that those tanneries, which had failed to take the minimum steps required for the primary treatment of industrial effluent were to be closed down, and though such closure of tanneries could bring unemployment, loss of revenue, etc. life, health and ecology were held to have greater importance to the people. What we see in this decision is a pro-active and bold stance taken by the Hon‘ble Supreme Court towards the protection of the fragile environment in which we exist. There is a realisation of the great role played by our rivers, especially the Ganga in the lives of millions of Indians and the dire need to protect it. The noteworthy aspect of this decision is the high standards of accountability that it creates for the concerned statutory bodies, with respect to the protection of the environment. Another aspect, which is worth noting, is the great emphasis it lays on the protection of environment over the economic interests and feasibility arguments advanced by the polluting tanneries.

Sadly, so many years have passed but the condition of the industries remains almost the same. Though few treatment plants have been installed however, their capacity is not enough to treat the effluent of all the tanneries. Moreover, machines are outdated and are not adequately equipped to function efficiently. Since neither the Government nor the tannery owners are ready to take the full responsibility, the matter stands unresolved till date and the river Ganga is bearing the brunt instead.

Household Power Generation

The city has very poor power supply, for most part the day the city witnesses power cuts for prolonged hours. The power crisis leads to heavy usage of gensets running on diesel mostly at the breathing level causing pollution and exposure to people in shops, markets and on the roads. This also worsens the air quality and according to estimates there are around 20,000 gensets in the city.

Noise Pollution

The factors/agents such as generators, loud speakers, automobile horns and fireworks/ crackers are responsible for noise pollution in the city. Indiscriminate use of the above is leading to several complications such as stress, psychological problems and loss of hearing. In spite of the Noise (Prevention and Control of pollution) Act, 2000 in place, the authorities have found it tough to bring the noise level with in the permissible limits. Some commercial areas like Ghantaghar has noise level as high as 78.2 dB and industrial area like Dada Nagar‘s noise level is 75.1 Db against a permissible

limit of 65 dB during day time. Corresponding to that the permissible noise pollution level during night time fixed at 55 dB for the above two localities have recorded 71.8 dB and 69.5 dB respectively. The large number of tempos, which ply all over the city, contributes greatly to noise pollution because of poor maintenance.

Reasonable Steps to be taken

To ease the traffic congestion and related environmental problems, new roads with improved width should be laid, pedestrian facilities and parking facilities provided. · Regulation of traffic is essential in the core area of the city. Mixed nature of traffic should be provided on these roads and certain slow moving traffic like bullock cart and hand carts should be banned during day time. All vehicles moving on the road should meet the stipulated emission norms. Two wheelers are responsible for 70% of the vehicular pollution. An organized mass transport system may reduce the use of two wheelers. Conventionally, the environmental problems are solved by introducing environmental management technique such as control of pollution at source, providing sewage treatment facilities etc. However, in large urban conglomeration like Kanpur city, the problems can not merely be solved by pollution control measures. The environmental aspects are to be induced into each of the developmental activities at the planning stage itself and are to be well coordinated and balanced, an analysis of the various environmental attributes such as air, water and land use indicate that the city is currently not geared to attain environmental sustainability unless remedial measures are in place. Critical assessments of the existing situation indicate that demographic structure, economic condition of the people and land use largely determine the state of the environment in Kanpur. Therefore, it is the planners and policy makers who have to decide on various parameters that needs to be in place for a sustainable environmental plan for the city.

WHAT WENT WRONG: COMPARATIVE STUDY AND CONCLUSION

India is witnessing an unprecedented rise in urbanization and cities like Delhi, Mumbai and Calcutta are over-crowded with people. Now nearly one-third of the population lives in towns and cities. The urban population, however, is economically very important and contributes 50 to 55 percent to the total GNP. It also means that the hub of all modern activity is concentrated in major cities, which continuously attract migrant workers in search of their livelihood.

However, unlike the big cities in rich countries, Indian cities are not able to take in more and more people because of poor urban management and resource constraints. The people continuously confront problems of safe drinking water, power, sewerage and garbage disposal. With rapid natural increase and inflow of rural population, cities are growing rapidly and there is an urgent need for better governance, transport and basic amenities for the growing population.

In case of Kanpur, along with unplanned urbanization many other factors resulted in its inhibited growth. Kanpur’s economy was adversely affected by the change in the national economic framework and, unlike most other Tier 1 or Tier 2 cities, it never really recovered from that change. Coimbatore, Surat, Ahmedabad and Mumbai all recovered from the closure of their large government-owned textile mills. More generally, comparable Tier 2 cities have exhibited much higher GDP growth than Kanpur. In Kanpur, the state owned not just textile mills, through the National Textile Corporation, but also the Tanneries and Fertilizer Corporation through the British India Corporation (BIC). All closed down in the 1990s. Large private sector firms, such as scooter-manufacturer LML Auto Ltd., were also unable to adapt to new competition from foreign manufacturers, such as Honda and Yamaha, as well as fast-changing market preferences, and LML stopped production in 2002. Over the past decade, Kanpur’s private sector has become increasingly dominated by SMEs that had served as ancillaries to large industries, both public and private. JnNURM [11] supported long overdue infrastructure improvements in Kanpur and had a disproportionate impact, albeit late and from a low base.

Kanpur Nagar Nigam's lack of adequate fiscal capacity to meet the required financial contribution has hampered Kanpur from accessing other infrastructure programs under JnNURM. While improving over time, Kanpur lags behind other cities in Uttar Pradesh on key infrastructure development criteria [12]. The Golden Quadrilateral highway project has significantly improved connectivity and market accessibility for Kanpur's industries. The Golden Quadrilateral (GQ) highway project connects the four major cities of Delhi, Kolkata, Mumbai and Chennai.

Thus, unprecedented population growth leads to unplanned and unmanaged developmental activities. Rapid urbanization has caused wide spread environmental degradation in the country [13]. The government has conceded that despite imposition of regulatory measures, the magnitude of pollution from industrial sources in the country has not shown any appreciable decrease during the last two decades. Increase in pollution levels in urban areas is also fueled by ever-growing traffic. The growth in the number of vehicles per capita in the past 12 years has been very high in the country. These vehicles contribute the most to air pollution levels. Poor maintenance of vehicles and traffic congestion has been found to be critical factors of air pollution problems in urban areas. Most vehicles do not confirm to permissible emission limits. These unplanned development activities generate pressure on infrastructure facilities and slacken off the sustainability. The spreading out of land use in an urban area expand along the transport nodes and roads or such other patterns in case of different phenomena in Kanpur. With the establishment of the industries, immigration in Kanpur city takes place from various directions in search of economic opportunities. As the area develops, commercial centers and services come up to specialize in economic functions. Kanpur is among the most industrialized cities in India and it works as a pull factor of immigration in the city due to better employment, education facility and other services. These demographic and economic factors promote the spatial growth and expand the city outward to fertile agricultural land. There is a lack of demarcation between residential area and other land uses as it has been observed in the cities of western countries by various scholars. A mix pattern of all types of land use is found in most of wards in Kanpur. It seems there is a significant requirement of residential area to accommodate the city's rapidly growing population but unplanned and irregular residential setup looking became hurdle to provide habitat to all. Dense settlement pattern indicating to reduce the burden of the city, specifically in some areas. Kanpur Development Authority has planned to develop 5000-acre Hi-tech residential land use as New Kanpur City which is located at Kalyanpur-Bithoor road and Jawaharpuram on Shivali road. City needs improvement in land use under public utilities and public and semipublic categories also. Increasing population growth put pressure on existing resource base and Kanpur must have a master plan for at least next 20 to 50 years.

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