

11. ENVIRONMENTAL MANAGEMENT PLAN FOR KANPUR CITY

11.1 INTRODUCTION

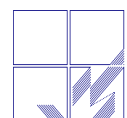
The chapter aims at developing a comprehensive environmental management strategy for the Kanpur city based on baseline information with regard to urban environment quality and services. The chapter takes a closer look at the existing framework of the state's policy on various components of environment; identify the processes and causes, which are leading to deterioration and decline of the environment in and around Kanpur. The report after detailing the threats to environment has made an attempt for future action plans aimed at ensuring compliance with the proposed city development plan.

Over the years, the city has faced huge changes not only in terms of pollution load increase, but also the infrastructure requirement (road network, water supply, solid waste management). As a result, the ambient air quality, surface water quality, ground water quality has deteriorated considerably.

Urban environment is an important component for the sustainable development of a city. While taking up developmental activities, the assimilative capacities of the environmental components i.e. air, water and land to various pollutants are rarely considered. Presently, the environmental aspects are not usually considered while preparing master plan or budget plan and the process is skewed towards developmental needs. For all developmental activities, a crucial input is land and depending on the activity a specific land use is decided. The environmentally related land use are trade and commerce, housing, transport, hazardous waste disposal facilities, quarrying and mining, power generation, forestry, recreation and tourism etc. In this back ground it is highly imperative to assess the existing status of urban environment, identify problems and issues and finally develop an environmental management strategy.

11.2 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 non-biodegradable polybags.



Further a number of Dhobi Ghats (5) operating permanently in the river bank contributes substantially to water pollution.

Kanpur has roughly 5500 industries with 75 medium and large industries such as those of fertilizers, detergents, chemicals and paint industries. Another potential danger to environment (water and air) is from 367 strong leather industries located in one area called Jajmau along the river Ganga out of which 70 are reportedly closed (PCB 2006). These highly polluting leather industries pose a major threat to water quality, ecology of the river particularly to aquatic life (fish and turtles). The population of fishes and turtles has declined dramatically and even those survive are not fit for human consumption as they carry toxic elements. This in turn has severe health hazards in the form of incurable diseases.

The State Pollution Control Board which periodically monitors the water quality of the city at various points studied the water quality at designated sites (table 11.1) in March 2006 with specific parameters as indicated in the table. Water temperature and pH in all the sampling stations were within the tolerance limit, whereas Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD) and Chloride content were exceeded the standard at sites marked with asterisk*. However the presence of coliform bacteria is alarmingly high at all sampling station, which clearly indicates that the water is not potable. From the table it is evident that although the situation is not alarming at all sites, but it can not be denied that the quality of water in the stretch of Ganga passing along Kanpur is not fit for consumption.

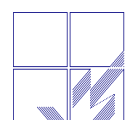
Actions

The stretch of river Ganga passing along Kanpur (south bank) and Unnao (north bank) is getting polluted from both sides. Although pollutants/sewage 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.

11.3 AIR POLLUTION

The air pollution problems in Kanpur are due to traffic and transportation, burning of solid waste, use of coal and cow-dung for cooking purposes, lack of green belt/buffer zones etc. In addition following factors also contribute largely to the problem.

1. Increase in the number of vehicular traffic
2. Poor(damaged) road condition
3. Under construction buildings
4. Smoke emitted from factory chimneys



City encounters severe dust and smoke problems and the prescribed limit of 500 mg/m³ is often exceeded in various locations. Due to impact of vehicular pollution, air quality at major road crossings exceeds the norms of the Suspended Particulate Matter (SPM) and lead. Respirable dust concentrations are also alarmingly high in many locations in the city.

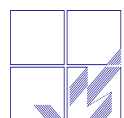
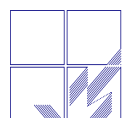


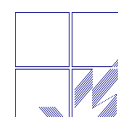
Table 11.1 Water Quality at Various Sampling Points



KANPUR

Sampling Points	Ghatiya Ghat	Kannauj W/S (near Mariyam Bridge)	Kanauj D/S (at Mariyam Bridge)	Bithoor (ghat)	Ganga Barrage (Kanpur u/s)	Rani Ghat (intake point)
Date	09/03/2006	09/03/2006	09/03/2006	09/03/2006	09/03/2006	09/03/2006
Temperature	24.5	25.5	26.0	25.5	25.0	25.5
PH	8.1	7.5	7.9	8.4	8.2	8.2
Alkalinity(mg/l)	138.0	172.0	186.0	194.0	200.0	192.0
Conductivity	33.7	53.6	50.7	47.2	51.3	51.1
Dissolved Oxygen	7.7	7.0	8.9	8.2	7.1	6.9
BOD (mg/l)	1.5	2.7*	2.8*	2.2	2.3	3.1*
Chloride (mg/l)	16.0	24.0	22.0	24.0	24.0	20.0
Total Coliform (MPN/100ml.)	4300	9300	9300	7500	4300	9300

Source: Data collected from State Pollution Control Board 2006



The major agents currently responsible for the air pollution in the city are the life style of people and the number of vehicular traffic and industries in commercial areas. Generator and exhaust fans at factories are the other contributors of air pollution. There are 196 brick kilns in and around Kanpur which to a great extent are responsible for releasing huge amount of smoke to air. It is estimated that 25% of city's population mostly constitute labour class who use cooking fuel (coal and firewood) and in turn cause air pollution. There are 5 cremations grounds which contribute both for the air and water pollution.

11.3.1 Emissions from Vehicular Traffic

The vehicular emissions are one of the major sources of air pollution affecting the urban population in Kanpur. Unlike industrial emissions, vehicular pollutants are released at ground level and hence the impact on recipient population will be more. As of April 2002, there were a total of 3,87,697 vehicles in the city (300 sq km area). Two-wheelers constituted 83 per cent of the registered vehicles. Badly maintained roads, heterogeneous nature of traffic aggravates the nature of vehicular pollution.

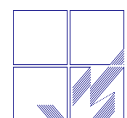
According to the state pollution control board, vehicular traffic contributes to 80 per cent of the pollution load, while domestic sources add another 14 per cent and industrial 6 per cent. Tempos alone contribute 60% of the total air pollution load. However according to a study by NEERI in 2002, auto exhaust and diesel generator sets contributed 30-40 per cent of the total respirable particulate matter, while resuspended dust contributed between 20-30 per cent and other sources, including garbage burning made up the rest. A study undertaken in 2002 to monitor the air quality in three sites covering one each at residential, commercial and Industrial location showed that in the monitored sites the air quality consisting all pollutants exceeded the national standard by 3 to 3.5 times. This trend continued in 2003 even though Euro II vehicles and fuel became mandatory in the city in April 2003.

11.3.2 Emissions from Domestic Sources

Fuel used for the purpose of cooking in domestic sector principally consists of the following:

Coal/Wood	:	100t/day
Kerosene	:	105kl/day (71 t/day)
LPG	:	91 t/ day
Cow-dung	:	not accounted

Kerosene and LPG are the major sources of fuel used in the city followed by coal and wood. Coal is predominantly used in slum areas, road side tea stalls, restaurants etc. Use of coal for the domestic purposes is a major source of pollution in terms of carbon monoxide, SO₂ and particulate matter



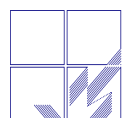


Table 11.2 Emission Loads from Domestic Source

Domestic Emission Sources		Emission Rate (kg/day)			
Types of Fuel	Consumption/day	PM	SO ₂	NO _x	CO
Coal	70 t	350	532	104	3132
Kerosene	105 kl	213	357	163	21
LPG	91 t	38	0.04	164	40
Wood	30 t	205	15	150	30

Source: State Pollution Control Board, 2006

Sulphur Dioxide (SO₂) and Nitrous Oxide are the two major air pollutants in addition to Suspended Particulate Matter (SPM). NO_x and SO₂ concentration in the city are well within national standards i. e 80mg/cu.m. However the city is facing severe dust and smoke problems that often exceeds the prescribed limit of 500 mg/cu.m in many locations.

For the purpose of monitoring air pollution, the state pollution control board has set up three stations in residential areas and one each in industrial and commercial areas.

Table 11.3 Air Pollution

	Upper Limit	Present Status
RSPM	100mg/m ³	196mg/m ³
TSPM	200mg/m ³	464mg/m ³
Sulphur Dioxide	80mg/m ³	80mg/m ³
Nitrogen Oxide	80mg/m ³	80mg/m ³

Source: TOI (May 16, 2006)

Year	Kidwai Nagar		Depty Parao		Fazal Ganj	
	RSPM(Av)	SPM	RSPM	SPM	RSPM	SPM
2003	173.84	410.49	172.82	397.38	191.49	439.73
2005	177.00	426.00	177.00	380.00	213.00	470.00
March 2006	148.15	328.25	144.21	330.72	216.83	292.15

Source: State Pollution Control Board, 2006

11.3.3 Emissions from Industrial Area

The air pollution from industrial area can be quantified from the amount of fossil fuel burnt in boilers. Data on location of industrial clusters in different areas in the city, quantity of fuel used in each area and the height of release of emissions from stacks are vital for estimating the air pollution potential. Fuel consumption in each of the industrial area and prominent point source emissions in the city is provided in the table below.

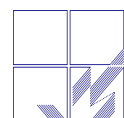


Table 11.4 Point Source Emissions (in kg/hr)

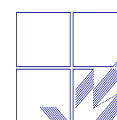
Source	Emission Rate of various pollutants		
	SO ₂	NO ₂	SPM
Fazalganj Industrial Area	71	28	585
Dadanagar Industrial Area	134	101	180
Panki Industrial Area	254	112	2600
Jajmau Ind. Area	55	50	607
Industrial Estate	21	9	195
Fertiliser Unit	91	62	162
Panki Power Plant	1090	751	3900
Textile Mills	63	44	682
Lal Imli	5	697	
Sarvodaya Nagar Ind. Area	3	2	65

Source: State Pollution Control Board, 2006

A perusal of the of the above figures indicate that air quality (RSPM &SPM) both in residential and commercial areas are much above the standards fixed by the State Pollution Control Board (SPCB). The level of respirable suspended particulate matter has exceeded the upper limit in many locations. As against the upper limit of 100 microgram (μ) for cubic meter, the level of RSPM in the city has been measured at 196 micrograms per cubic meter. And the total particulate suspended material (TSPM) at the densely populated Kidwainagar was recorded at a high of 464 micrograms per cubic meter, which is twice the upper limit. In last one decade there has been a spurt in the number of cases of asthma, bronchial asthma and allergy etc. in the industrial hub of Kanpur due to declining air quality.

11.4 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.

Table 11.5 Noise Level at Selected Locations

Monitoring Station	Category	Average Sound level recorded(dB)		Ambient Standard		Monitoring month
		Day	Night	Day	Night	
Kidwai Nagar	Residential	63.07	60.79	55	45	March 2006
Ghantaghar	Commercial	78.02	71.80	65	55	March 2006
Dada Nagar	Industrial	75.07	69.49	75	70	March 2006
Hallet Hospital	Sensitive	63.02	59.16	50	40	March 2006

Source: State pollution Control Board, 2006

Table 11.6 Sound Pollution

ZONES	UPPER LIMIT		PRESENT STATUS	
	DAY	NIGHT	DAY	NIGHT
COMMERCIAL	65db	55db	82db	78db
RESIDENTIAL	55db	45db	70db	63db
SILENCE	50db	40db	69db	69db
INDUSTRIAL	75db	70db	74db	68db

Source: TOI (16th May 2006)

From the table it is evident that the noise level both during day and night are on higher side for residential, commercial and sensitive zones for which monitoring was done, where as it is almost stable for the industrial site.

Actions

- Creation of green belt along the major roads, which would help in the reduction of noise level since the plants are best known to mitigate the sound effect
- Provision for flying squad to deal with the problem agent
- Awareness among the public on the adverse impact of noise pollution on human health

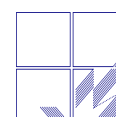
11.5 ENVIRONMENTAL RESOURCES OF KANPUR:

The environmental resource areas of Kanpur broadly consists of the following

- Natural forests
- Plantation forests
- Open lands
- Agricultural lands
- Rivers/Wetlands
- Play grounds
- Parks/recreational areas

11.5.1 Natural and Plantation Forests

Kanpur city and Dehat has 5400 hectares of forest area. Consequently, much of the natural flora and fauna has disappeared over the years due to various



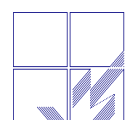
anthropogenic pressure. However, the city currently has negligible area under forest. The Allan Forest which originally had 200 hectares now reduced to 50 hectares only. Interestingly this natural forest patch harbours the Kanpur Zoological Garden (Allen Forest Zoo). The other area called Sanjay Van Banglia has 20 hectares. Currently these two forest patches, serves as the green lungs for the city. Other than this under the social forestry scheme, road side plantations have been taken up by the forest department. The species which are recommended for plantation are Neem, Kadamb, Gulmohar, Chilbil, Kaneer, Biganwalia and Chitwan

Action plan

- Afforestation measures in degraded ravine areas along the river Ganga and Pandu will help to meet local needs, enhance biodiversity and lead to improved environmental condition
- Strip plantations along the major city and arterial roads, railway lines and canals are important strategies for increasing the forest cover of the city
- The concept of Tree Outside Forest (TOF) should be inculcated on public, private and farmlands.
- The existing forest areas should be managed through assisted natural regeneration, enrichment plantations and soil and water conservation measures.

11.6 ISSUES RELATING TO KANPUR CITY ENVIRONMENT

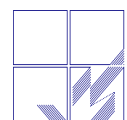
- Horizontal growth of the city and defective land use planning (Refer Table 5.1 & 5.2 in Chapter -5 for details on existing and proposed land use in Kanpur) are the two most inevitable factors that attribute to poor city environment.
- The rapid increase in population together with industrialization over the years has substantial impact over the city environment.
- Haphazard developmental activities contribute significantly to the environmental pollution thus posing risk to city residents in the form of overcrowding, unhygienic living conditions and air, water and noise pollution.
- The estimated pollution loads in Kanpur is 5500 kg/d from domestic sources, 2250 kg/h (142 t/d) from vehicular sources and 12,000 kg/h from industrial sources
- Extent of pollution in the stretch of river Ganga and Pandu adjoining Kanpur is highest. The river in Kanpur is presently being used as a natural sewer, garbage dump and morgue.



- Respirable Suspended Particulate Matter (RSPM) levels in Kanpur are alarming.
- Large number of leather industries besides fertilizers, detergent, chemicals and paint factories contribute significantly for polluting air, water and noise.
- Dhobi Ghats, cremation grounds, brick kilns also responsible for polluting the city environment.
- Large number of drains empties their sewage daily to river Ganga and other city ponds.
- Noise levels are alarmingly high in commercial areas, far exceeding the prescribed limit.

11.7 INDICATIVE STRATEGIES TO IMPROVE THE CITY ENVIRONMENT

- A master plan for the city needs to be in place with clear cut guidelines for different type of land use for commercial, industrial and residential purpose
- The city planners and policy makers must not allow heavy and medium size industries within the city limit
- Environmental resource map showing distribution of natural forests, plantations, water bodies, agricultural land and open lands would help in the planning process
- Drainage and sewerage network map showing drains/nallas, sewer lines, pumping stations, disposal points and location of sewage treatment plant would guide in the preparation of environment management strategy.
- Vehicles responsible for air and noise pollutions should be phased out and in no case they should be allowed to ply on the road after 15 years
- Strict regulation to be made for not allowing poorly maintained tempos who are the main culprit for causing noise pollution. They must be banned from plying on the city roads.
- The city should take up the concept of Compressed Natural Gas (CNG) - run vehicles in phased manner.
- Phasing out of tempos must be initiated since they are mainly responsible for the air and sound pollution exceeding the set limits in the city
- Efforts should be made to identify the environmental hot spots such as poor air quality area, ground water contaminated area, unsewered area, waterlogged area, slums, polluted river stretches etc. so that remedial measures can be put in place.
- Decision makers in top policy making bodies like UP Jal Nigam, Pollution Control Board and Kanpur Development Authority should work in tandem for implementing development projects without delay
- There is a need for a centralized waste disposal facility for the city so that wastes after disinfection and incineration can be disposed to a separate



dedicated facility. In addition waste collection, storage and transportation network need to be strengthened.

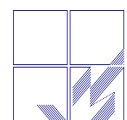
- Development of integrated waste management planning, inter-agency coordination and institutional capacity building measures to improve the efficiency and effectiveness of solid waste management at each stage of collection, transportation, treatment and disposal should be in place.
- Relocation of polluting industries from non-confirming areas should be made with proper supporting infrastructure.
- Projects that are earmarked for execution under GAP, Phase-II should be taken up as per the timeline and remaining drains should be tapped to bring it under STP
- KESCO, KDA and Police should not comprise on issues relating to granting of licenses for installation of industries within the city limit.
- Some senior officers of the SPCB are of the view that a quasi-judicial body such as Pollution Control Commission with sweeping powers should be in place to deal with matters for ensuring a clean city environment.

11.8 ACTIONS REQUIRED

- 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 organised 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

