Chapter 5

MAJOR SOURCES OF POLLUTION

1.1 Industries

Existence of polluting industries is one of the major sources of pollution within the district. This may be in the form of air pollution, which takes place due to the release of harmful gases into the atmosphere that causes harm to the surrounding atmosphere and water pollution due to release of untreated effluents in surface water bodies. For the protection of the surroundings from pollution which may be caused by industries, it is necessary to have a knowledge about the individual industries or industrial estates in a region, the area they cover, their pollution potential based on the production and the type of treatment and disposal measures taken by the industry.

Pune District is well developed industrially. In the district there are **12** industrial estates and Information Technology (IT) Parks developed by the Maharashtra Industrial Development Corporation (MIDC) having overall area of 54.01 sq. km. (Existing and proposed). In the district the industrial estates are located at Talegaon (Maval), Chakan and Rajgurunagar (Khed), Hinjavadi (Mulshi), Talavade and Chinchwad (Haveli), Jejuri (Purandhar), Kurkhumb (Daund), Pandare and Baramati (Baramati), Indapur (Indapur), Kharadi (Pune City) (**Annexure 1**: Table 37). The industrial area covers industrial and residential area together at Hadapsar, Gultekdi, Parvati, Bhor and Lonavala. Also, within the district, small-scale industries and other different types of isolated industries are located at various places. Many of these small scale industries are engaged in production of agricultural implements pump-set, engine, cotton mill, medicine, rubber, plastic material, soap, nylon, biscuits, electric material, wooden furniture, steel etc.

According to District Social & Economical Review Report-2003 (Economics & Statistical Department, Pune District) as on Dec. 2001, Out of 3,526 industries registered in the district under the Factory Act (1948) 2,981 industries are working. Compared to the total number of registered industries in the State, about 10.09% industries are located in Pune district.

The Regional Office, MPCB, Pune as on 2003-04, has granted 3,602 consents for establishment of industries in Pune district. The district has 222 large, 218 medium and 3162 small-scale industrie (Table 38 at **Annexure-I**). The total quantity of effluent generation is 82,460 CMD. The 1,902 no. of industries are not generating trade effluent. In all 42 industries from Pune District are registered under the partnership called as ‘Corporate Responsibility for Environmental Protection’ (CREP). This partnership calls for participatory action of all the concerned stakeholders for pollution control. Of these industries, 30 belong to the red category and 12 to the orange category (**Annexure 1**: Table 39).

The District Industrial Centre and the District Khadi and Village Industries Board have an influential role in the development of small-scale industries. Upto 2001, the District Khadi and Village Industries Board developed 1,683 small-scale non-polluting industries in the district. Out of which 965 industries are working. Eleven Co-operative sugar

industries are located in the district (**Annexure 1**: Table 40). Haveli, Junnar, Daund, Ambegaon, Bhor, Shirur and Mulshi Taluka, each has one Co-operative Sugar Industry whereas in Baramati and Indapur Taluka, two sugar industries are located.

Common Effluent Treatment Plant (CETP) for treatment of industrial wastewater is located at Kurkumbh MIDC in the Daund Taluka. For the disposal of hazardous wastes new Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF) site is being developed at Ranjangaon, Taluka Shirur.

1.1.1 Location Map of Existing and Proposed Industrial Areas

The Map of Existing and Proposed Industrial Areas **(Map No. 18)** depicts the location of industrial estates, isolated industries and major industrial and residential areas. Industrial growth centres and the areas under different industrial estates have also been shown.

1.2 Mines

The major kind of pollution caused by mines is noise and dust pollution. Based on the information obtained from the District Geology and Mining officer, Pune, excluding the Taluka Pune city, there are in all about 141 open cast stone mines located in the different Taluka of the district having area of 262.4 sq.km. No other types of mines are present in the district. Due to rapidly increasing urbanization, Haveli Taluka has about 60 open cast stone mines. Most of these mines are for construction purposes. Junnar, Shirur, Daund and Maval Taluka also have sizable number of stone mines. Talukawise details of the stone mines have been given in **Annexure 1:** Table 41.

1.2.1 Location Map of Mines

The Location of Mines Map **(Map No. 19)** depicts locations of open cast mines in the district.

1.3 Generation of Wastes

Problems that arise due to waste generation are primarily because of unscientific disposal methods of the wastes. Wastes in such cases are dumped on the land surfaces or water bodies without treatment, which leads to air pollution of the surrounding areas, water pollution in case surface water bodies are located in close vicinity and the contamination of ground water due to seepage of leachates from the waste. Land degradation in the cities mainly results from inadequate and unsuitable sites being used for disposal of municipal, hazardous and bio medical waste that is generated in the cities.

1.3.1 Domestic (Organic) Sewage Load

Details of sewage generated in different ULBs within Pune District have been given in **Annexure 1:** Table 42. The discharge of sewage from settlement of Pune city and adjoining urban areas in river Mula-Mutha has resulted in localized degradation of the river water quality in the river water stretch downstream of the urban settlements. Details of the urban and rural breakup of the basin wise surface water pollution have been given in Table XXII.

The major urban settlements in Pune District include Two Municipal Corporations, Eleven Municipal Councils & Three Cantonment Boards. Pune Municipal Corporation, Pimpri Chinchwad Municipal Corporation, Khadki & Pune Cantonment Boards are the major contributors of domestic sewage pollution.

The river Mula, Mutha, Pauna and Indrayani are the main tributaries of Bhima River flowing through the city of Pune and Pimpri Chinchwad. The details of population, water

supply and sewage effluent generated by various ULBs in the disrttict is given in Table 42.

PUNE MUNICIPAL CORPORATION:

Pune city is situated on the banks of Mula, Mutha River in a gentle rolling valley with small hillocks and off western Ghat ranges all around the city having population 31,00,000 (2004). Present water requirement of Pune is 791 MLD, which is fetched from Khadakvasala dam. The Pune city generates about 451 MLD sewage water. For the treatment of sewage Pune Municipal Corporation has constructed six STP's having total treatment capacity of 325 MLD and remaining sewage is discharged untreated into the River Mula Mutha (Table 42).

Disposal of sewage is thus resulted in deterioration of water quality of these rivers. Thus, MPCB has classified the stretch as Class-IV of water quality. However, Pune Municipal Corporation has prepared a master plan targeting year 2025, for water supply and sewage collection & treatment in entire PMC limits of 430 sq.km area. Pune Municipal Corporation also prepared a proposal under National River Action Plan to clean the rivers. It is an urgent need to ensure the earliest implementation of master plan to improve the quality of river water. Necessary public pressures and followup from PMC and state Govt. is important for the purpose. Maharashtra Pollution Control Board is persuing the followup for compliance with PMC by giving directions to improve the quality of sewage water on various occasions and has filed the criminal case in the CJMFC Pune For improvement of quality of river water. *(Ref. Environmental Status Report 2004-05, Regional office MPCB-Pune)*

PIMPRI CHINCHWAD MUNICIPAL CORPORATION:

The Pimpri Chinchwad is adjoining city of Pune. The Pimpri Chinchwad Municipal Corporation has developed very fast in terms of industrial, commercial and residential growth. The MIDC has also set up industrial centers in the area known as Chinchwad, Pimpri and Bhosari. Geographically, the area falling in Pimpri Chinchwad Corporation is situated in between River Mula & River Indrayani. The River Pauna flows from the city area.

The Pimpri Chinchwad Municipal Corporation is having 36 zones. The main source of water is River Pauna. The Corporation draws 200 MLD of water, MIDC draws 75 MLD of water and M/s Pudumjee Pulp & Paper Mills draws 11 MLD of water. The MIDC is supplying water to industries and partly to Residential zone. Also, M/s Pudumjee Pulp & Paper Mills using water for the industrial purpose as well as supply to residential zone in and around the industry. It is estimated that these water supply schemes will meet the requirement of 11 lakh and above population ensuring 145 liters of water supply per person per day. The Corporation is having good water distribution and supply network in the area for Residential and Industrial Zones.

Presently, all water supply schemes are having water treatment facilities at their respective water supply centers. The Corporation has six numbers of STPs having treatment capacity of 157 MLD. However, presently PCMC treats only 94 MLD of sewage. It is to be noted that 63 MLD of sewage is not taken to STP for treatment, though they have facility to treat the same quantity. From the Corporation area 15 Nalls and number of minor drain carry untreated sewage waste of about 170 MLD into the River Mula, Pauna and Indrayani. Corporation is discharging 94 MLD of treated sewage water into River Pauna and Indrayani. About 4 MLD of treated sewage is used for irrigation at Chikhli area. Also, 2–3 MLD of treated sewage is used for gardens etc. After having close look at the working of STP, drainage and collection network, it is noticed that some of the common laps in relation with performance of STP, unit operation. Therefore, the Maharashtra Pollution Control Board has prosecuted the Pimpri Chinchwad Municipal Corporation and filed criminal case in the Court of Law at CJMFC, Pune. MPCB officers have carried out extensive survey of the sewage quality, river

water quality at designated point of discharge by locating water monitoring stations, Water Supply Drainage network and performance of STP *(Ref. Environmental Status Report 2004-05, Regional office MPCB-Pune) .*

1.3.2 Domestic Sewage Load Map

The Domestic Sewage Load Map **(Map No. 20)** shows the river basin wise urban and rural organic waste generation.

1.3.3 Municipal Solid Waste (MSW)

The changing lifestyle and growing requirements of the increasing standard of living tend to increase consumption of goods, there by leading to increase in the generation of wastes. The quantity of municipal solid waste generated depends on a number of factors such as population, food habits, standard of living, and scale of commercial and industrial activities. The per capita generation of solid waste differs greatly from city to city.

Details of solid waste generated in different urban local bodies (ULBs) within Pune District have been given in **Annexure 1:** Table 42. It shows around 1550-1575 MT/day of solid waste genetate in the district.

Presently, Pune city generates about 1000 MT/D of MSW. For the disposal of MSW generated in the city, the Pune Municipal Corporation (PMC) has one major site for disposal at Hadapsar and six small ramps at Katraj, Yerwada, Dhole Patil Road, Ghole Road, Aundh and Paud Road. The PMC is currently disposing its waste by land filling at Urli Devachi having area is of 17.20 ha.

Where, waste is converted into the compost by adopting the method of sparying the EM solution. The existing practice seems to be unscientific. Hence, the subsoil water of surrounding area is contaminated due to seepage of leachets generated from the dumping site. The efforts are being taken by the Municipal authorities for selection of other site which are to be finalized.

The PCMC having population of 11,85,467 souls generate about 440 MT/D. The existing dumping site is at village Moshi. The Municipal authority has applied for obtaining authorization for improvement in existing dumping site. But the authorization proposal is refused by the Board. Nearly about 20 MT organic wastes are used for vermicomposting and remaining 420 MT is being converted in to compost by spraying the EM solution. The PCMC has been asked to submit the proposal for new dumping site. *(Ref. Environmental Status Report 2004-05, Regional office MPCB-Pune).*

The method of disposal of solid waste in all the other ULBs except Baramati is through open land filling. In Baramati, the composting method is followed for disposal of waste.

1.3.4 Municipal Solid Waste Generation Map

The Municipal Solid Waste Generation Map **(Map No. 21)** shows the MSW generated by Municipal Corporations / Municipal Councils and Cantonment Board.

Table I. Basinwise domestic sewage (Census Town) pollution load in Pune District

Sr. No.	Census Town	Taluka	Class	Civic status	Watershed No. *	Total Population (2001)	Water consumption (MLD)	Sewage Load (MLD)
1.	Pune	Pune City	I	Municipal Corporation	BM 52	2,538,473	342.69	274.15
2.	Pimpri Chinchwad	Haveli	I	Municipal Corporation	BM 42	1,012,472	136.68	109.34
3.	Pune Cantonment	Pune City	II	Cantonment Board	BM 52	79,965	9.99	7.92
4.	Khadki	Pune City	II	Cantonment Board	BM 45	77,473	9.68	7.74
5.	Lonavala	Maval	II	Municipal Council	BM 39	55,652	4.45	3.56
6.	Baramati	Baramati	II	Municipal Council	BM 69	51,334	4.10	3.28
7.	Dehu Road	Haveli	III	Cantonment Board	BM 42	46,921	5.86	4.68
8.	Talegaon Dabhade	Maval	III	Municipal Council	BM 37	42,578	3.40	2.72
9.	Daund	Daund	III	Municipal Council	BM 48	42,204	3.37	2.69
10.	Shirur	Shirur	III	Municipal Council	BM 27	26,999	2.15	1.72
11.	Sasvad	Purandhar	III	Municipal Council	BM 59	26,689	2.13	1.70
12.	Junnar	Junnar	III	Municipal Council	BM 3	24,741	3.34	2.67
13.	Chakan	Khed	III	Census Town	BM 23	21,680	1.73	1.38
14.	Indapur	Indapur	III	Municipal Council	BM 78	21,592	1.72	1.37
15.	Bhor	Bhor	IV	Municipal Council	BM 81	17,886	1.43	1.14
16.	Rajgurunagar (Khed)	Khed	IV	Census Town	BM 20	17,636	1.41	1.12
17.	Alandi	Khed	IV	Municipal Council	BM 25	17,565	1.40	1.12
18.	Manchar	Ambegaon	IV	Census Town	BM 12	13,799	1.10	0.86
19.	Jejuri	Purandhar	IV	Municipal Council	BM 58	12,000	0.96	0.76
20.	Wadgaon	Maval	IV	Census Town	BM 39	11,364	0.90	0.72
21.	Shivatkar (Nira)	Purandhar	IV	Census Town	BM 73	10,135	0.81	0.64
22.	Khandala	Maval	V	Census Town	BM 39	9,804	0.78	0.62
23.	Kusgaon Budruk	Maval	V	Census Town	BM 39	8,567	0.68	0.54
24.	Tathavade	Mulshi	V	Census Town	--	7,976	0.63	0.50
25.	Dehu	Haveli	V	Census Town	BM 37	5,332	0.42	0.33
				Total	**24 Nos.**	**42,00,837**	**541.81**	**433.27**

Note: *1) Assumed water consumption for I) Municipal corporation-135 lpc, ii) Municipal council (B &C class)-80 lpc, iii) Cantonment Board-125 lpc, iv) Census Town-80 lpc. 2) Assumed sewage generation80% ofwater consumption.*

Source: *1.) * : Based on Drainage and Watershed Map (Map No.9)*
2.) Superintending Engg. Pune Irrigation Circle, Pune (2002),
3) District Social & Economical Review Report, Economics & Statistical Department, Pune District (2002).

1.3.5 Hazardous Waste

There are 516 hazardous waste generating units in Pune district, which generate about 5,205 MT/M of hazardous wastes. The details of Talukawise generation of hazardous waste are shown in **Annexure 1:** Table 43. Maximum numbers of industries i.e. 254 are located in Haveli Taluka, which generates 51% of the total hazardous wastes within the district, followed by Taluka Daund, which generates 22 % hazardous waste. The profile of hazardous waste generating industries has been shown in **Annexure 1:** Table 44. A CHWTSDF site in Shirur Taluka at Ranjangaon is at initial stages of development.

Maharashtra Pollution Control Board (MPCB) has permitted the industries located at a distance of more than 100 km from CHWTSDF, Taloja, Navi Mumbai to store the hazardous waste on site till CHWTSDF at Ranjangaon, Pune is made operational. However, 283 industries from the Pune District are members of the TSDF at Taloja and they are sending hazardous waste to this site.

1.3.6 Biomedical Waste

Biomedical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals, or in the production or testing of organisms. Generation of BMW varies widely from place to place. Generally, it is 125 to 250 gram / bed/day. The ratio of incinerable and non-incinerable waste is about 75: 25.

In the district, there are 1,072 HCEs generating biomedical waste, which generate about 2,782 kg/day of BM waste. As per the available records, the maximum waste is generated by Government Hospitals. **Annexure 1:** Table 45 shows the sub-region wise status of biomedical wastes in Pune district. The maximum waste i.e. upto 54% is generated in Sub-Regional Office-I (Pune-I) area, of which 93% is treated. In the Pune-II Sub-Region, 27% biomedical waste is generated, of which about 5% is treated and in Pimpri-Chinchwad sub-region 20% waste is generated and treated100%.

Common Bio Medical Waste Treatment and Disposal Facilities (CBMWTDF) at Pune have facility of Incineration, Autoclave and Shredder (capacity 100 kg/hr., 100 kg/hr. and 75 kg/hr. respectively). The facility covers total 666 nos. of HCE's having 8500 beds. The quantity of BMW received and treated in July 2006 is 27,000 kg. The fly ash generated at facility is disposed at PMC landfill site at Urli Devachi. The incinerator is horizontal type, twin chember with single burner.

At PCMC facility Incineration, Autoclave and Shredder is not installed. The CBMWTDF at PCMC is located at Yashvantrao Chavan Memorial Hospital, at Tukaram Nagar, Pimpri. The facility covers total 444 nos. of HCE's having 3621beds. Presently the BMW is disposed to PMC Biomedical waste facility. The quantity of BMW received and treated in July 2006 is 19,500 kg.

1.3.7 Hazardous Waste Generation Map

The Hazardous Waste Generation Map (Map No. 22) shows the quantity of hazardous waste generated by various industries in each taluka of Pune district. The distribution of hazardous waste into 3 categories based on the method of disposal (landfill, incineration and recyclable) has also been depicted Taluka wise. The proposed hazardous waste disposal site at Ranjangaon in Shirur Taluka is also been marked.

1.4 Consumption of Fertilizers and Pesticides

Pune District falls under the high agriculture use. For the purpose of agriculture, use of fertilizers is unavoidable. Within the district, the total consumption of fertilizers in year 2001-02 is about 91930 tonnes per year, based on the data from the District Agriculture Office. The chemical fertilizers used and its consumption in the district is given in **Annexure 1:** Table 46.

1.5 Industrial Air Pollution

The industrial scenario and the pollution load in Pune city, PCMC area, Taluka Khed, Maval, Junnar, Ambegaon, Mulshi, Haveli and Maval is given in the table below (Table XXIII). The small-scale industries mainly belong to service category. These industries are having high air pollution potential have taken measures for emissions control.

Table II. Industrial air pollution sources & air pollution load in Pune District

Name of Area	No. of LSI /MSI	SO_2 (kg/Day)	SPM (µg /Nm^3)	
Pune City	12	9,410	700 (Max. Avg.)	152 (Min. Avg.)
PCMC	76	19,393	351 (Max. Avg.)	57 (Min. Avg.)
Khed Taluka	13	1,618	--	--
Maval Taluka	10	14,606	--	--
Junnar and Ambegaon Taluka	3	6,535	--	--
Mulshi and Haveli	17	6,411	--	--
Total	131	57,973		

Note: *' –' Not Available*
Source: *Revised Action Plan for control of Air Pollution in Pune, MPCB, (2005).*

1.6 Vehicular Pollution

Due to the development of the urban areas as centres of trade, commerce and industries, the growth in vehicular traffic has been alarming in Pune city and Pimpri- Chinchwad. Air pollution from vehicles is of serious concern. The health effects caused by vehicular pollution in the cities are indicated through increasing incidences of cough, headache, nausea, irritation of eyes, and various bronchial and respiratory diseases besides visibility problems.

The total registered vehicle in Pune District is 1500383 up to March 2004. The estimated pollution load for 1087306 vehicles is about 400 tonnes per day (**Annexure 1:** Table 47 and 48). The numbers of vehicles plying on the National Highways passing through the district for the years 2000 and 2001 have been given in **Annexure 1:** Table 49.

The total vehicular pollution load within Pune city area is about 182 tonnes per day (Table XXIV). Among the vehicles plying on the roads of Pune city, maximum pollution is caused by 2-wheelers as the number of 2 wheelers is highest. The number of cars is more than twice that of rickshaws, inspite of which the pollution caused by rickshaws is about 27% and that of cars is only about 15% of the total pollution load. The number of vehicles registered in the Pune city from the year 2002 to 2004 has been given at **Annexure 1**: Table 50.

Table III. Vehicular pollution load in Pune City (2002)

Vehicle Type	Nos. of Vehicle	CO	NO_x	SO_x	HC	TSP	PM_{10}	Total Pollution Load	Pollution Load (%) to total pollution load
Cars	71,771	20.2	2.32	0.034	3.8	0.3	0.2	26.854	14.76
2 Wheelers	5,60,359	36.1	0.3	0.058	19.2	0.9	0.7	57.258	31.47
Rickshaws	30,785	28	0.75	0.036	18.4	0.9	0.7	48.786	26.81
Taxies	1,633	2.7	0.25	0.002	0.5	0.03	0.02	3.502	1.92
Buses	6,602	9.2	9.72	0.903	1.8	1.42	1.11	24.153	13.27
Trucks	10,367	7.5	9.51	0.724	1.2	1.38	1.09	21.404	11.76
Total	**6,81,517**	**103.7**	**22.85**	**1.757**	**44.9**	**4.93**	**3.82**	**181.957**	**100.00**

Note: *All values of pollutants are in tonnes /day*
Source: *Central Institute of Road Transport (CIRT), Pune.*

The main pollutants emitted from automobiles are hydrocarbons, lead/ benzene, carbon monoxide, sulphur dioxide, oxides of nitrogen and suspended particulate matter. Though the number of vehicles is one of the major factors on which vehicular pollution depends, there are other reasons for the increased vehicular pollution in urban areas. These include: fuel quality, vehicle maintance, traffic congestion, poor road conditions and old automotive technologies.

The total pollution load in the Pimpri Chinchwad Municipal Corporation (PCMC) is about 88 tonnes per day (Table XXV). The number of two wheelers is, about 79%. But the pollution load due to the movement of trucks is the maximum, i.e. about 43% of the total pollution load. This may be due to the reason that this area is a major industrial belt within Pune District and hence, a large number of trucks play on the roads in this area.

Table IV. Vehicular pollution load in PCMC (2002)

Vehicle Type	No. of Vehicles	CO	NO_x	SO_x	HC	TSP	PM_{10}	Total Pollution Load	Pollution Load (%) to total pollution load
Cars	27,224	7.66	0.9	0.012	1.44	0.11	0.07	10.19	11.53
2 Wheelers	2,11,837	13.64	0.11	0.021	7.2	0.34	0.26	21.57	24.41
Rickshaws	10,203	9.27	0.24	0.011	6.1	0.3	0.23	16.15	18.27
Taxies	587	0.94	0.09	0.0007	0.17	0.01	0.007	1.21	1.37
Buses	214	0.3	0.31	0.03	0.06	0.04	0.35	1.09	1.23
Trucks	18,492	13.37	16.96	1.3	2.14	2.46	1.94	38.17	43.19
Total	**2,68,557**	**45.18**	**18.61**	**1.37**	**17.11**	**3.26**	**2.85**	**88.38**	**100.00**

Note: *All values of pollutants are in tonnes /day*
Source: *Central Institute of Road Transport (CIRT), Pune.*

1.6.1 Vehicular Volume Map

The Vehicular Volume Map **(Map No. 23**) shows the vehicular volume on the major highways in Pune district.