INDEX

CHAPTER-ONE

History and Development of Pune City

Pune was ruled by several dynasties over the centuries. The earliest evidence found (copper plates of 758 A. D. and of 768 A. D.) indicates that the Rashtrakutas ruled this region. At that time, Pune was referred to as Punaka Vishaya and Punya Vishaya. Here Vishaya means region. Copper plates of 960 A. D. and 963 A. D. refers to Pune as Punaka Wadi and Punaka Desha. Later on, the city has been mentioned as Kasabe Pune.

The Pune Gazetteer explains that the term Pune was derived from Punya - a holy place. In the Hindu tradition, a confluence (sangama) of two rivers is sacred. Hence this city, where two rivers confluence, is know as Punyanagari. After Rashtrakutas, Pune was ruled by the Yadava dynasty. After the fall of this dynasty, it was under Muslim dominance till the seventeenth century.

This is the grama devata where invitations for all religious functions are first offered, be it for a marriage, upanayana (thread) ceremony or any other function. It was in

After the death of Shivaji in 1680 and the cold blooded murder of his son Sambhaji, Aurangazeb named Pune as Muhiyabad. Pune gained importance during the period of the second Peshwa Thorala (senior) Bajirao who ruled from 1720 to 1740. During his time, the palace of the Peshwas - Shaniwarwada was built. The various mahals or buildings were constructed by different Peshwas. There are still remains of a fountain with a thousand outlets called Hazari Karanje. It was Thorala Bajirao who expanded the Maratha Empire into the north and central provinces.

CHATRAPATI SHIVAJI MAHARAJ

With the emergence of Chhatrapati Shivaji, who founded the Maratha Empire, Pune became well known to the Delhi Sultanate. Shivaji, spent his early childhood in Pune at Lal Mahal, a palace built by his father Shahaji, where Shivaji's mother Jijabai lived for a decade. Dadaji Kondev, Shivaji's mentor, developed the Pune city. He constructed a temple of Ganesha, which is now known as Kasba Ganapati.

SHANIWARWADA

Lal Mahal that Shivaji attacked the Moghuls and defeated Shahistekhan, the uncle of Aurangazeb.

Due to the family feuds that ensued thereafter, the Maratha power came to an end in 1818, when the British led by Mount Stuart Elphinstone defeated them and established the British Raj in this region. It was during this period, the French, the Portuguese and the British powers established contacts with the Peshwas, and sent representatives for various functions.

Pune and Delhi were the only power centers during this century. Pune has been recognized as a learning center and the Deccan College (1851) led Pune's educational movement. Tilak, Agarkar, Bhandarkar and other luminaries of the nineteenth century studied at the Deccan College. They studied in English language, but organising the first Marathi literary conference in 1878 started a literary movement. Justice Mahadev Govind Ranade, V. K. Chiplunkar and others took lead in this sphere of life. Tilak, Agarkar, Nam Joshi and Principal Apte founded the Deccan Education Society and its Fergusson College in 1885. The New English School (1880), the Nutan Marathi Vidyalaya (1883) and the MES Society's High School (1875) were also started. Soon after, a high school for Indian girls was established in 1884. A new generation of educated Indians started the freedom movement under the leadership of Lokmanya Bal Gangadhar Tilak. He started two newspapers, the Maratha in English (January 1, 1881) and the Kesri in Marathi (January 4, 1881). Through these newspapers, Tilak aroused an interest in national education, national language, swadeshi and swarajya - the four fold aims for independence. "Swaraj is my birthright" was the slogan given by Tilak to the rest of India.

SINGHGAD FORT

Nanasaheb Peshwa succeeded Thorala Bajirao Peshwa and ruled the Maratha kingdom from 1740 to 1761. He tried to control the Nizam and maintain peace. He was instrumental in urbanising Pune and encouraged the setting up of Peths or wards in Pune. He constructed the famous Parvati Temple complex, a pride for Pune city. He designed a water supply system from Katraj Lake that lies to the south of Pune city. A number of temples and palaces were constructed during his time.

Gopal Krishna Gokhale is another builder of modern India who established the Servants of India Society and represented Indian interests in the imperial legislative council. Mahatma Gandhi considered him as his guru. Maharshi Dhondo Keshav Karve is yet another gem of modern India, who throughout his life fought for the upliftment of women, started a college for them and established the first Indian University for women, named SNDT Women's University. He was awarded the Bharat Ratna in 1958. Senior Wrangler R. P. Paranjape is another luminary from Pune who sacrificed higher salaries and worked as the principal of Fergusson College for over twenty years. Mahatma Jyotiba Phule started education for women and struggled hard for the upliftment of the depressed classes. Shrimati Anandibai Joshi was the first lady to complete medical education in the USA.

Thus, we find the origin of various movements - social, religious, educational, political, economic and literary in Pune.

The Post Independence period

Important morphological transformations of the post independence period in Pune and its surrounding area are marked by:

(a) Rapid growth of large industries in all peripheral areas, particularly
(i) The Pune-Mumbai road and the railway belt to the north of the PMC area and along the Mutha River. The area expanded so rapidly, that in course of time it was accorded the status of a separate Municipality and later a Municipal Corporation.
(ii) The belt along the Pune Solapur road, in and around the industrial estate developed by the Pune Corporation.
(iii) Belts along Nagar road and Satara roads.

(b) Growth of new national-level institutions, namely the National Chemical Laboratory, Armament Research and Development Laboratory and Explosive Research Development Institute in the Pashan area in the north west, National Insurance Academy, west of Pune, National Institute of Bank Management, east, C-DAC and IUCAA in the middle western part. The Institutional locations were on all sides but unlike the industries, which formed groups, the Institutions largely presented a picture of isolated locations.

(c) Spilling over of residential development all directions, some of this spill bearing a resemblance of planned development and a large part being in the form of rank unauthorized development.

Current features of the City's morphology

The present structure of Pune shows the following morphological components

1. The Core City marked by its high densities, narrow roads and paucity of open spaces, but containing major share of residential as well as commercial development in the city.
2. A major office complex near the Pune Railway Station.
3. Peripheral first belt areas mostly inhabited by the middle and higher income groups containing a mix of residential, institutional and commercial (including wholesale commercial) users.
4. Pockets and belts along the radial roads entering the city, containing industrial development.
5. Peripheral second belt areas of the fringe villages [recently merged in the Pune Corporation) generally presenting a picture of unorganized sprawl of residential, petty industrial and local commercial users.
6. The two cantonments forming wedges between [1] and [5], or [3] and [5] above.
7. A system of roads, generally having inadequate capacities, connecting all the above components.
8. The suburban railway lines on the northern side.
9. And lastly, two rivers providing the city with a water front of over 20 kms, and the girdle of the spurs of the Sahyadris on the southern and western sides providing a picturesque backdrop for the city, spreading from there into the gently falling lands upto the river. It is these features of the natural setting, together with its climate, which endeared the city to the Britishers and which earned for it the befitting title of the **'Queen of the Deccan'**.

Growth of Pune City

The process of formation of the Pimpri-Chinchwad New Municipal Council in 1970 and its subsequent conversion to a Municipal Corporation in 1982 along with the extension of the PMC and PCMC limits in 1997 has made the Pune agglomeration one of the largest in the country. From its embryonic origin covering a small area around the Kasba Peth, it has grown in size by successive affiliations of the peripheral areas and is now rated as the seventh largest urban agglomeration in the country. The latest merger in 1997 proved to be extraordinary. The 38 peripheral villages were merged in the Corporation's limits, resulting in an area of 368.69 Sq. km. However, the Government of

Maharashtra in 2001, decided to de-link 15 villages completely and 5 villages partly from PMC's limits, reducing the total area to 243.96 Sq. Km.

The growth of the city in sixties was mainly due to industrial development in the Pimpri – Chinchwad area by private industrialists and MIDC. The bursting of the Panshet dam in 1961 changed the growth pattern and the city started growing along the Mutha River. A number of town planning schemes under the Bombay Town Plan Act, 1945 were planned and completed giving an orderly development pattern to the city. Unfortunately Pune Municipal Corporation took up no town-planning scheme since 1970 and now the city is growing based on a broad development plan and by using development strategies like zoning, reservation TDR, and accommodation reservation. These half-hearted efforts have created haphazard urban pattern.

Functional transformation

A functional transformation accompanied growth in the population of the city. The cause and effect relationship between the population of a city and its functions would indeed be of an interchangeable nature. From an educational and cultural center the city gradually became a center for large scale manufacturing industries. In just a couple of decades after independence, the Pune urban agglomeration became a second order industrial complex in the State. Rapid industrial development naturally attracted migrants from all parts of the country and the social composition also underwent a dramatic change. From being a bastion of cultural conservatism, the city started becoming a trendsetter of new ideas and modern ways of lifestyle.

It is noted that no TPS was planned and implemented since 1970. The draft development plan of 1981 had provided 814 reservations out of which the state Government deleted 309 reservations & allowed 513 reservations in the final development plan of 1987. Thus the planning norms considered by the planner, for a livable city, were watered down. Change of zones under reservation and deleting the lands under reservation has further affected the quality of life in the city. From 1987 to year 2001, 29 out of 513 reservations were deleted under 'minor modifications'. The City Engineer has observed that only 26% of the provisions of development plan of 1987 have been implemented.

Complete details of actual realization and developed lands under the development plan were not available. Amongst the main reasons cited by the PMC officials for its failure to acquire lands under reservations are the 'lack of resources' and procedure length for 'land acquisition'.

CHAPTER-TWO

Census

Demographic trends

British captured Pune by defeating the Marathas in 1818 A.D. The city covered a negligible area of 5 sq. kms at that time. It gradually expanded during the British rule but the post independence era saw an explosive expansion with the formation of the Pune municipality and the establishment of Pune, Khadki and Dehu Road cantonments. The urban area has since grown by nearly 120 times. Even though planning zones are used for analysis in the Development Plan, the PMC requires electoral wards for prioritization of its developmental activities. At present, the city has 48 electoral wards and 14 Administrative Zones.

Population

The population of Pune has grown at moderate rates during the post independence period. In 2001, 38 villages were included in the PMC limits. At present the city comprises of the old city limits and only 23 newly added villages measuring a total of 243.96 sq.km area. After the inclusion of these villages, the area under the PMC has tripled. The next table shows growth in the city's population from 1921 to date. By 1981 Pune had become a one million plus city, where after in a few years time, was born the Pimpri-Chinchwad township, on the northern side, across the river Mula. The new town was also virtually an expansion of Pune. The census is conducted every 10 years. According to the 2001 census the population under the Pune Municipal Corporation is 25,40,089. The estimated population of Pune City in the year 2004 is approximately 30,25,000.

Table No. 2.1 Decadal population of Pune

Year	Population
1921	1,33,227
1931	1,62,001
1941	2,57,554
1951	4,88,419
1961	6,06,777
1971	8,56,105
1981	12,03,351
1991	15,66651
2001	25,40,069
2004 Estimated	**30,25,000**
2011 Projected	38,37,000
2021 Projected	44,44,000

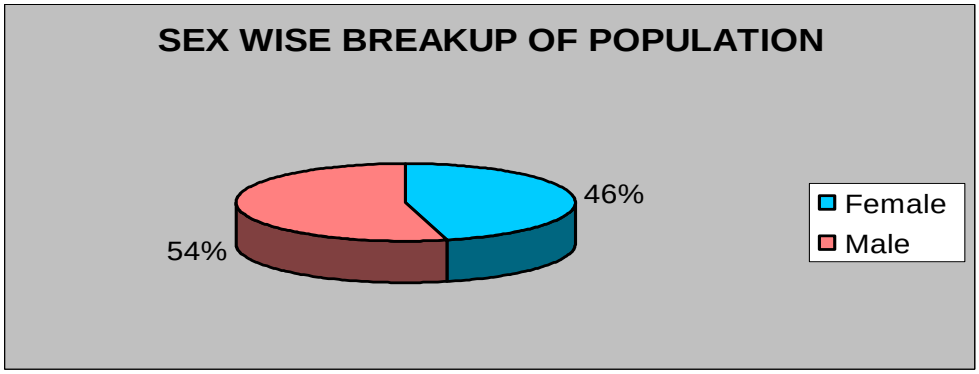
Source: Development Plan Department, 2001 and estimate by MASHAL

Population of the city can be broken into urban and rural categories taking into account the new villages that have been added. It can also be classified according to gender, age and the education status (Table no. 2.2).

Table No. 2.2 Population of Pune City in the year of 2001.

Population	Male	Female	Total
Urban	1325694	1214395	25,40,089
Rural	-	-	-
Total	1325694	1214395	25,40,089
0-6 age group	152161	137826	2,89,987
Literate	N.A	N.A	19,56,976
Illiterate	N.A.	N.A.	5,83,113

Source: Computed information from Census 0f India 2001, Census Handbook.
Note: N.A. = Not Available.



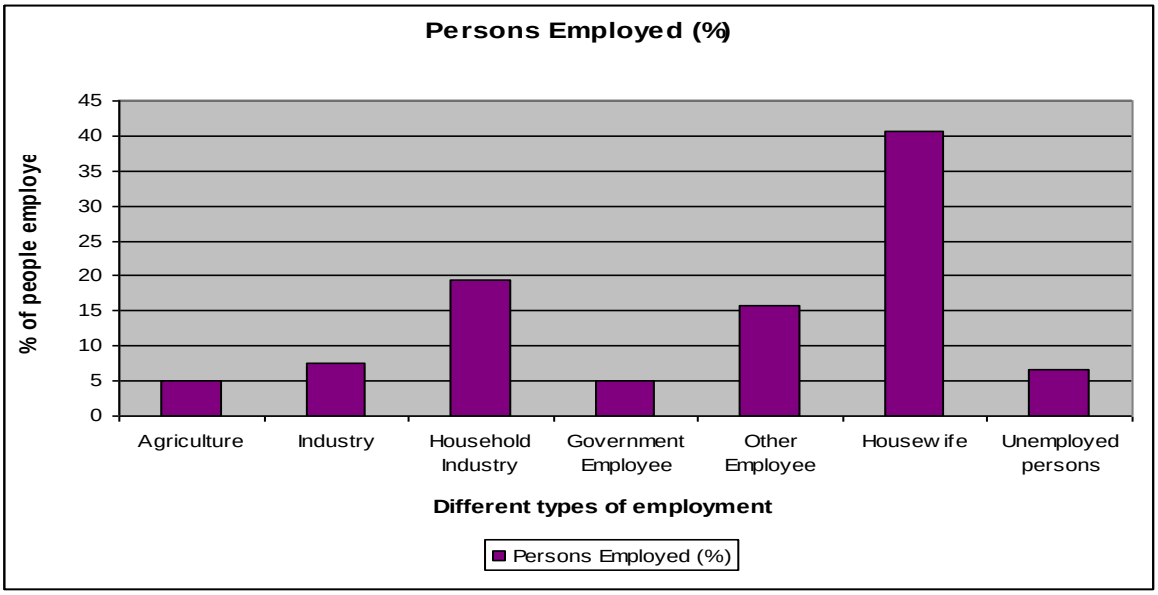
Source: Interim Report, Comprehensive Traffic and Transportation study for Pune City, May 2003 PMC.

The Employment pattern in the city can be seen in table 2.3. While 40.6% of the female population is in the 'household' category, 19.4% of the population is in the small-scale industry sector.

Table No. 2.3 Employment pattern and percentage

Sr. No.	Employment Pattern	Persons Employed (%)
1	Agriculture	5.0
2	Industry	7.5
3	Household Industry	19.4
4	Government Employee	5.0
5	Other Employee	15.8
6	Housewife	40.6
7	Unemployed persons	6.7
	Total	**100.0**

Source: Interim Report, Comprehensive Traffic and Transportation study for Pune City, May 2003, PMC



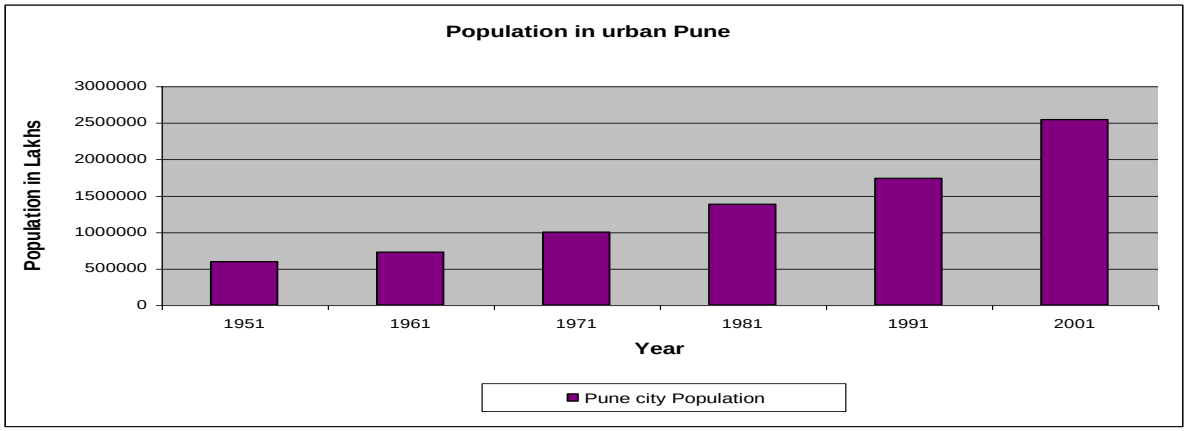
Source: Interim Report, Comprehensive Traffic and Transportation study for Pune City, May 2003, PMC

The city has shown a varying growth rate over the last fifty years. The growth of the urban city and of the district is shown in the following table.

Table No. 2.4 Growth of Urban and Rural Population in Pune City.

Year	Population Pune city	Population Pune district
	Total	Total
2001	25,40,089	72,24,224
1991	1735000	5533000
1981	1380000	4164000
1971	100000	3178000
1961	723000	2467000
1951	594000	1951000

Source: Computed information from Census 0f India 2001, Census Handbook.



Source: Computed information from Census 0f India 2001, Census Handbook.

Thus, using the above information, the population of Pune is projected statistically. This information is useful for planning various long-term schemes.

Wards

According to the 1981 census, there were 75 electoral wards under the PMC, which were increased to 85 in 1991. For effective management of civic functions, the 85 wards were further reconstituted and after an intermediate formation of 111 wards, the number was raised to 124. PMC adopted panel system for the election of corporators and three individual electoral wards were merged to form one panel electoral ward. At present, PMC has 48 electoral wards electing 146 corporators. There are five co-operate members. Thus the total strength of the general body is 151. Pune Municipal Corporation has 14 administrative wards. For effective administration each ward also has ward committees which includes elected representatives and representatives of NGOs.

Table No. 2.5 Estimated Electoral Ward wise population, 2001

Ward No.	Name of the Ward	1991 Population.	2001 Population
1	Aundh	28486	64935
2	Kalas Dhanori	33965	56956
3	Lohagaon Kharadi	80494	53320
4	Hadapsar / Vithalnagar	2883	38082
5	Vadgaon Dhayari	28757	12597
6	Warje	42283	49029
7	Pashan	31167	60548
8	Bopodi	69121	54403
9	Golf Club	41908	52083
10	New Khadki	16253	37846
11	Agakhan Palace	15376	46249
12	Vadgaon Sheri	20652	54856
13	Koregaon Park/ Mundhva	27976	45738
14	Kirloskar Pneumatic Company	43089	36346
15	Sadhana Vidyalaya	22214	61072
16	Wanavadi Mohamadwadi	46204	69509
17	Kondwe Undri	30965	54524
18	Katraj Balajinagar	30073	70145
19	Dhankawadi Hingne Kh.	33830	81639
20	Karve Nagar	43142	67956
21	Kothrud	38239	74940
22	M.I.T. College	37199	71093
23	Gokhalenagar	37632	49504

Ward No.	Name of the Ward	1991 Population.	2001 Population
24	Pune Vidyapeeth	27768	48620
25	Sangamwadi	64367	66833
26	Tadiwala Road	38876	54321
27	Bibvewadi	30279	67562
28	Sahakarnagar Padmavati	39020	50336
29	Karve Road	34636	58283
30	Ferguson College	24064	55384
31	Police Parade Ground	41318	48019
32	Kamala Nehru Hospital	27687	55898
33	Sassoon Hospital	51930	54535
34	Rasta Peth Power House	51604	52739
35	Salisbary Park	33295	61638
36	Tilak Maharashtra Vidyapeeth	25950	55806
37	Shantinagar	39934	41184
38	Parvati	37563	74495
39	Dattawadi	41371	56288
40	Gokhale Hall	24534	58430
41	Bandivan Maruti Mandir	40576	56217
42	Panchhaud Mission	24332	60707
43	Arun Kumar Vaidya Stadium	57835	52145
44	Sonawane Hospital	21703	52715
45	Nehru Stadium	35989	42372
46	Maharana Pratap Garden	35756	64656
47	Tambadi Jogeshwari Mandir	46020	71726
48	Ganesh Peth Gurudwara	51336	72720

Source: Interim Report, Comprehensive Traffic and Transportation study for Pune City, PMC

CHAPTER-THREE

Setting and Land use

Physical settings

Nested in the picturesque Sahyadris (the Western Ghats), just 150 km south of Mumbai (18^0 31' N, 73^0 51' E) is our plateau city situated near the Western Margin of the Deccan Plateau. It lies on the leeward side of Sahyadri, that is the Western Ghat and is about 50 Km. from crest of the Ghat country. It is 100 Km east Konkan i.e. the West Coast. It is almost 160 Km south east of Mumbai by road. It is situated at a height of 560 meters above the mean sea level, near the confluence of Mula and Mutha rivers. Two more rivers, the Pavana and the Indrayani traverse the northwestern outskirts of the urban area. The Mula Mutha River later empties into the Bhima River. Thus the city is located in the upper Bhima basin. The city is surrounded by hills on the west and the south. The Sinhagad-Katraj-Dive range is the southern boundary of the city. The highest point within the city is the Vetal hill, whereas, the highest point in the area is the Sinhagad.

Climate

The city has a typical tropical climate, with three distinct seasons- summer, monsoon and winter. The height above sea level and the leeward location with reference to the Western ghats have made the city's climate moderate and salubrious. The mean daily maximum and the minimum for the hottest month - May is 40 Degrees Celsius and 23 Degrees Celsius respectively. The evening sea breeze from west-northwest keeps the city summer nights at equitable levels. For the coldest month of December the temperature ranges from 30 Degrees Celsius to 12 Degrees Celsius. The relative humidity ranges from 36% in March to 81% in August. Three fourths of the annual rainfall of 70 cm is received in the months from June to September.

Natural resources

Rivers

Lying between Indrayani River in the north and Katraj Lake in the south, Pune is located in the valley between four rivers and several other minor streams. The rivers Ambi and Mose, tributaries of the river Mutha have dams upstream, 40.23 Km West of the Pune City. Ambi's Tanaji Sagar Dam has a catchment area of 12,030 hectares and yields about 304 million cubic meters of water annually. Mose's Veer Baji Pasalkar Dam has an expected yield of 397 million cubic meters of water annually. 17.70 Km west of Pune is Khadakwasla dam on river Mutha with a catchment area of 50.180 hectares, which catches

almost 1088 million cubic meters of water annually. Khadakwasla reservoir has been designed to store only 86 million cubic meters. The overflows from the Tanaji Sagar and Veer Baji Pasalkar dam flow into the Khadakwasla dam from where the overflow is released into the Mutha River. The water from Khadakwasla travels through the Mutha right bank canal, running within 6.4 Kms. parallel to the river, supplying water to Pune city and Cantonment Boards as well as to the rural hinterland's irrigation needs. The total length of the Mutha River within the city limits is approximately 8 km. The average ranges between 150-225 meters, and the gradient is 1/1500, with an average depth of 2 to 3 meters. The floodwater passes through the river during the monsoon at the rate of 700 cubic meters/sec up to a maximum of 2450 cubic meters/sec, occurred once in the last 55 years. The post monsoon flow averages 60 to 80 cubic meters/sec. Since the river, without a definite channel and low water level, was creating an unhealthy environment because of the stagnant water-breeding mosquitoes, the PMC decided to create a channel in the middle of the riverbed of 110 m width and 2 to 2.5 m high walls on both sides to pass 283 cumecs of floodwater. The banks were to be filled up with soil for gardens and playgrounds. However, slums have developed on a certain stretch of these banks, which has had a negative impact on the river water quality. The major stretch of the river carries slushy slit clay, earth, pebbles and shingles as well as rubble to the extent of approximately 60,000 cu. m.

Katraj Lake

The Katraj Lake is situated on an 82 hectares area on the Pune-Satara road in the southern direction. Around 65 hectares of the 82 hectares comes under PMC jurisdiction. In year 2003-2004 PMC with the help of private parties undertook major action in desilting of the lake at zero cost to PMC.

Model Colony Lake

It is situated in the heart of the city with an area of 2.42 hectares. The Garden Department of PMC has completed the beautification of this lake.

Hills

Pune is situated on the Sahyadri Hills. Earlier, due to the presence of trees on the hills and mountains, the city's climate was pleasant and comfortable. But now the climate has considerably changed because of the exponential rise in the number of concrete structures and the loss of green cover on the hills. The city has approximately 12% land under hilltop and hill slope.

There are 11 natural hills in the city, which are as follows:

(1)Parvati Hill
(2)Arai and Malwadi Hill
(3)Fergusson College Hill
(4)Vetal Hill
(5)Ram Hill
(6)Baner Hill.
(7) Taljai Hill
(8) Chaturshringi Hill
(9) Law College Hill
(10) Katraj Hill
(11) Kirkitwadi Hill

Landuse

During the 1970's, the urban activities spilled beyond the erstwhile city limits and it was felt that for comprehensive and integrated planning, a metropolitan region converging on Pune be defined. Accordingly, the Pune metropolitan region was defined in July, 1967. Earlier, the Pune Municipal Corporation city area was 18.3% of the Pune Urban Agglomeration, while about 45% was village areas, 9% cantonment area and 17% was the town area. In 1997, PMC's area increased by 14,611 hectares, to include 10 census towns and 26 villages bringing the land extent to over 46,713 hectares. This increased the PMC's share in the PUA to 58.75%. However the city forms a mere 31.28% of this area, the rest being villages (45.7%), and towns (23.02%). It is clear that the expansion of the urban area into neighboring towns and villages needs to be checked. At present after delusion of few newly added villages, the PMC area is 243.96 sq. km.

Within PMC, the newly added villages show a predominance of agricultural activity and some forestland. This should continue to remain so, in order to sustain the ecological demands of the city. The urbanization of the agricultural land has displaced many farmers, who, having lost their sources of livelihood, have settled down in the city's informal settlements. The riverbed is not spared from slums either. The land use pattern of the city reveals a dense core with commercial and residential areas bisected by the river. The southern bank, having the older parts of the city, has a haphazard high-density development, while the cantonment areas to the north have comparatively low densities. The city shows a concentric growth pattern with the river as the center.

Change in Landuse

Pune has grown from an area of 7.74 sq. km. in 1857 to 243.96 sq. km in 2001 i.e. it has increased by 236.82 sq. km in the last 144 years. In 1985, the area of old PMC was 166.11 sq. kms, which increased to 368.69 sq. kms in 1997, with the inclusion of the 36 villages. The expansion of the PMC limits over the years is shown in the following table.

Table No. 3.1 Expansion of City limit

Year	Area (Sq. Km.)	Increase Area (Sq.Km.)
1857	7.74	-
1889	9.86	2.12
1890	18.04	8.18
1931	18.83	0.79
1935	19.09	0.26
1958	138.94	119.85
1975	139.79	0.85
1981	147.66	7.87
1985	166.11	18.45
1997	368.69	202.58 (After inclusion 36 fringe villages)
2001	**243.96**	124. 73 (After delinking of few newly added villages)

Source: Development Plan Department, PMC

Pune agglomeration includes the area under Pune and Pimpri-Chinchwad Municipal Corporations, Pune, Khadki and Dehuroad Cantonments, Talegaon and few semi-urbanized villages on the periphery.

In 1967 Pune Municipal Corporation, Pimpri Chinchwad Municipal body, Pune Khadki and Dehuroad Cantonment, Talegaon Municipal body and surrounding villages were included in the limits of Pune Metropolitan Region. The land use of the Pune Metropolitan Region in past 30 years is given below. In the past 30 years, the area under residential use has increased by 2.4 % and the area under agriculture and plantation has decreased by 34 %. The area under water bodies, hills and forest has remained the same. However most of the hills areas have been encroached upon.

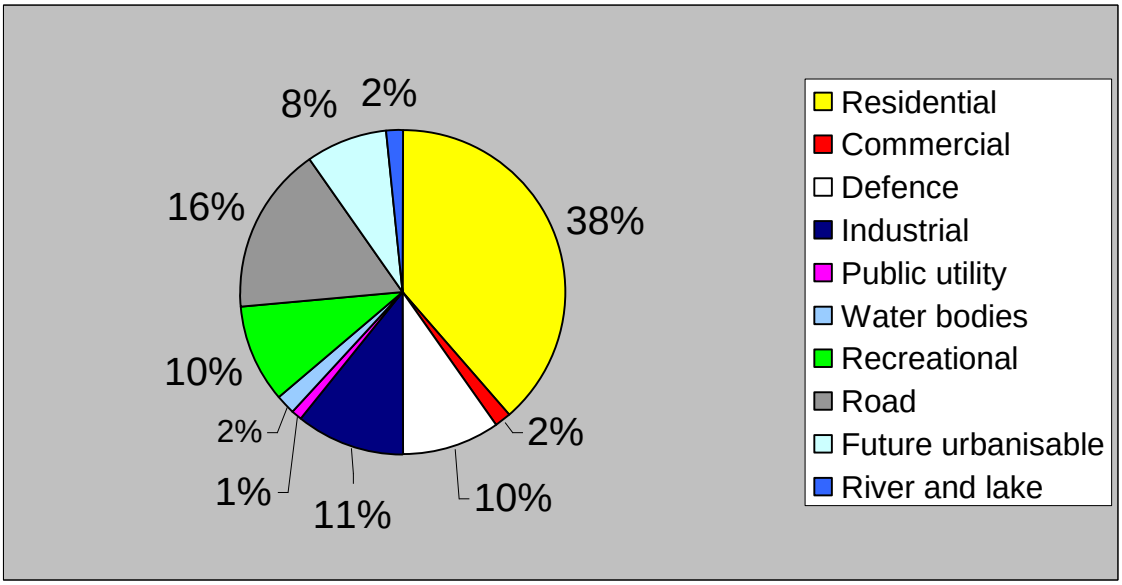
The following table shows the land use pattern in the old PMC limits. Thus one can see the shortage of green cover within the old limits, which makes the surrounding and the hills even more important.

Table No. 3.2 Land use pattern in old Pune Municipal Corporation

Sr. No.	Type of landuse	% of total land
1.	Residential	38.6 %
2.	Commercial	1.8 %
3.	Defence	9.5 %
4.	Industrial	11.0 %
5.	Public utility	1.1 %
6.	Water bodies	1.8 %
7.	Recreational	9.7 %
8.	Road	16.8 %
Sr. No.	**Type of landuse**	**% of total land**

9.	Future urbanisable	7.9 %
10.	River and lake	1.8 %
	Total	**100 %**

Source: Development Plan Department, PMC



Source: Development Plan Department, PMC

The table below shows the land use patterns for the newly added villages. These are the lands, which were added in the year 2001. There were 23 fully added villages and 5 partly added villages. The agricultural land usage in these villages is the highest.

Table No. 3.3 Land use pattern in newly added 23 villages (fully) and 5 villages (partly) in 2001

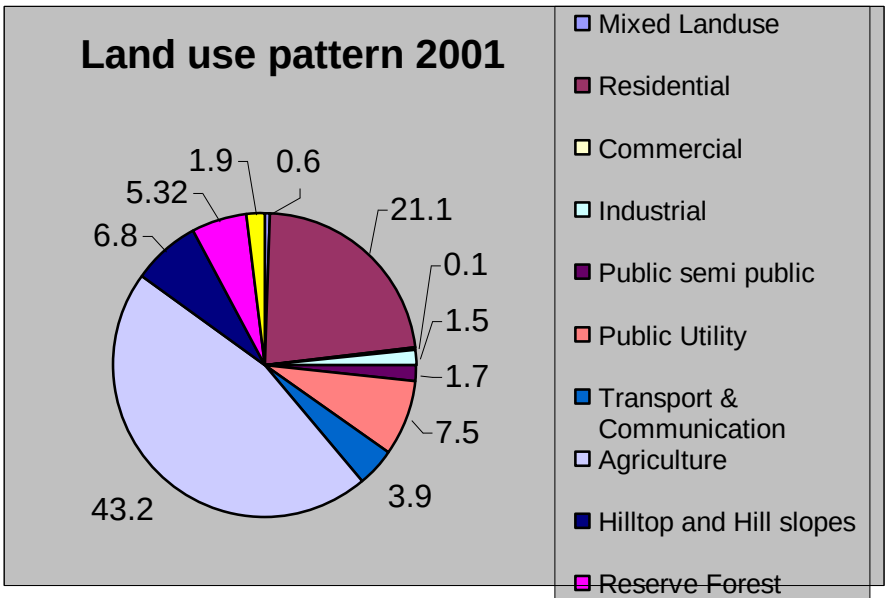
Sr. No.	Type of land use	% of total land
1.	Agriculture and open land	51.16
2.	Defense land	12.96
3.	Residential land	13.57
4.	Commercial	10.26
5.	Industrial	10.51
6.	Public / semi-public	3.63
7.	Hills and hill slope	10.48
8.	Forest land	2.90
9.	Water bodies	1.87
10.	Road	2.53
	Total	**100**

Source: Development Plan Department, PMC

Table No. 3.4 Existing Land use for the resultant PMC area after addition of villages in 2001.

Sr. No.	Landuse 2001	%
1	Mixed Landuse	0.5
2	Residential	21.1
3	Commercial	0.1
4	Industrial	1.5
5	Public semi public	1.7
6	Public Utility	7.5
7	Transport & Communication	3.9
8	Agriculture	43.2
9	Hilltop and Hill slopes	6.8
10	Reserve Forest	5.3
11	Others	1.9
	Total	**100%**

Source: Comprehensive Traffic & Transportation Study for Pune city, Interim Report, May 2003, PMC



Source: Comprehensive Traffic & Transportation Study for Pune city, Interim Report, May 2003, PMC

Transferable Development Right (TDR)

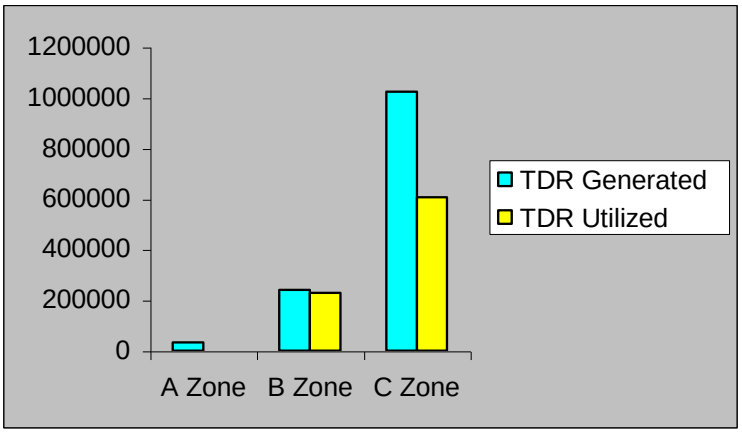
TDR is a handy instrument in the hands of the PMC to implement the development plan. PMC has divided the city area into three zones. Congested areas and the old PMC limits is zone A, the middle ring is known as zone B, while the outer ring within the old PMC limit is zone C. All 23 villages in new PMC area are yet to be designated a zone name. TDR generated in A zone can be used in B or C zone. TDR cannot be used in areas of A zone, as the areas

are densely constructed. Similarly TDR generated in C zone cannot be shifted inwards. PMC is yet to formulate policies for the newly added villages.
The TDR utilization capacity of the TDR receiving plot is controlled by PMC. TDR concept is effective, as PMC does not have to assure monetary compensation while taking land for DP roads or for public amenities. Compared to land acquisition, this takes less time and the owner clears encroachments. The owner is free to sell the TDR at market price and the PMC continues to tax any property that has used this TDR.

Table No. 3.5 Zone wise, TDR generated and Utilized (Area in sq.m) till the year 2003-2004

	A Zone	B Zone	C Zone	Total
TDR Generated	33104.24	239045.54	1022220.30	1294370.08
TDR Utilized	_	228310.00	604712.00	833022.00
TDR Remaining	-	10735.54	417508.30	461348.08

Source: Development Plan Department, PMC



Source: Comprehensive Traffic & Transportation Study for Pune city, Interim Report, May 2003, PMC

New construction

The city is growing at a very fast rate. It can be seen from the table 3.5 that the numbers of construction, which are given building permissions and which have acquired the completion certificates are on a rise. The number of residential buildings that were given permission in 2003 was a staggering 36,830. In addition to this 10,705 non-residential buildings were given permission for construction.

Table No 3.6 Number of building permissions and completions issued

Year	Details of Permissions			Details of completions certificates				
	Residential No.	Area (Sq. m)	Non-Residential No.	Area (Sq. m)	Residential No.	Area (Sq. m)	Non Residential No.	Area (Sq.m)
1996	1388	568680	145	83065	1047	288545	103	36155
1997	1273	591175	182	12276	1506	394064	182	42594
1998	1201	641941	178	113073	1459	439291	364	67926
1999	1030	486695	176	90033	1679	505530	341	54341
2000	1326	416310	99	105325	792	453141	287	44166
2001	1446	519970	132	84356	853	438329	201	54969
2002	22357	12,62634	6602	2,79,583	15360	10,51,805	1352	1,57,319
2003	36830	1725940	10705	460036	12113	798585	1678	157743

Source: Building Permission Department, PMC

Unsafe Constructions

Whilst the PMC has granted permission for many new constructions, it has shown keen interest in making sure the constructions around the city are safe and do not endanger the lives of the citizens. Hence, while the completion certificates are granted only after through checking of the building plans, the PMC has also undertaken steps to demolish the unsafe constructions within the city limits. It can be seen that the number of unsafe constructions demolished is reducing as indicated by the table 3.7

Table No 3.7 Information regarding demolition of unsafe constructions

Year	Number of demolished unsafe construction	Area of unsafe construction (Area in Sq. M.)
1997-1998	110	5189.149
1998-1999	119	3832.4043
1999-2000	95	1732.6272
2000-2001	81	1891.1185
2001-2002	97	2174.3775
2002-2003	36	1008.9186
Total	**538**	**15828.59**

Source: Building Permission Department, PMC

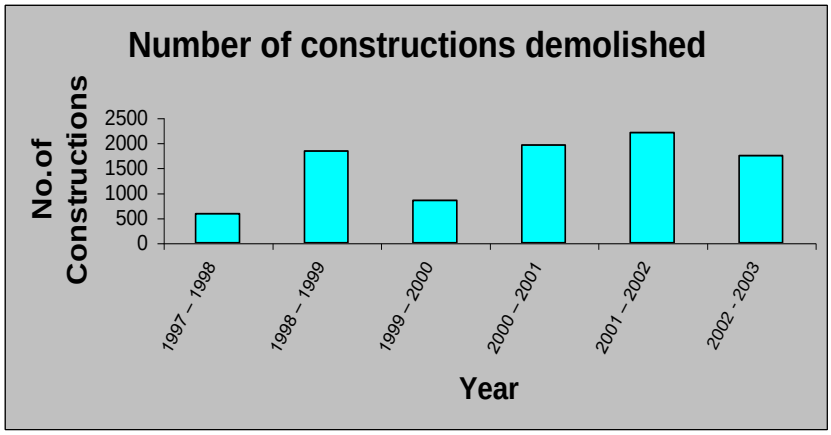
Unauthorized structures

The PMC has undertaken steps to counter the increasing number of illegal constructions that are taking place within the PMC limits. At times the PMC, justifiably, undertakes the demolition of the illegal structure. The details regarding the same are:

Table No 3.8 Information regarding action taken for eradication of Unauthorized constructions

Year	Number of constructions demolished	Constructions demolished (Area in Sq. M.)
1997 – 1998	584	29,305.46
1998 – 1999	1838	51,224.63
1999 – 2000	851	32,687.01
2000 – 2001	1953	95,212.46
2001 – 2002	2208	78,581.93
2002 – 2003	1746	652,872.90
Total	**9180**	**939,884.39**

Source: City Engineer, PMC



Source: City engineer, PMC

Gunthewari System

The State Government has promulgated the Gunthewari Development Act of 2001 to regularize the Gunthewari constructions, which were built before 1.1.2001. This act empowers the development authority (The PMC) to levy charges in order to regularize these constructions. Accordingly, it is estimated that the PMC will generate an extra income of around Rs. 25 Crores through

the regularization process, which will spent on development works in the respective areas.

Table No.3.9 Information of Rupees collected for sanction cases under the Gunthewari system.

File Cases	Sanctioned Cases	Rupees collected (Crore)
14964	496	5.36

Source: Building Permission Department, PMC

Anti encroachment:

With the traffic increasing, it is important that the vehicles use the entire capacity of the roads. Hence the PMC has undertaken the shifting of encroachers on the roads. The details of the actions taken for the past few years are given in the table below.

Table No 3.10 Details of actions taken by Anti-Encroachment Department

Year	Handcarts	Squatters and Other Vehicle	Stalls	Pathariwala
2000-2001	5265	2194	80	------
2001-2002	6319	2661	197	------
2002-2003	7406	494	244	3124

Source: Anti-Encroachment Department, PMC

No-Hawkers Zone

In order to enhance the traffic mobility, the PMC issued a public declaration in local newspapers banning hawking along some roads. The Pune Municipal Corporation, in absence of suitable Development Plan reservations, has prioritized and declared the following 8 roads as No-Hawkers zones and accordingly has started taking actions against them.

1. Jangli Maharaj Road. (Modern Café to Sambhaji Bridge)
2. Bajirao Road (Nava pul Bdg. To Abhinav College Chowk)
3. Ganesh Khind Road (Sancheti hospital to University Chowk, Raj Bhavan)
4. Sinhagad Road (Dandekar Bridge till PMC limit)
5. Shastri Road (Alka Talkies Chowk to Dandekar Bridge)
6. Senapati Bapat Road (V.S.Khandekar Chowk to Chaturshringhi Chowk)
7. Ferguson Road.
8. Bund Garden to Circuit house.

PMC's efforts to plan for newly added villages in fringe areas

- **City Planning and Preparation of D.P. for Fringe villages**

  PMC as a local planning authority, with an area of 243.96 sq. kms. needs to prepare a development plan for the new areas within the framework of MR & TP Act and submit it to the Government of Maharashtra for sanction within a stipulated period. Hence according to section 23 of MR&TP Act 1966, PMC has decided to pursue its intention of preparing the Development Plan, for the growth and expansion of Pune. This was openly declared in local newspapers and also in the State Government Gazette of January 1998. The task of preparing the development plan was given to private consultants – IIIE.

  In 2001, the State Government de-linked few newly added villages from PMC boundaries. Hence the General Body of PMC cancelled the draft Development Plan for 38 villages and under the guidance of the city improvement committee, prepared a new draft Development Plan for remaining 23 fringe villages. There has been uproar from the common Punekars about certain provisions in the draft development plan. These objections mainly include issues about converting hills into residential zone and reducing or canceling green belts along the rivers and Nallas. PMC has involved C-DAC to the use of remote sensing /Arial survey technology for the preparation of detailed report. It is however imperative that PMC should have one integrated development plan for the city. The need of the time is also to keep an up-to-date database in the form of a continuously upgraded land use pattern, using latest techniques like remote sensing satellite imagery, GIS and MIS, which will help the civic body in planning exercise as and when required.

CHAPTER - FOUR

Ward level administration and Map based Information System

The 74th Constitutional Amendment, in 1992, envisaged considerable changes in the functions of Local Self-Governments. It further expects decentralization of the city administration. Pune Municipal Corporation responded to the call by forming fourteen administrative wards for effective functioning of local administration as well as for responding to local needs.

Good urban governance includes the following criteria:

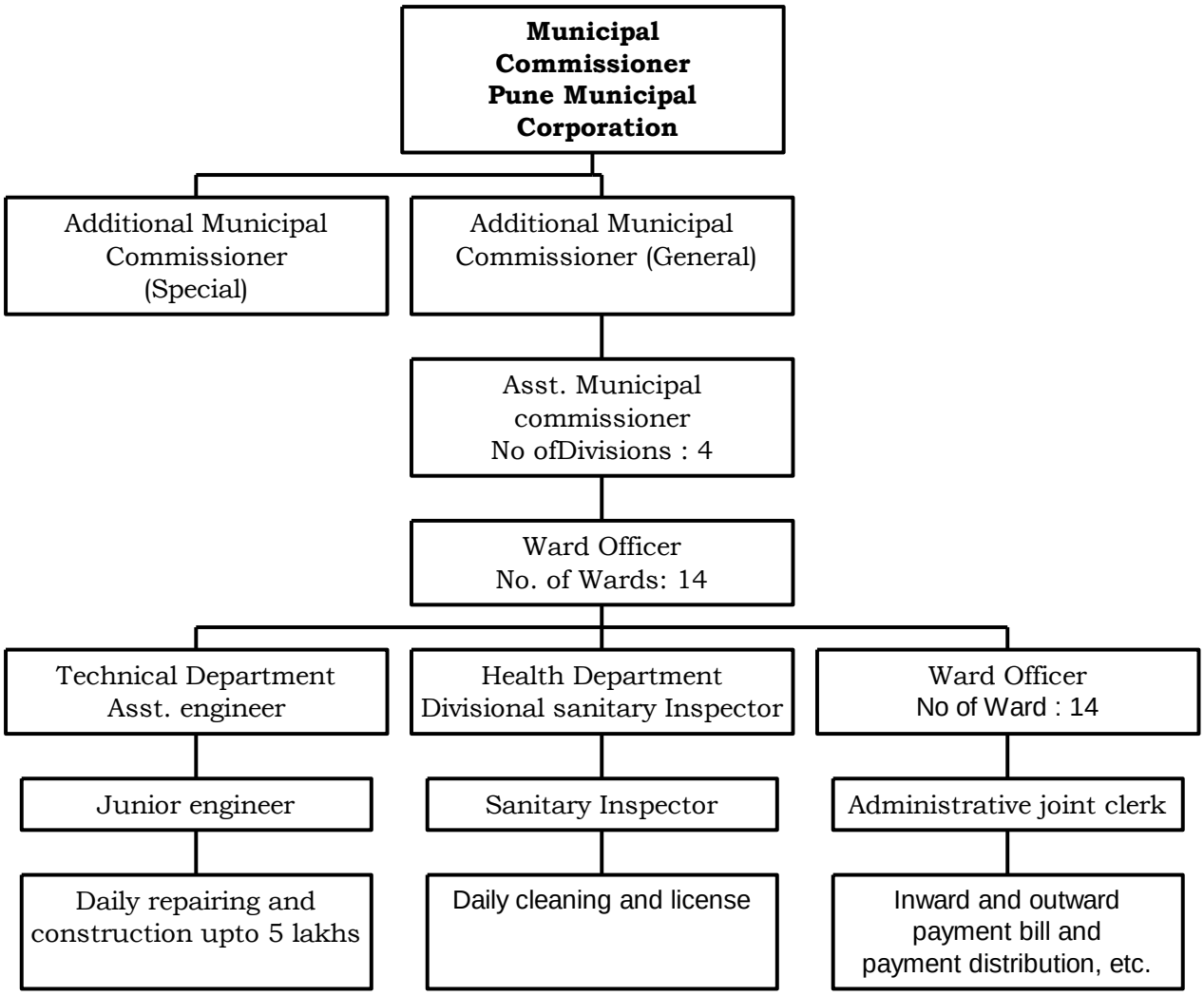
a) Technical Capacity building: The ward level administration shall have necessary technical staff and shall work with professional consultants, local NGO's and with elected representatives to plan and implement development schemes as well as to maintain already executed schemes.
b) Financial Capacity building: The ward-level administration shall be able to prepare its own budget, based on local priorities and implement it effectively.
c) Manpower and resource planning capabilities: Proper manpower, planning and resource mobilization is a must for effective administration.
d) Response to citizens: In a democratic system, an administration shall respond to the needs of citizens and welcome their participation at every level.
e) Access to information and services: The ward-level administration should share all information in most transparent possible manner with citizens as well in between different departments. Public services shall be accessible to one and all irrespective of their caste, creed, religion or sex.
f) Accountability and transparency: These are must for modern and effective urban management and administration.

On this background, Pune Municipal Corporation directed each ward to evolve an appropriate system for administration. This system is to look after solid waste management, road repairs, daily cleaning of the same, drainage, epidemic outbreaks, take action on activities and situations affecting the citizens' health, control unauthorized usage of resources etc. This system is expected to perform its duties in consultation with the elected representatives i.e. ward-level committees.

The City is divided into four administrative zones, viz. Ghole road, Dhole patil road, Kasba peth and Tilak road. Each administrative zone has 2 to 4 administrative wards within its jurisdiction. There are total 14 administrative wards in the city, each headed by the respective Ward Officers. Each

administrative ward comprises of 3 to 4 electoral wards. Thus there are 48 electoral wards *(Prabags)* and three elected representatives represent each ward. Each electoral ward is further divided into 3 to 4 *khotis* for grass-root administration. Thus, the city has over 150 *khotis* to manage the lowest level of administration in the city.

Ward level Administrative structure of the Pune Municipal Corporation:



Pune Municipal Corporation responded to the State Government's call of *Gadge Baba urban Cleanliness drive* by organizing competitions amongst different wards. This encouraged the ward officers to reflect on their activities, prepare documents, map based information systems etc. for their own wards. The competition was judged considering the following ten parameters.

Table: 4.1 Parameters for judging competition for cleanliness

Sr. No.	Parameters	Marks
1.	Water supply and its management	15
2.	Community toilets and its management	15
3.	Solid waste management	13
4.	Drainage management	12
5.	Community health and general health	10
6.	Family planning	05
7.	Community urban facilities	05
8.	City planning and decoration of public spaces	05
9.	Human resource planning	05
10.	Financial planning	10
	Total	**100**

Source: Ward Level Administration, PMC.

The following table gives the result of the competition, where Bopodi ward was judged as the best.

Table 4.2: Cleanliness drive evaluation results

Sr. No.	Ward No.	Name of the ward	Total Marks	Marks Obtained	Percentage
1	8	Bopodi	8000	7249	90.61
2	11	Agakhan Palace	8000	7098	88.72
3	39	Dattawadi	8000	6900	86.25
4	17	Kondhwa Undri	8000	6785	84.81
5	30	Fergusson college	8000	6689	83.61
6	13	Koregaon Park	8000	6516	81.45
7	9	Golf club	8000	6374	79.67
8	29	Karve Road	8000	6362	79.52
9	28	Sahakarnagar Padmavati	8000	6194	77.42
10	45	Pandit Nehru Stadium	8000	5952	74.40
11	42	Panchwad misson	8000	5833	72.91
12	48	Ganesh Peth Gurudwar	8000	5746	71.82
13	15	Sadhana Vidyalaya	8000	5548	69.35
14	6	Warje Karve Nagar	8000	5254	65.67

Source: Ward Level Administration, PMC.

Map Based Information System (MIS)

An exercise in Effective City administration

MASHAL working for better urban governance systems approached PMC with an idea of preparing a Map Based Information System (MIS) for its different departments. These departments provided the factual information and MASHAL converted it in to digitized maps, for effective planning and governance.

The base map was prepared considering the development plans made for the old PMC limits, the draft development plan for newly added villages, revenue maps of the villages, maps from the Survey of India, satellite imageries and ground verification. The required information was then superimposed on the base-map. This further helped prepare maps of any subject and any size for effective administration. These maps were also made available to all the elected representatives. MASHAL encourages the elected Corporators to prepare maps of their constituencies showing all the development works as well as environmental 'hot spots'. Some of the corporators showed keen interest in getting developmental activities of their *prabhag* mapped properly. The maps were available to all citizens at print cost in various sizes.

Some of the administrative wards obtained detailed infrastructure related maps, which were helpful for effective administration.

Table No. 4.3: Details of administrative wards

Administrative Zone ***(Vibhag)***	**Administrative ward** ***(Kshetra)***	**Electoral wards** ***(Prabhag)***	**Status on MIS**
GHOLE ROAD	1. Aundh	Aundh Pashan Bopodi	Preliminary maps are prepared
	2. Karve Road	Kothrud M.I.T. college Karve road	Preliminary maps are prepared
	3. Ghole road	Gokhle nagar Pune Vidyapeeth Fergusson college Police ground	Proper MIS prepared
	4. Warje	Warje Karve nagar	Preliminary maps are prepared

Administrative Zone *(Vibhag)*	Administrative ward *(Kshetra)*	Electoral wards *(Prabhag)*	Status on MIS
DOLE PATIL ROAD	5. Yerwada	Lohegaon Kharadi Agakhan Palace Wadgaon Sheri	Preliminary maps are prepared
	6. Dole Patil Road	Koregaon park (Mundhwa) Tadiwala Road	Preliminary maps are prepared
	7. Hadapsar	Hadapsar Vitthalnagar Kirloskar pneumatics Sadhna Vidyalaya Wanwadi Mohammadwadi	Preliminary maps are prepared
	8. Sangamwadi	Kalas Dhanori Golf club Navi Khadki Sangamwadi	Proper MIS prepared
KASBA PETH	9. Vshrambagwada	Dattawadi Gokhele Hall Maharana Pratap Udyan Tambari Jogeshwari Mandir	Proper MIS prepared
	10. Bhawani Peth	Panch Haud Mishan Vaidya Stadium Sonavane Hospital	Proper MIS prepared
	11. Kasba Peth	Kamala Nehru Hospital Sasson Hospital Bandiwan Maruti Mandir Ganesh Peth Gurudwara	Proper MIS prepared (Part)
TILAK ROAD	12. Bibvewadi	Bibvewadi Salisbury Park Tilak Maharastra Vidyapeeth	Preliminary maps are prepared
	13. Sahakarnagar	Katraj Balaji Mandir Sahakarnagar – Padmawati Shantinagar	Proper MIS not prepared
	14. Tilak Road	Wadgaon Dhayri (a) Dhanakwadi (b) Hingane Kothrud Parvati Nehru Stadium	Proper MIS not prepared

Source: Ward level administration, PMC

Thus, MIS, a tool well used by the PMC, is an example to be followed by other cities. It is also a very good example of a joint effort by a Municipal Corporation trying to improve governance with the help of an NGO.

CHAPTER-FIVE

Slums

Slums have become an integral part of growing cities. A spurt of industrial activities resulted in mass migration. Due to the lack of planning to accommodate this problem, the migrants started squatting in slum settlements with minimal available infrastructure. Estimates show that about 34 percent of Pune's population live in slums. A slum settlement can be defined loosely as an irregular low-income urban settlement with poor living conditions. The term "slum" is commonly used in India to denote informal settlements.

As per the census of 2001, a slum is defined as, "a compact area of at least 300 people in poorly built congested tenements surrounded by unhygienic environment, usually with inadequate infrastructure and lacking proper drinking water and sanitary facilities". When a settlement is recognized by the local municipality as one where living conditions are below a specified standard, it is "declared" under the Maharashtra Slum Improvement Act (1971) as slum dwelling.

These dwellings are usually constructed using locally available materials and are of a semi-permanent nature. They lack basic services and infrastructure like potable drinking water, proper drainage and sanitation facilities, roads and electricity. Slums are housing solutions adopted by the homeless population, who do not have access to formal housing. The dwellers usually reside close to their source of employment, thus reducing transportation costs. Scarcity of affordable housing facility has resulted in the growth of slums on unguarded lands all around the city.

Growth of slums

PMC estimates that almost 34 percent of the population is residing in slums. Over the years there has been a considerable growth in the slum population, as evident from the table 5.1. The high growth during the 1968-76 period is probably due to the rural conditions, particularly, during severe droughts faced in Maharashtra in the years 1966-67 and in 1972-73. It is likely that these brought a large number of migrants to Pune in search of livelihood. By 1971, slums occupied around 250 hectares of land with a density of 600 persons per hectare. With the growth trends it is evident that almost half of Pune's population would reside in slums over the next 10 years.

Table No. 5.1: Population growth and slum population in PMC

Year	Total population	Slum population

1921	1,33,227	NA
1931	1,62,001	NA
1941	2,37,547	NA
1951	4,80,942	36,726
1961	5,97,562	92,101
1971	8,56,105	2,39,701
1981	12,03,351	3,77,000
1991	16,91,430	5,69,000
2001	25,40,069	9,50,000
2004	30,25,000	10,25,000
2011 (Projected)	38,37,000	12,50,000
2021 (Projected)	44,44,000	17,50,000

Source: PMC Slum Department and Projected by MASHAL

GROWTH OF SLUMS

Declaration of Slums

353 of the 503 slums within the PMC limits are declared. Out of the 503 slums, 386 are given photo passes for their recognition. Out of these, 61 slums are on government land, while the rest are on private lands. The declared slums occupy a total area of 660.63 hectares. To upgrade the living conditions in slums, it is necessary to declare them under the Maharashtra Slum Improvement Act (1971) and provide them with basic amenities.

Table No. 5.2: Slum population and declared and undeclared slums, PMC

Year	No. of Declared Slum	Population of declared Slum	No. of Undeclared slum	Population of undeclared slum	No. of total slum in Pune city	Total slum Population	Percentage of slum population
1990	226	4,73,438	87	1,27,112	213	5,40,550	35.98%
1991	272	4,28,672	87	1,40,328	359	5,69,000	36.47%
1992	272	4,47,122	87	1,50,328	359	5,97,450	37.34%
1993	288	4,53,888	97	1,73,412	385	6,27,300	38.25%
1994	295	4,75,857	100	1,82,828	395	6,58,685	38.74%
1995	307	4,86,723	127	2,04,891	444	6,91,615	39.74%
1996	308	4,93,723	136	2,06,277	444	7,00,000	39.32%
1997	326	N. A.	133	N. A.	459	7,25,000	30.60%
1998	321	N. A.	N. A.	N. A.	N. A.	N. A.	N. A.
1999	321	N. A.	N. A.	N. A.	N. A.	N. A.	N. A.
2000	337	N. A.	166	N. A.	503	N. A.	N. A.
2001	353	7,50,000	150	3,00,000	503	9,50,000	37%
2002	353	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2003	353	7,75,000	150	3,50,000	503	N.A	N.A.
2004	353	N.A	1 50	N.A	503	10,25,000	34%(approx)

Source. Slum Department, PMC

Ward wise distribution of slums

It is observed that the slums are spread throughout the city. The number of slums in each ward differs according to many factors like employment opportunities, availability of open land etc. At present the Karve Nagar ward shows the maximum number of slum, i.e. 43. The least number of slums are found in the Warje and the Vishrambagwada wards.

Table No. 5.3: Ward wise number of slums

Slum No.	Ward office	No. of slums
1	Aundh	28
2	Karve Nagar	43
3	Ghole road	29
4	Tilak road	49
5	Bibwewadi	20
6	Sahakarnagar	24
7	Kasba peth	35
8	Bhawani peth	29
9	Dhole Patil road	25
10	Hadapsar	35
11	Yerwada	9
12	Sangamwadi	21
13	Warje	03
14	Vishrambaugwada	03
	Total	353

Source: Slum Department, PMC

The total area occupied by the slums in Pune is to the tune of 660.63 hectares. Out of this, Yerwada has the highest slum area amongst all the wards, i.e. 156.85 hectares.

Slums on government land

The PMC had detailed information on the slums, which are present on governmental lands. The governmental lands include ones owned by the PMC, State Government, Central Government and Defense.

Table No. 5.4: No. Of slums on Government lands

Sr. No.	Form of Government	No. of slums
1	State Government	39
2	PMC	1
3	Railway	5
4	PMC + State Govt.	4
5	PMC + State Govt. + Private	1
6	Defence + Private	1
7	Defence	2

8	Central Govt. + State Govt.	2
9	State Govt. + Private	3
10	MHADA	2
	Total	60

Source: Slum Department, PMC

Rehabilitation schemes

The government of Maharashtra has started a rehabilitation scheme under which, the declared slum dwellers are given 20.905 sq. feet of carpet area of free housing. PMC does not implement this scheme but is implemented by the participation of private developers. This is included in the development rules as appendix 'T' and accordingly, the slum rehabilitation proposals are sanctioned. A free sale component is given against redevelopment of slums in proportion to the area developed for slum dwellers. City is divided into zones of A, B, C consisting various ratios for F.S.I.

Table No. 5.5 Slum area and sale area

Sr. No.	Particulars	Ratio for FSI
A	Main city and congested area	1: 2.50
B	Near congested area	1: 2.50
C	Within old PMC area	1: 3.00
-	23 new villages are added (fully) and five villages are added(partly)	Yet not finalized

Source. Slum Development Department, PMC

In this scheme, a 2.5 FSI is given on the original plot. However, if more people are to benefit from such schemes then more than 2.5 FSI for such areas is needed. Corporation could allot this extra FSI in the form of TDR.

Table No. 5.6 Schemes for rehabilitation

Sr. No.	Schemes	Numbers
1	Sanctioned schemes	34
2	Building plans sanctioned	05
3	Work started	15
4	Completed schemes	05
5	Other schemes	10
6	Total rehabilitated schemes	69

Source. Slum Department, PMC

Common toilet scheme for slum dwellers

In all approximately 2,500 toilet seats were constructed in the last 25 years before 1999 - 2000. The toilets were not maintained, making them extremely dirty. Due to this contagious diseases would spread. To avoid such problems,

PMC took lead to construct common toilet schemes in 1992, through the Sulabh International organization. In this scheme a total of 30 toilets were constructed upto 1999. Most of the toilets were constructed on PMC land. In the year 1999-2000, the PMC started to develop such toilet schemes in slums and other areas with the help of Non-Governmental Organizations (NGOs).

Table No 5.7: Information regarding pay and use toilets

Sr. No.	Stage	Year	No. of Blocks	No. of seats	Status
1	Stage 1	1999-2000	220	3438	Completed
2	Stage 2	2000-2001	198	3520	Completed
3	Stage 3	2002-2003	135	2220	Completed
4	Stage 4	2003-2004	115	1500	Work in progress
5	Stage 5	2004-2005	93	1170	Proposed

Source: Slum Department, PMC

The table above shows that till 2001, a total of 418 blocks were constructed with 6958 seats. In stage 3 a total of 135 blocks were constructed with 2220 seats. In stage 4 the work of total 115 of blocks with 1500 seats is in progress. In stage 5 for the year 2004-2005 the work of total 93 numbers of blocks with total 1170 seats is proposed.

PMC is the only local body in India to adopt citywide approach on slum sanitation. This changed the scenario where roadside squatting was normal. The efforts are appreciated by the state/ Central governments and also by the World Bank. Number of representatives from various cities in India and of the international agencies has visited the project to form the same

URINALS IN PUBLIC PLACES

CHILDREN SQUATTING

Urinals in Public Places

Since the existing urinals were not sufficient and those present were dilapidated, the PMC has undertaken steps to improve the quantity and quality of urinals. Under this the PMC has set up fiber urinals, which occupy less space and also take less time for installation. These urinals are being installed by MAVIN. Till date 165 fiber urinals for men and 30 fiber urinals for women have been installed.

Valmiki Ambedkar Malin Basti Awas Yojna (VAMBAY)

Under this scheme, the Central and State Governments contribute equal amounts for the rehabilitation of backward class slum dwellers. Those slum dwellers, whose names appear in the voters list of 1.1.1995 and are below the poverty line have been offered Rs.50,000/- subsidy for construction of a house upto 20.90 sq. m carpet area in the city. They are also given identity cards for recognition. They are expected to raise additional amount if required for construction.

The slum dwellers residing along the railway lines, roads under widening projects and below flood levels near rivers will be shifted under this scheme to Hadapsar.

Rehabilitation Scheme at Hadapsar (VAMBAY)

Already 2.48 hectares of land in Hadapsar has been allotted in Sr. no 88/1 to 5 for multistory construction and Sr. no 89A, 312 and 250 for single story construction for rehabilitation. 250 tenements are to be shifted to Hadapsar survey no. 89 & 312. An amount of Rs.6.00 Cr. is allotted for the same. At present, work for 1200 tenements is in progress at Hadapsar survey no. 88/1 to 5. Similar work has been proposed on Sr. no 89,92,126 at Hadapsar for 200 tenements.

Table no 5.8: Work done in Hadapsar project by VAMBAY

Year	Phase	Status	Tenements	
2001-2002	2nd phase	Completed	2328 T/S	194+56 Hadapsar (Other Insitu)
2003 onwards	2 nd phase	Work in progress	5547 T/S 926 toilet seats	1200 Hadapsar (Other Insitu)
2004-2005	3 rd phase	Proposed	A. 10000 T/S 1428 toilet seats	

			B. 3349 T/S 464 Toilet seats	Insitu

Source: Slum Department, PMC

REHABLITATION OF SLUM AREAS

CHAPTER – SIX

Water Supply

Water is H_2O.
It is colourless, odourless, and tasteless.
It takes shape of the container it is put in.
When in solid form, it floats on itself.
When in vapour form in the steam engine,
it moves a loaded train!
Seventy percent of the Earth surface is covered with water
and seventy percent of human body by weight is also water.

When we don't get water,
we want some water.
When we get some water,
we want more water.
When we get enough water,
we want it free and we abuse it as much as possible!
Six thousand persons die every day in India
due to water related diseases.

Water is essential for living
and for living in better ways!
It is a basic life giving and life-sustaining element.
All the old civilizations have had developed along rivers-
a perennial source of water!

Throughout human history, water resource
has been a source of conflict.
As demand for water rises,
the potential for conflicts may increase.
Many international commentators argue
that water will be an increasing
cause of dispute (even war) in the years ahead!

Some feel that water is a technical issue;
to be handled by hydro-geologist experts,
health consultants and engineers
from water supply department.

Water is a social issue;
Water is an economic issue;
Water is a political issue;
Water is a gender issue;
Water is an environmental issue;
Water is a fiery issue!

Pune won't have been Pune without abundant availability of water - the gift of nature!

PMC is well aware that this year's monsoon rain is not satisfactory. The available water in dams are also cannot fulfill ever-growing thrust of the city dwellers may not be filled. *Punekars* might have to face the water scarcity problem and thus, they should change their attitude towards water consumption and start water conservation.

Taking into account the growing need for water, the merger of 23 villages and the population projection for the year 2025 A.D., a water supply and sewage scheme costing Rs. 201 crore has been designed. This plan will be implemented in three stages. Under this scheme, three new water filtration centers at Warje, Wadgaon and Holkar Bridge are proposed. Along with these, 9 water storage tanks for the low-lying areas and 5 tanks for the high altitude areas will be constructed.

Water is one of the most critical services provided by the municipal corporation. Water supply in the city, on a whole, seems to be adequate in terms of quantity. However, some reports indicate problems related to the quality of raw water, due to possible contamination of water in the open Right Bank canal, which passes through the city.

History of water supply

Two important rivers, viz. Mutha and its tributary river, Amba pass through the city. A small dam was constructed on the river Amba near Katraj in 1750, from which, water was supplied to the city through a pipeline. Later in 1848, a small bund was constructed on Mutha River, to supply water to the Pune Cantonment area. Over time, with the growth in population, these two reservoirs proved inadequate. Therefore, a large lake was constructed on the river Mutha by building a dam at Khadakwasala, about 12 Kms from the city. From this dam, a Right Bank Canal was constructed to supply the city with a discharge of 11.66 Cumecs.

By 1950, the population of Pune city increased to 0.45 million. And hence the available 45 MLD proved inadequate. As the Pune Municipal Council was upgraded into a Municipal Corporation in 1949, a new scheme to provide 110 MLD of filtered water was proposed. However, this scheme took a long time to materialize and was commissioned only by 1968.

Meanwhile, the population of Pune reached 0.9 million by 1968 and the new plant ensured about 110 liters per capita per day (lpcd). To meet the increasing water demands of the growing population, another filter plant of 160 MLD was constructed at Parvati in 1975. This enhanced the supply to a total of 270 MLD treated water, which was provided to a population of about 1.5 million. Subsequently, in the year 1980 and 1990 the capacities of these two filter houses were augmented. Today the total capacity at Parvati water works is 470 MLD.

In 1989, the 103 year old Pune Cantonment Water Works was handed over to Pune Municipal Corporation. Though this plant was initially meant only for the cantonment and military establishments, it later supplied water to about 0.5 million civilians residing in the PMC area. The capacity of this water works, which was 100 MLD, in the year 1989, is 273 MLD presently.

Present water supply system

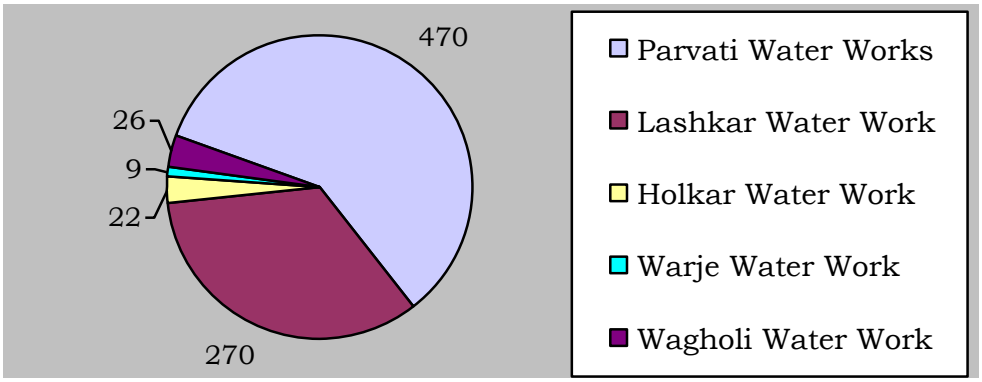
Pune City gets its water from the Khadakwasala Dam, 12 Kms from the city, through the Right Bank Canal and a closed pipeline. Three more dams, viz. Panshet, Warasgaon and Temghar have been constructed on the same river, upstream of Khadakwasala. The Kirloskar Consultants study observed that Khadakwasla is the most suitable water source for Pune City, under the given framework of technical and administrative consideration. The total storage capacity of these three are partly commissioned dams is 900 MM^3. The present the annual requirement of the city is about 200 MM^3.

300 MM^3 of water was sanctioned as water supply for the city till the year 2001, with a condition that the PMC will recycle 160 MM^3 water for irrigation by treating sewage water to the irrigation standards. The PMC has hence laid raw water lines from the Khadakwasala dam to the Parvati Water Works in order to save the canal seepage losses and avail the full sanctioned quota.
Presently, Pune has two major water work systems, i.e. Parvati Water Works and the Cantonment Water Works. In addition to these, Pune has three minor water works: the Holkar Bridge Water Works (22 MLD), Warje Water Works (9 MLD) and Wagholi Water Works (26 MLD).

Table No. 6.1: Existing Capacity 2003

Water Works	Year of commissioning	Capacity (MLD)
Parvati Water Work	1969	470
Lashkar Water Work	1893	270
Holkar Water Work	1919	22
Warje Water Work	1999	9
Wagholi Water Work	2000	26
Total		**797**

Source: Parvati Water Works, PMC



Source: Parvati Water Works, PMC

The capacities of all the minor water works will have to increase, keeping in mind the future population. The PMC plans to increase the capacities to the following:

Table No. 6.2: Proposed Capacities of Water Works in PMC

Name of Water Works	Capacity (MLD)
Warje Water Work	100
Vadgaon Water Work	125
Holkar Water Work	40
Total	265

Source: Water Supply Department, PMC

RIGHT BANK CANAL AT PARVATI

Water pumping facilities

Raw and pure water pumping forms the largest cost component of the water supply budget of the PMC. An undulating topography, with ground elevations of settlements ranging from 550 meter to 670-meter, leads to a substantial expenditure on pumping.
There are 5 major pumping stations in Pune and their installed and operating capacities as follows.

Table No. 6.3: Water works with their related pumping stations:

Pumping (HP)	Total	Parvati	Cantonment	Holkar bridge	Wagholi	Warje
Installed	16,320	10,015	4,000	760	1,145	400
Operating	8,900	5,000	2,640	380	680	200

Source: Water Supply Department, PMC

Testing of water

PMC carries out daily testing of the water supplied through 76 samples points. Out of the 76 samples, 35 are from fixed sampling sites and 41 are random samples collected all over the city. One sample is collected from the raw water entering the balancing tank of the flash mixer chamber and the second sample is collected from the filtered water. These 2 samples are checked for parameters as per IS 10500. Apart from regular testing of water, sampling is also carried out in case of complaints.

Quality of water

The water quality is maintained as per IS 10500, 1991. The laboratory facilities at Parvati and cantonment waterworks are well equipped to carry out pertinent physical, chemical and bacteriological tests of raw water, as well as filtered water. As mentioned above, 76 samples are tested every day to ensure the quality of water. The samples from wells and tube wells are tested fortnightly. Decision on additional online or step chlorination is taken subsequent to the quality control test reports. Since the water supply system in the newly added area is under development, the existing systems are stretched far beyond present capacities, seriously affecting the water quality. The entire population along the Sinhgad Road survives on unfiltered water, but with adequate chlorination.

The PMC has resolved to prepare a water quality profile across the existing distribution system, in order to enable decision making, with regards to preventive measures. Significantly, occurrence of water related diseases is limited despite the absence of a well laid out water supply system, thanks to constant monitoring of water quality.

Table No. 6.4: I.S. limits for drinking water

Parameter	Desirable limit	Permissible limit
Turbidity	5 NTU (max.)	10 NTU
PH	6.5-8.5	6.5-8.5
Total hardness	300 ppm (max.)	600 ppm
Chloride	250 ppm (max.)	1000 ppm
Residual Chlorine	0.2 ppm (min.)	….
Nitrate	45 ppm (max.)	100 ppm
Alkalinity	200 ppm (max.)	600 ppm
Coliform	NIL	10/100 ml
E. Coli	NIL	0/100 ml

Source: Parvati Water Works, PMC

Water, which enters the Parvati Water Works, has the following quality. This water is exposed to a chain of purification processes at the Parvati water works.

Table No. 6.5 Water Quality before Treatment at Parvati Water Works-2003-2004

Month & Year	Parvati Raw Water						
	Tur. (NTU)	PH	Chlorides (ppm)	Total Hardness (ppm)	Alkalinity (ppm)	Coliform	E. Coli.
April 2003	2.7	8.11	11	25	30	1800+	1800+
May 2003	3.0	8.2	11.5	27	33	1800+	1800+
June 2003	4.4	8.1	11	28	36	1800+	1800+
July 2003	8.2	8.15	12.5	38	40	1800+	1800+
Aug 2003	14.0	8.2	12.5	54	64	1800+	1800+
Sept 2003	3.0	8.1	11	54	60	1800+	1800+
Oct 2003	2.7	8.2	10	42	46	1800+	1800+
Nov 2003	2.4	7.9	10	28	32	1800+	1800+
Dec 2003	2.2	7.75	10	22	24	1800+	1800+
Jan 2004	2.2	7.8	10	22	24	1800+	1800+
Feb 2004	1.9	7.8	10.5	21	24	1800+	1800+
Mar 2004	2.2	7.9	11	25	26	1800+	1800+
April 2004	2.0	7.8	11	25	27	1800+	1800+
May 2004	3.2	7.85	11.5	27	28	1800+	1800+
June 2004	3.4	7.75	11.5	27	33	1800+	1800+

Source: Parvati Water Works, PMC

Table No. 6.6: Water Quality after Treatment at Parvati Water Works-2003-2004

Month	Parvati Treated Water				
	Turbidity (NTU)	pH	Total Hardness (ppm)	Alkalinity (ppm)	Residual Chlorine (ppm)
April 2003	1.2	8.0	25	29	0.7
May 2003	1.3	8.2	26	32	0.6
June 2003	1.6	7.8	27	36	0.7
July 2003	1.6	7.9	38	39	0.9
Aug 2003	4.0	7.8	52	58	0.6
Sept 2003	1.2	7.9	52	60	0.7
Oct 2003	1.0	8.0	41	44	0.7
Nov 2003	0.9	7.8	26	30	0.9
Dec 2003	0.8	7.6	20	21	0.5
Jan 2004	1.1	7.7	21	23	0.7
Feb 2004	1.0	7.8	20	22	0.6
Mar 2004	1.0	7.8	23	2	0.5
April 2004	1.1	7.7	23	25	0.6
May 2004	1.2	7.65	24	26	0.6
June 2004	2.0	7.6	27	30	0.8

Source: Parvati Water Works, PMC

Thus it can be seen from the tables 6.7 and 6.8 that the purification process at the Parvati water works brings the water to the permissible standards.

Ground water

Though most of the city is covered by a reliable water supply, some areas still depend upon ground water wells for water. Some of the wells are enlisted below

Table No. 6.7 List of wells in PMC used for the purpose of drinking

Wells	Number	Source	Borewells	Number
Sasanenagar	3	Canal	Vitthal nagar	1
Mohamadwadi	2	Natural	Manjari	1
Vitthal nagar	1	Canal	Sadisatra nali	1
Manjri	6	Canal	Ghorpadi Bhimnagar	1
Lohgaon	5	Natural		
Vadgaon Sheri	1	Natural		
Yerwada	2	Natural		

Source: Water Supply Department, PMC

The PMC also carries out sampling of the ground water at the various wells within the city limits. Some of the water monitoring data is given below.

Table No. 6.8: Ground Water Analysis (2003-2004)

Month	Residual Chlorine (ppm)					
	Sasane Nagar Well-1	Sasane Nagar Well-2	Sasane Nagar Well-3	Mohammad Wadi Well	Vitthal Nagar Well	Vadgaon Budruk Well
April 2003	0.8	0.8	N.A.	0.5	0.2	2.0
May 2003	N.A.	N.A.	N.A.	N.A.	0.1	0.4
June 2003	0.3	0.4	N.A.	N.A.	N.A.	0.2
July 2003	N.A.	N.A.	N.A.	N.A.	N.A.	0.4
Aug 2003	N.A.	N.A.	N.A.	N.A.	N.A.	0.2
Sept 2003	2.0	2.0	0.7	2.0	N.A.	0.2
Oct 2003	1.0	1.0	N.A.	0.8	N.A.	0.4
Nov 2003	1.0	1.0	N.A.	0.4	N.A.	0.5
Dec 2003	1.2	4.0	N.A.	1.2	N.A.	0.4
Jan 2004	1.5	1.5	N.A.	1.8	N.A.	0.6
Feb 2004	N.A.	N.A.	N.A.	N.A.	N.A.	0.7
Mar 2004	N.A.	N.A.	N.A.	N.A.	N.A.	1.0
April 2004	0.7	0.8	N.A.	0.5	0.2	1.0
May 2004	0.8	1.0	1.2	1.0	0.2	0.2
June 2004	0.6	0.5	1.2	1.2	1.2	0.4

Source: Parvati Water Works PMC

For all the above samples E. Coli and Coliform number is zero.

Storage and water distribution network

Water is supplied from the earlier mentioned water works to Pune through a network of reservoirs and pipes for distribution. This network is divided into different water zones. Table 6.10 gives the list of water distribution zones. Pune is surrounded by hills and the River Mutha passes through its centre. Therefore, taking advantage of this, water supply is made from ground water reservoirs situated on the hills at different levels. According to their altitudes, these reservoirs are classified as Low Level Reservoir" (LLR); "Middle Level Reservoir" (MLR) and High Level Reservoir ' (HLR).

Zone formations

Considering the undulating topography, ease of laying distribution mains, administrative boundaries of the PMC, Cantonment limits, etc. different zones have been formed as Water District. The following are the existing zones in the service areas of PMC, including that of cantonments.

Table No. 6.9 Water distribution zones

Sr. No.	Name of Reservoir	Capacity (M.L.D)	FSL (R.L.M)	LDL(RLM)
1	Parvati WTP Sump 1	4.5	566.93	562.23
2	Parvati WTP Sump 2	4.5	566.93	562.23
3	Parvati WTP Sump 3	9	566.93	562.23
4	Parvati HLR	4.5	627.28	622.1
5	Paravati HLR1	4.5	627.28	621.28
6	Parvati HLR2	4.5	627.28	621.28
7	Parvati MLR	13.16	598.35	593.17
8	Parvati LLR	31.78	580.9	576
9	S.N.D.T.MLR Sump	1.81	595.9	590.4
10	S.N.D.T. MLR Sump	11.35	596.83	591.33
11	S.N.D.T.HLR	13.16	625.46	620
12	Chaturshirigi (old)	4.5	608.38	604.38
13	Chaturshirigi (New)	8.4	608.38	604.38
14	SUS	4.5	657	653
15	Padmavati Sump	9	598.93	595.88
16	Kartaj Taljai HLR	6.26	669.91	665.91
17	Dhankwadi MLR1	3.40	657.73	654.13
18	Dhankwadi MLR 2	3.4	657.73	654.13
19	Bibvewadi Comp-1	3.4	657.73	654.13
20	Bibvewadi Comp-2	3.4	657.73	654.13
21	Indiranagar Sump	0.45	614.68	611.25
22	Indiranagar Upper	0.45	704.65	700.18
23	Cantonment WTP Sump	9	576.23	573.41
24	Cantonment Low level	17	577	575.02
25	Bakari Hill GSR-1	0.18	642.02	639.29
26	Bakari Hill GSR-2	0.3	641.1	638.1
27	Bakari Hill GSR-3	6	644	639.5
28	Wanowri RCC	5.45	612.8	607.13
29	Wanawadi GSR	5.45	610.81	605.63
30	Wanawadi ESR	2.45	633.02	605
31	Thakarsi Hill	5.45	588.22	582.22
32	Cantonment MLR	4.45	592.16	589.11
33	Wadgaon Sheri Sump	0.1	564.65	562.15
34	Race course ESR	1.80	607.2	600
35	Yerawada HSG ESR	2.5	593	586
36	Housing Board	4.54	-	-
37	Tingre Nagar Sump	0.06	556	553
38	Bopodi ESR	2.27	-	-
39	Kharadi ESR	4	-	-

Source: Water Supply Department, PMC

Future Works

The population of the city is projected to cross the 3 million mark by 2005 and the 5 million mark by 2025. Keeping in mind the future needs for water, the PMC had appointed Kirloskar Consultant Ltd., for the preparation of a Water supply and sewerage project in 1999.
The project has projected the requirement to increase many folds over the next few years.

Table No. 6.10 Proposed water supply in the Pune

Phase	Year	Water (MLD)
Phase I	2005	791
Phase II	2015	1074
Phase III	2025	1506

Source. Water Supply and Sewerage Project by PMC.

CHAPTER – SEVEN

Solid Waste Management

Solid waste is any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous materials resulting from industrial, commercial, mining, agricultural activities and from community activities. (It does not include solid or dissolved materials in domestic sewage or in industrial sources)

These non-gaseous and non-liquid residues are a result of various human activities. Proper collection and effective disposal of solid waste without causing harm to the environment is collectively termed as **'Solid Waste Management'**.

There are different types of solid waste, depending on their source. About 1325-1465 metric tons of solid waste is generated daily in Pune. The Municipal Solid Waste is of mainly classified as dry and wet waste. On the basis of a population of about 25 lakhs 40 thousand as per the 2001 census with another floating population of two and half lakhs at newly added villages the approximate solid waste generated in the city is as follows:

Source: Solid Waste Department, PMC

The garbage generated is dependant on the type of activity that is prevalent in any ward. Thus if the ward has a majority of residential areas, the waste would comprise of more wet and kitchen waste than dry. For office areas it would be the other way.
The table 6.1 shows the waste generated in every ward. At present the Kasba peth ward, Bibwewadi ward and Vishrambagwada ward produce the maximum amount of waste. The least production of solid waste is in the Dhole Patil ward, which can be attributed to the low population.

Table No. 7.1: Approximate daily ward wise generation of solid waste

Ward	Population	Waste generated (Metric Tons)
Aundh	2,10,000	95-105
Karve Road	2,40,000	100-110
Ghole Road	2,25,000	100-110
Warje	1,60,000	55-65
Yerwada	1,85,000	75-85
Dhole Road	1,25,000	50-60
Hadapsar	2,40,000	100-110
Sangamwadi	2,75,000	100-110
Vishrambaugwada	2,46,000	120-130
Bhavani Peth	2,55,000	105-115
Kasba Peth	2,64,000	120-130

Bibvewadi	1,65,000	120-130
Sahakar nagar	2,20,000	80-90
Tilak Road	2,15,000	105-115
Total	**30,25,000**	**1325-1465**

Source: Solid Waste Department, PMC and MASHAL's projection.

Collection Equipment

The PMC is responsible for providing the necessary infrastructure for collection, storage, segregation, transportation, processing and disposal of solid waste. However the task could be easy and environmentally beneficial if solid waste is segregated at source and is converted into manure in different areas. The dry waste should be given to the rag pickers for recycling. The solid waste generated in the city is collected by the following methods:

Table No. 7.2: Collection equipment of Municipal Solid Waste (MSW)

Sr. No.	Type of Vehicle	No.	Collection source
1	Wheel Barrow Two buckets (1 dry + 1 wet)	1000	House to house collection. (Mainly slums)
2	Cycle Rickshaw with 4 buckets(2 dry + 2 wet)	150	To be deployed by October 2003 mainly for middle income group and small lanes and by-lanes. Mainly in the middle-income group society.
3	Ghanta Trucks	18	House to house collection. Big societies/Multi plexus bungalows
4	Ghanta Trucks	15	Hotels Restaurants and Wedding halls
5	Tipper Trucks	20	For clearance of masonry bins

Source: Solid Waste Department, PMC

Collection, transportation and disposal of solid waste are undertaken in 3 shifts. The schedule of lifting the solid waste from the collection points is accordingly fixed. Solid waste collected at 750 points is lifted every day, while at 465 points it is lifted on alternate days. 426 collection points are cleared after every three days, while 363 have a weekly frequency.

Table No. 7.3: Types of solid waste containers/bins

Type	Nos.	Details
Compactor Bucket 3.8 m^3	1250	750 are collected daily
Compactor Bucket 2.2 m^3	160	All are collected daily
Compactor Bucket 1.1 m^3	300	All are collected daily
Compactor Bucket 1.5 m^3	800	All are collected daily
Garbage bins including cement concrete	210	All are collected daily
Total	2720	

Source: Solid Waste Department, PMC

In an effort to make the transportation of solid waste optimal and hygienic, the PMC has setup six mini ramps at strategic locations in the city at Ghole Road, Karve Road, Aundh, Yerawada, Dhole Road and Katraj. The solid waste from each collection point is brought to mini ramps by dumper placers and other modes of transportation. From the mini transfer stations, it is brought for weighing and then disposed of at the Devachi Urali landfill site. At the Hadapsar ramp, solid waste from three ward offices is brought and emptied into the bulk refuse carrier, which is finally disposed off at the landfill site. Efforts must however be made to maintain hygienic conditions during the transfer of waste to the mini transfer stations.

The transportation of the solid waste is carried out in three shifts. The fleet of vehicles used for the transportation of solid waste to the mini transfer stations and the landfill site is as follows:

Table No. 7.4 Vehicles used for transportation of Municipal Solid Waste

Type of vehicle	Nos. (June 2004)
Dumper Placers	80
Tippers	47
Bulk refuse carries	46
Mobile compactors	20
Static compactors	02
JCB Machine	03
Bulldozers	02
Poclain	02
Water tanker	02
Fire Fighter Engines	02
Total	**206**

Source: Solid Waste Department, PMC

Three JCB machines, two chain bulldozers, and one poclain are used in the landfill site at Urali Devachi. Two water tankers and two fire fighting machines are also available for processing, composting of waste and as precautionary measures. Approximately 450 to 500 metric tons of solid waste is collected daily by approximately 5000 rag pickers spread all over the city, of which 3900 are issued identity cards by the PMC. About 3000 are also covered by the medical insurance scheme of the PMC. It was the first time such a scheme was launched in India.

TRANSFER OF SOLID WASTE FROM HADAPSAR RAMP

According to the directives of the Supreme Court and Govt. of India Gazette Extra ordinary dated 3.10.2000 and provisions of Environment (Protection) Act 1986 and Municipal Solid Waste (M&H) Rules 2000, all the residents of houses,

societies, bungalows, and row houses are directed to segregate the garbage generated by them at source, into **DRY** and **WET** wastes, into **Green** and **White** buckets/containers respectively, within their premises. This was made MADANTORY in accordance with the above rules. The details are as follows:

1. WET WASTE: Kitchen wastes such as vegetables, leftovers and spoilt food, mutton, fish, chicken, egg shells, fruit peels, etc. are to be packed in bio-degradable bags into **green containers**.
2. DRY WASTE: Such as paper, plastic, glass, rubber, metal scrap, nails, wires, medicine bottles, broken crockery, packaging materials, etc. are to be kept in **white containers**.

Based on the directives of the Supreme Court, segregation of Municipal solid waste has been vigorously started by the PMC at the:

1. Domestic level.
2. Transfer station level
3. At the land fill site.

At the domestic level, the PMC has provided 18 *Ghanta* trucks along with 2 rag pickers and 2 PMC employees, which go house to house. The dry waste is collected by the ragpickers directly and the wet waste is collected by the PMC.
At the transfer station the PMC has appointed 4 to 5 ragpickers to collect the dry waste from the mixed waste, brought in from the various ward offices. The waste is collected at the transfer stations in bulk refuse carriers and is transported to the land fill site at Devachi Uruli. Here again, the dry recyclables are segregated by rag pickers.

In this way maximum quantity of dry recycles are segregated by the rag pickers. The remaining waste is treated with the EM (Effective Microorganisms) solution at the landfill site.

As far as commercial shops are concerned, rag pickers are provided to collect the dry waste from the stationaries, shops, hosieries, electronic gadgets and appliances shops etc. For this purpose facilitators to rag pickers, which monitor proper collection of dry recyclable waste from commercial shops and super markets, are appointed at 7 ward offices. PMC will provide 7 more facilitators in the remaining 7 ward offices, which will help in segregation of dry waste at an optimum level. The other benefit of this system is that the rag pickers are protected from contracting any disease.

The organic or bio-degradable waste is processed by various composting processes, with the help of NGOs, Private organization, Schools, Individuals, Educational institution, Hotels, Restaurants. The composting techniques involve Vermiculture involving earthworms, use of enzymes, and the use of microbial solution (EM). For the new housing complexes it has been made

mandatory to construct composting pits, to recycle biodegradable waste, and rag-pickers are deployed to collect the dry recycle waste. In case of multiplexes and large residential complexes, the builder, architect and promoters are asked to set up mini 'waste to bio gas and energy' plants based on the principal of Non-conventional energy resources. They are also asked to set up water harvesting systems to supplement the PMC water system.

PMC secured the second prize in the Sant Gadge Baba cleanliness Drive at State level. Many factors like cleanliness of schools, beautification, etc. were included in this drive. The drive is continued this year and PMC is working hard to better itself.

At the intermediate level (transfer station level), to obtain maximum segregation and reduction in waste, PMC has sanctioned an NGO named Sonia Gram Udyog for segregation and collection of the dry waste from all six transfer stations. The dry waste, in the form of rubber, paper, plastic, metals, glass, and rags will be segregated, collected, weighed and then transported for recycling at various places. The first unit of this type of is under construction at Katraj transfer station. Such units are also under construction at the Yerwada & Aundh Transfer stations. These initiatives are mainly implemented according to the Supreme Court Recommendations and guidelines so that most of the Municipal Solid Waste (MSW) is reduced at source, at the transfer station and lastly at the point of processing i.e. the landfill site. This ensures that economization of garbage transportation is done and life of the landfill site increases.

To collect the commercial biodegradable waste from the hotels and restaurants, PMC has deployed a separate vehicle in 14 ward offices to collect the biodegradable/kitchen waste. The hotels are enforced to collect their organic waste in green biodegradable bags, which are hygienic and safe. The PMC employers collect these bags from hotels and restaurants and also from wedding houses. All this is then transported for processing at the landfill site. PMC has principally approved to setup two Biogas or 'waste to energy' plants of 20 and 10 metric tons capacity each, on BOT basis. In this way all the commercial biodegradable waste will be treated/ recycled. Based on the success of these plants, other transfer stations could have the same system for treatment of biodegradable waste. In this way nearly about 80-100 metric tons organic waste could be recycled at the transfer stations itself. This would create a healthy, hygienic and clean environment at the landfill site and the transfer stations. The energy generated can be utilized for cooking and lighting purposes.

Disposal of solid waste

Pune Municipal Corporation has one big ramp at Hadapsar and 6 small ramps at Katraj, Yerwada, Dhole Patil Road, Ghole Road, Aundh and Paud Road. Pune Municipal Corporation is currently disposing the waste by scientific land filling. PMC is also using the method of compaction besides dumping.

Table No. 7.5: Disposal sites for solid waste

Sr. No.	Name	Area	Remarks
1	Urli Devachi	17.2 hectares	Currently waste processing and disposal site.

Source: Health Department, PMC

Uruli Devachi landfill site is located to the East of Pune, off the Pune-Saswad Road, near Fursungi Railway station. It is located in the Uruli Devachi village S.No.30 &31. At this site, part of it was developed scientifically.

WINDROW OF GARBAGE AT LANDFILL SITE

The following problems were faced with regarding the site during the initial stages

1. Ground water pollution due to leachate percolation
2. Landfill fires
3. Bird Menace
4. Odour problem
5. Litter problem
6. Petition in the High Court

To improve the existing landfill site as per provisions of MSW (M&H) rules 2000, following actions are taken

LAND FILING SITE AT URALI DEVACHI LAND FILING SITE AT URALI DEVACHI

Land Preparation

1. The disposal site was undulating in nature. Hence soil was placed on the grade slopes and compacted and to form a base for the Geomembrane liner.
2. A 0.75 mm thick VFPE Liner was used on top of the soil layer. This was important to prevent the seepage of rainwater, hence preventing the formation of leachate.
3. On top of the geomembran liner, a non-woven geo textile was placed.

4. A layer of soil, to protect the geotextile and geomembran below, was placed.
5. Interceptor drains are provided in the top soil layer so that rainwater would not create deep rivulets. These cross drains flow into the Open gutter at the periphery of the landfill.
6. There is an open gutter at the periphery of the landfill to carry the rainwater, which flows from the top of the slopes.
7. Passive Gas vents are provided at the sides of the landfill closure so that the gas, which is formed inside the landfill, will be released naturally.
8. Bore wells and open wells are used to monitor the quality of the ground water. In case the leachate is detected, these wells can be used to pump out the leachate for further treatment and disposal.
9. Water and Ambient Air Quality monitoring is regularly carried out.

A) The Top portion of the Existing Landfill site

1. The top portion of the landfill site is leveled with a 2% slope at one side. This was used for making the Base of Landfill No. 1.
2. A Sand layer will be placed on top of the waste to give way for the Gas to move towards the Gas vents.
3. Soil will be placed on top of the sand.

B) Landfill No. 1 On top of the Closed Landfill site.

As the acquisition proceedings are in process with respect to the adjoining area, it was thought that a new Landfill be prepared on top of the existing landfill site after proper closure steps, as given above.

1. The PMC is constructing an impervious base for the composting plant. This work will be carried out after the completion of the landfill work.
2. The designing and estimation of Landfill No. 2 has been taken up in the adjacent quarry area. The tender would be floated shortly.
3. PMC is acquiring an area of about 48 hectares adjacent to the present landfill site. This will be used for complete Solid waste management and land filling of waste, on long term basis in a proper scientific manner.

EM technique

From Jan 15, 2002, PMC started composting by using “EM” (Effective Micro Organism), a Japanese technology. With this process, harmful gases such as Ammonia and Hydrogen Sulphide, which are generated in rotten garbage, are eliminated and this helps in elimination of foul odour.

Benefits of using EM in solid waste management are as follows
1. Odour removal
2. Reduction in fly menace

3. Protection of environment and health of workers.
4. High quality of organic compost.
5. Easy maintenance.
6. Reduction in auto combustion.

EM SOLUTION BEING SPRAYED ON WASTE AT LANDFILL SITE

Presently, PMC is composting about 550 to 650 Metric tones per day of organic waste, with EM technology at Urali Devachi. The Final compost is given free to the farmers. Pune also ranks first in India for composting MSW by EM technology.

Vermiculture composting

Under the `Clean Pune Project' the Corporation has proposed to start vermiculture in all public gardens and, at open spaces at the Balgandharva Ranga Mandir.

VERMICOMPOSTE PITS, HADAPSAR WARD

TERRACE GARDEN IN HOUSING SOCIETY

As mentioned earlier, garbage collected has two forms, viz. wet and dry. After segregating it, the PMC sells the dry garbage to the rag pickers for recycling. The wet biodegradable garbage, including kitchen waste, leaves is used for Vermicomposting. The PMC has appointed some facilitators, to give the technical know how and knowledge about various biodegradable waste recycling techniques. Nearly 550 housing societies and 3 lakh individuals have adopted this technique. Many NGOs and private organizations are also involved in promoting the process of Vermiculture.

Table No. 7.6: Number of associations for Vermicomposting

Sr. No.	Associations	No. of Association
1	Societies	186
2	Offices	6
3	Hotels	10
4	Schools and Colleges	6
5	Hospitals	8
6	Mangal Karyalys	2
7	Ward Offices	18
8	Others	42
	Total	278

Source: Solid Waste Department, PMC

Carcass utilization plant

The Carcass Utilization plant was approved by the Department of Animal Husbandry & Dairying Govt. of India in 1998. The carcass utilization plant was erected, commissioned by the Pune Municipal Corporation. The Govt. of India had approved Rs. 152 lakhs as grant in aid, out of the total cost of Rs. 178.85 lakhs, and released an amount of Rs. 121.32 lakhs in three installments till

March 2003. The plant is now run by M/S Diliwala & Sons. Two shifts are being carried out for large animals and stray dogs. M/s Diliwala & sons collects the dead animals and disposes them in a scientific manner in the carcass utilization plant. On an average 20-25 large animals are disposed in the plant every month. The byproducts available are tallow, meat cum bone meal and hides. The meat cum bone meal can be used in manures as well as cattle/ poultry feeds. The Uruli Devachi site is selected for this plant.

Anti Plastic carry bag Campaign

A workshop was held on 5th May - 2000, to create awareness amongst the public regarding the health and environmental hazards caused by thin plastic carry bags (below 20 microns). The work shop saw participation from Municipal officers, corporators, NGOs, Shopkeepers, Hospital associations and even plastic bag manufacturers. Now targets are set up for penalizing the manufactures and monthly reviews are taken during apex committee meetings.

Bio-medical Waste

BIOMEDICAL WASTE TREATMENT PLANT

A central incineration facility set up by the Pune Municipal Corporation for the collection and disposal of bio-medical waste was commissioned in December 2000. The present status is impressive with 100 collection points across the city, covered by two collection Vans.

Currently 500 Nursing homes, 550 Hospitals, 15 pathological laboratories and 6 blood banks are registered with PMC under the pay and use scheme for incineration of bio-medical waste generated. The total waste collected from these is around 450-500kg/day. The private hospitals are charged Rs.20/kg for collection and disposal of the bio-medical waste. The pathology laboratories are charged Rs. 300 per month, while blood banks are charged Rs. 1000 per month.

Cleanliness drive

One of the biggest, and much needed action projects launched by the Pune Municipal Corporation since 1997 was '**Clean Pune Project**'. With growth of the city, the problem of solid waste management is bound to occur in the future. Before this problem gets out of hand, the Pune Municipal Commissioner has taken immediate steps to solve it. Taking inspiration from Surat, which was cleaned up after the plague, PMC has also undertaken a cleanliness drive in the city under the 'Clean Pune – Sankalp' Project. The drive was worked out on the directives of a citizen's committee appointed by the Municipal Commissioner.

The following measures are taken to achieve the objectives of **Sankalp:**

1. Installation of an Arogya Kothi in each electoral ward with equipments, hand carts and disinfectants
2. Provision of identity cards for workers.

3. Formation of Zonal committees, which consist of 14 divisional offices having three or four prabhags in each divisional office. The committees attend the complaints from the citizens.
4. For better Supervision, the Additional Municipal Commissioner, all the HODs and Zonal Commissioners conduct surprise visits in the Prabhags every week.
5. Wheel –Barrows, Containers, Vehicles are provided for collection and transportation of waste.
6. In order to minimize the cost of Transportation, the PMC has set up one Central Transfer Station at Hadapsar and 6 Mini Transfer Stations at various sites.
7. From 2002 PMC along with some NGOs organise Eco Friendly Festivals. On the Ganesh immersion day, they collect all the Nirmalaya in special containers, keeping in mind the traditional beliefs, and dispose using the EM technique.
8. Final disposal-Introduction of EM Technology.

Zero garbage City

In order to keep the city clean and beautiful, the PMC started a cleanliness drive on 1st May, 1999. Mechanical clearance, with the help of dumper placers and buckets, was started then. To speed up the process, to clean garbage within 24hours of its generation and to dispose it outside the city, the Zero Garbage drive was initiated on August 15, 1999 and are observed on January 1, January 26 and February 15, Padwa Day.

Regarding Solid Waste Management, the following improvements are achieved by PMC:

1. Improvement in vehicle depot
2. Purchase of sophisticated vehicles.
3. Construction of garbage transfer stations.
4. Increase in participation of citizens and NGOs.
5. Construction of Pay and Use toilets on a massive scale.
6. Improvement of nullahs.
7. Anti plastic carry bag campaign.
8. Completion of projects for disposal of bio medical waste from hospitals.

9. Use of bio-degradable plastic bags for wet waste.

Some Major achievements are:

- Qualitative and quantitative improvement in garbage lifting.
- Closure of two garbage disposal sites surrounded by residential areas (Kothrud and Ramtekdi).
- Total reduction in complaints of fowl smell and fly nuisance.
- Reduction in communicable diseases (overall improvement of public health).

- Commissioning of the Hadapsar transfer station to effect saving time and fuel.

Awareness Programs:
PMC is conducting various awareness program involving Schools, NGOs, Political leaders, common people and builders. PMC is also implementing various awareness techniques like awareness through cable network, theatres, slides show, documentaries and dramas for common people. A short film on separation, transportation, disposal and composting is undertaken by Sai Paranjpe to showcase solid waste management techniques.

CHAPTER- EIGHT

Sewerage and Drainage

Introduction

Sanitary works start where water supply engineering ends. Sanitary system, which includes a number of units, begins with the collection system and ends after the purified water is returned to the receiving bodies. The sanitary works can be broadly classified as:

- Collection works,
- Treatment works and
- Disposal works

Collection work

The collection system starts from the house drainages. These join the network of sewer lines in any town, designed to collect the wastewater from individual houses, public places and industries.

Treatment work

Wastewater treatment is required before disposal so that it may not pollute the atmosphere and the receiving body of water. If untreated, it could be responsible for pollution of water supplies for downstream towns, destruction of food, fish and other valuable aquatic life, contamination of bathing places, creation of unpleasing sights, cause of bad odour, air pollution, contamination of water making it unfit for recreation and commercial use.

Disposal work

The treated wastewater is finally disposed off by irrigating fields or discharging it into the natural watercourse.

In Pune 450 million liters of used water is drained everyday through the drainage system, of which, at present, 90 million liters is treated at the Dr. Naidu Sewage Water Treatment center and released into the river. Likewise the capacity of Bhairoba Treatment Plant was enhanced from 45 MLD to 130MLD and the treated water from this plant is supplied to farmers in Hadapsar and Mundhwa.

History

The first sewerage system for Pune was installed in the year l928. The scheme covered an area consisting of the Pune Gaothan, parts of Shivaji nagar and Erandawane. A collection system was also installed and primary treatment was given at the Bhairoba Pumping Station. The treated sewage was then used for irrigation. The old system is still in operation and disposes effluents after primary treatment through 13 l/4 and 17 l/2 Nali near Hadapsar. This is later used for farming applications. This system covers almost 40 percent of the present PMC area. A collection system was also installed in other parts of the city increasing the total coverage to almost 100 percent of the PMC area. However, adequate capacity for conveyance, treatment and recycling or disposal of treated sewage is not available presently. This necessitates the use of septic tanks in the remaining areas. However, these are not adequate and are leading to pollution in the Mula and Mutha rivers.

It is observed that there are no severe problems for water supply in the old city limits. However, the sewage conveyance and treatment are inadequate, eventually leading to the pollution of Mula–Mutha River.

Present

Drainage lines cover almost 72.25% of the PMC area. All collecting lines are connected to the main sewer line, and hence, all the drainage is transported to the sewage treatment plant.

Water is supplied to the city during restricted intervals, leading to high drainage flow during peak hours. As the quantity of drainage increases Due to the limited capacity of the treatment plant, the effluent spills into the river water due to inadequate capacity.

Natural drains in old PMC

1. Nagzari nala
2. Ambil nala
3. Bhairoba nala
4. Muredha nala
5. Mutha right bank canal (new)
6. Hadapsar nala
7. Mutha right bank nala
8. Mutha left bank nala

Present sewerage system

The sewage from the city is transferred to the Bhairoba Treatment Plant through two outfalls. The capacity of the Bhairoba treatment plant is not adequate to treat the entire quantity of sewage. The outfall sewers start from Tara Chand hospital and end at the Bhairoba Pumping Station. Raw sewage is pumped from the Mangalwar pumping station, Tanaji Wadi and Yerawada

pumping stations. Recently one more outfall has been contructed from Wanavadi to Bhairoba pumping station. It collects and conveys sewage from the eastern part of the city. Sewage water is pumped for irrigation purposes into the Hadapsar and Wanawadi areas.

Sewage pumping stations

The total capacity of the main pumping station at Kasba Peth is 90 MLD. It is designed to convey sewage to the I.D.H. treatment plant situated near Sangam, through a 1400mm diameter rising main. It is commissioned for full capacity use. Approximately 80 to 85 MLD sewage is pumped at present. In addition, Mangalwar, Pulachi Wadi, Tanaji Wadi and Yerawada are other pumping stations located in low-lying areas, which convey sewage to outfalls. PMC also plans to put up new pumping stations as per the water and sewerage plan. The details of the total expenses for the existing and proposed pumping stations are explained in table below.

Expenses

Every year the PMC spends money for the operation and maintenance of the pumping stations. The majority of the cost is on electricity. The Mangalwar pumping station shows no expenditure because now all the sewage is pumped from the Kasba pumping station.

Table No. 8.1 Total Expenses for existing pumping stations

Name of the pumping station	Year	Total Expenses (Rs.) (Electricity + Maintenance)
Kasba pumping station	2000-2001	6,87,75,000
	2001-2002	2,22,70,700
	2002-2003	2,00,92,100
	2003-2004	2,00,92,100
Mangalwar pumping station	2000-2001	60,00,000
	2001-2002	Nil
	2002-2003	Nil
	2003-2004	Nil
Bhairoba Pumping station	2000-2001	2,31,71,600
	2001-2002	2,31,71,600
	2002-2003	2,50,08,600
	2003-2004	2,50,08,600
Dr.Naidu Sewage treatment Plant	2000-2001	1,62,26,700
	2001-2002	1,62,26,700
	2002-2003	1,57,88,600
	2003-2004	1,57,88,600

Source: Drainage Department, PMC

Proposed Pumping Stations

In order to supplement the present pumping stations, the PMC has proposed constructing three more pumping stations. This decision was taken keeping in mind the future population of the city. The details are given below.

Table No. 8.2 Proposed Pumping Station

Sr. No.	Name of Station	Civil work	Mech. work	Remark
1	Botanical Garden	Started	In progress	-
2	Mental Hospital	Started	In progress	-
3	Topkhana Pumping station	Not started	Not started	Land acquisition In progress

Source: Development Engineer (projects), P.M.C.

The PMC plans to develop the pumping stations along with the STP in the following manner. The details for the next 20 years plan are given in the table below. This plan is initiated keeping the expansion of the city in mind. This will be done in three phases, the first of which is nearing completion.

Table No. 8.3 Phase wise development of Pumping stations and STPs

Sr. No.	STP Name	Pumping Station/ STP	2005 (MLD)	2015 (MLD)	2025 (MLD)
1	IDH STP	Kasba pumping station	90	108	110
		Mangalwar pumping station	-	42	95
		Total	**90**	**150**	**205**
2	Bhairoba STP	Kalyani nagar pumping station	30	50	69
		Bhairoba pumping station	100	113	131
		Total	**130**	**163**	**200**
3	Erandawane STP	Erandawane Pumping station	50	70	100
		Total	**50**	**70**	**100**
4	Tanajiwadi STP	Tanajiwadi pumping station	17	20	24
		Total	**17**	**20**	**24**
5	Bopodi STP	Bopodi pumping station	13	15	20
		Spicer college pumping station	5	7	8
		Total	**18**	**22**	**28**
6	Tophkhana STP/P.S.	Tophkhana pumping station	8		24
		Total	**8**		**24**
7	Baner STP	Baner STP	-	-	66
		Total	**-**	**-**	**66**
8	Mundhawa STP	Malwadi Magar Naik	14	46	92
		Manjari (Bk.)	-	-	16
		Kharadi pumping station	-	21	43
		Total	**14**	**67**	**151**
9	Vitthalwadi STP	Vitthalwadi pumping station	20	35	50
		Total	**20**	**35**	**50**

Source: Water and Drainage Project Development, PMC

Sewage Treatment

Sewage treatment is done at the following treatment plants before disposing the sewage into the Mula Mutha River.

Some more details regarding the sewage treatment plants is given in the table below.

Table No. 8.4 Sewage Treatment Plants

Sr. No.	Name of the plant	Civil work	Mech.work	Remark
1	Bhairoba (130M.L.D.)	Complete	Complete	Already commissioned
2	Erandawane (50M.L.D.)	Complete	In progress	Will be commissioned by August 2004.
3	Bopodi (18M.L.D)	Complete	Complete	Already commissioned
4	Tanajiwadi (17M.L.D.)	Complete	Complete	Already commissioned
5	Vitthalwadi (20M.L.D.)	Not started	Not started	Land acquisition in progress

Source: Water and Drainage Project Department, PMC

The treatment plants treat the sewage and effluents to certain standards. The PMC follows a stringent set of standards for various parameters, which ensure that the ecological balance is not disturbed.

On an average the raw sewage entering the plant is highly harmful for the river ecology. The levels of pollution of the raw sewage on an average are as follows:

Table: 8.5 Characteristics of Raw sewage

Parameters	Limits
Temperature	Ambient
PH	6.0 – 8.5
BOD_5 days at 20^o centigrade	250 mg/l
COD	350 mg/l
TSS	300 mg/l
Total Kjedhal Nitrogen	40 mg/l
Sulphates	20 mg/l
Oil and grease	30 mg/l

Source: Drainage department, PMC

The aim of the treatment plants is to bring the levels down to the levels prescribed by the CPCB. These standards are

Table 8.6 Table showing the treated sewage quality

Treated Parameters	Sewage quality
BOD_5	Less than 20 mg/l
TSS	Less than 30 mg/l
Oil and grease	Less than 10 mg/l
Residual Cl_2	Less than 1 mg/l

Source: Drainage department, PMC

Brief Information on newly constructed Sewage treatment plants under Pune Municipal Corporation

1. Dr. Naidu (I.D.H.) Treatment Plant

This sewage treatment plant was commissioned in 1987. With a capacity of 90 MLD, it is the only full-fledged treatment plant that brings the sewage to stream standards. Full treatment is given to the sewage before disposing it into the Mula-Mutha River near Sangam. The treatment process includes a primary treatment with screening, grit removal, and primary sedimentation. This is followed by a secondary treatment with aeration, secondary sedimentation, and chlorination and sludge digestion. The special feature of this conventional activated sludge plant is the use of a 'carousal system' in the aeration tank. This system has claimed to combine the advantages of the plug flow and complete mix systems.

SECONDARY SETTLING TANK AT DR. NAIDU TREATMENT PLANT

Table No. 8.7 Results after treatment at Naidu Treatment Plant

Parameters	Value
BOD(mg/l)	22 to 26
COD(mg/l)	70 to 110
S.S (mg/l)	40 to 50
PH	6.5 to 7
D.O.(mg/l)	1.8 to 2.2

Source: Naidu Treatment Plant, PMC

PMC has undertaken construction works for the following Sewage treatment Plants based on the requirements of the year 2025, based on phase wise projection, priorities, and deciding thrust areas. Ongoing/completed constructions are to cater sewage flow in phase-1 (year 2005) and provisions are made for future expansions in these plants to cater sewage flow in phase-3.

2. Bhairoba Sewage Treatment Plant (Conventional Activated Sludge Process)

As it was proposed, this plant is based on a conventional activated sludge process to treat 130 MLD of raw sewage in order to achieve the desired effluent quality. The sewage will be treated by sedimentation and aeration processes. Oxygen will be supplied by means of surface aerators.
Design Parameters: Average flow: 130 MLD or 1.505 m^3/sec Peak factor 2.00.

3. Erandawane Sewage Treatment Plant: (Modified Activated Sludge Process)

This proposed plant is based on the modified Activated Sludge Process to treat 50 MLD of raw sewage in order to achieve the desired effluent quality.

Oxygen will be supplied by means of diffused aeration. It was decided to construct a raw sewage pumping station & grit removal chamber, to cater a flow of 100 MLD expected in the year 2025. All other units are designed for a present flow of 50 MLD.
Design Parameters: Average flow: 50 MLD or 2083.33m^3/hr, Future flow: 100 MLD or 4166.7 m^3/hr, Peak factor: 2.00.

4. Bopodi Sewage Treatment Plant: (Extended Aeration Process with Centrifuge)

As per the proposal, this plant is based on the Extended Aeration Process with centrifuge, for treatment of 18 MLD of raw sewage in order to achieve the desired effluent quality. The sewage will be treated using the sedimentation and aeration processes. Oxygen will be supplied by means of surface aerators.
Design Parameters: Average flow: 18MLD , Peak factor: 2.00

5. Tanajiwadi Sewage Treatment Plant: (Bio Tower with Extended Aeration Process)

As proposed, this treatment plant is based on the Bio Tower with Extended Aeration Process, for treatment of 17 MLD raw sewage, to attain the desired effluent quality. The sewage will be treated by means of a Bio-Tower followed by extended aeration for Biological Treatment and finally exposed to chlorination.
Design Parameter: Average flow: 17MLD, Future flow: 24MLD, Peak factor: 2.00

6. **Vitthalwadi Sewage Treatment Plant: (Trickling Filter with Extended Aeration Process)**

As the land was not finalized, the decision for the treatment process is not yet final.

It is commonly seen in Pune and other cities of India that the generation of sewage and civic effluents continuously keeps outstripping the facilities installed and investments allocated for the treatment of sewage and underground drainage systems. To reduce the pressure on the effluent treatment plants, it has become necessary to use this sewage and civic waste for other purposes.

Treatment Costs

Table 8.8 Total annual Operation and Maintenance costs (Rs.)

	Naidu STP	**Bhairoba STP**		**Bopodi STP**	
		P.M.C.	Others	P.M.C.	Others
Manpower cost	NA	-	35,64,000	-	15,00,000
Chemical consumables	NA	-	28,10,500	6,76,710.00	-
Energy hikes	NA	3,60,00,000	-	1,05,12,000	-
Miscellaneous Exp.	NA	-	26,40,000		3,60,000

Note: the values for the Naidu Treatment plant were not available. Operation and maintenance costs of these newly constructed (Bhairoba and Bopodi STP) remain with the contractors for a period of 2 years from the date of completion. Manpower chemical and miscellaneous expenses in the said period.

New proposal

The PMC has set up the Pune Sewerage Project keeping in mind the population to be catered by the year 2025. This is a phase wise project and the details regarding the same are indicated below:

Table No. 8.9 Pune Sewerage Project

Name of the STP	Area covered in Km²	Population Benefited and Sewage generation					
		Year 2005	MLD	Year 2015	MLD	Year 2025	MLD
Bhairoba+ Kalayni Nagar	81.20	9,62,800	130	13,40,239	175	17,54,387	200
Bopodi	15.00	1,25,515	18	1,64,234	18	2,10,930	23
Erandwane	26.15	3,46,002	50	5,05,002	70	7,32,034	100
Tophakhana	3.77	71,610	8	85,903	8	1,03,017	24
Tanajiwadi	9.35	1,32,141	17	1,52,911	20	1,77,189	24
Vithalwadi	48.00	1,37,015	20	2,23,979	30	3,68,338	60
Total	**183.47**	**17,75,083**	**243**	**24,72,268**	**321**	**33,45,895**	**431**

Source: Water and Drainage Project Department, PMC

Action plan

The Master plan (Horizon year) for sewerage planning is adopted for the year 2025, the phase I and phase II of this project are to be completed by 2005 and 2015 respectively. The sewerage system is designed with 1 existing and 6 new STPs. The sewage entering these 7 STPs based system is estimated for all three phases. The new capacities for all treatment plants are proposed accordingly. Phase wise capacities, including the present 90 MLD sewage treated would results to: phase I = 333 MLD, phase II = 527 MLD, phase III = 848 MLD.

Subsequently, to meet this requirement, sewage will be carried to these STPs by sewer line networks. Phase wise total length of these lines would be phase I = 348962 mts., phase II = 573824 mts., phase III = 973220 mts.

Accordingly, PMC has already undertaken the phase wise development of the sewage system and a major part of the work in phase I is near completion.

Programs arranged by the PMC

PMC has taken steps to understand the new techniques, which can be used for sewage treatment. PMC had arranged a two day workshop, in association with Decentralized Effluent and Wastewater Treatments (DEWATS) for the same.

CHAPTER-NINE

Roads and Transportation

Introduction

Everybody travels, be it for working, playing, shopping or business. All raw materials must be delivered from an area of cultivation to a place of manufacture or use and all goods must be moved from the factories to the market place and then to the consumer. Transport is the means by which these activities occur. Meeting these needs was and continues to be, the most important of all tasks. Transport, because of its pervasive nature, occupies a central position in the fabric of a modern-day urbanized nation.

It is because of the same criteria, that the solutions to transport problems can influence the people to a large extent. These influences are reflected in the constraints, which society currently places on the development and evaluation of road proposals, i.e. they must be analytically based, economically sound, socially credible, environmentally responsible, and politically acceptable.

Until the advent of mechanized transport, the size of a town was limited by the distance that people could walk and in many larger towns, this lead to high residential densities and unhealthy living conditions. With the advent and increasing affluence of urban transport in the mid-nineteenth century, people began to spread and residential densities began to fall, although towns continued to grow due to migration form the countryside.

Impacts of private vehicles on Public Transport

Increase in the number of two wheelers like motorcycles, scooters, and three wheelers like auto-rickshaws etc. and four wheelers like cars, vans etc. is the biggest single factor affecting the public transport usage. Buses are the most important form of public transport in a large number of urban areas. Two wheelers have a negative impact on usage of public transport because of their convenience.

Impact of Transport on the Environment

Growth in the numbers and usage of motor vehicle has taken its toll on environment in many ways, like road congestion, vehicle noise and exhaust emissions. Road accidents also are a major cost to the society both in monetary and human terms.

Congestion

Increasing traffic, population and badly maintained roads together lead to congestion, which has far reaching impact on pollution level on a local scale. It also contributes towards global impacts such as global warming and extra

usage of the already scarce oil resources. In urban areas, congestion encourages the people to use unsuitable residential roads, there-by endangering the quality of life in these areas. Congestion on urban roads is tackled by widening of existing roads to maximize ease of movement.

Experiences from other parts of the world suggest that building more roads encourages an "induced traffic" and instead of reducing congestion, new roads/flyovers etc. encourage more private vehicles to use the roads. Cities that have succeeded in combating traffic congestion have done so not by building more roads, but by adopting **Traffic Demand Management** measures.
The traffic demand management measures such as introduction of deterrents on use of private vehicles, reducing parking areas, increasing parking charges, charging congestion tax and drawing up plans for substantial increase in the capacity and efficiency of mass public transport (not necessarily owned by the public sector), help in the long- term by development of a sustainable transport system.

With the above in mind, PMC has outlined its objectives regarding traffic and transportation

Objectives

- Decongest the city roads.
- Reduce accidents on the city roads.
- Provide safe, convenient and pollution-free atmosphere for vehicular and pedestrian traffic.
- Segregate directional traffic and vehicular and pedestrian movement.
- Provide parking facility to traffic.
- Encourage Public transport and discourage personalized models.
- Inculcate basic traffic discipline amongst the citizens.

Roads

The total length of roads in the PMC area is approximately 800 kms, out of which 88 kms are located in the congested part of the city. One of the major problems, which Pune is facing, is the near-total collapse of traffic.
The traffic movement in the city has not only led to increasing traffic jams and overcrowding on the roads, but also has a very serious effect on the health of the citizens. Respiratory and other ailments caused by auto exhausts/emissions are taking their toll, indicated by a steep increase in diseases like asthma, bronchitis and other related ailments (refer chapter on health).

Major Roads of Pune

Pune City is well connected by road to the surrounding area. The British era saw the development of construction of the Bombay-Pune link road. The

road, presently known as the Mumbai-Pune Road (NH 4). later also connects some major cities from southern part of India to the city, It is one of the busiest road of the country today. Recently the country's first 'Expressway' was built between Mumbai and Pune. This expressway is the nation's first dedicated highway and is a cause of pride for the city.

Existing Road Network

Express highways, National Highways, State Highways, Major District Roads and other District Roads pass through Pune. Pune roads are segregated as below:

Express highway
The express highway between Mumbai and Pune

National Highways
a) NH 4 Mumbai – Bangalore Highway
b) NH 4 By-pass
c) NH 9 Mumbai – Solapur Highway

State Highways

a) SH 27 Pune – Nagar Road
b) SH 64 Pune– Saswad- Baramati Road
c) SH 60 Pune – Paud Road
d) SH 59 Pune – N.D.A.
e) SH 57 Pune – Pashan.

Major District Roads
a) M.D.R. 35 Pune- Sinhagad Road
b) M.D.R. Pune – Saswad Road

Arterial Roads

NORTH - SOUTH
a) Jawaharlal Nehru Marg
b) Maharana Pratap Road
c) Shivaji Road
d) Bajirao Road
e) Modi Ganapati Marg
f) Lal Bahadur Shastri Marg

NORTH TO SOUTH WEST
a) Tilak Road

EAST - WEST
a) Lokmanya Nagar Road
b) Bhikardas Maruti Road
c) Kumathekar Road
d) Laxmi Road
e) NC Kelkar Road

The General Body has also sanctioned implementation of the IRDP (Integrated Road Development Project) from 2003 – 2004. Accordingly a project is under planning, and will include the following projects:

1. High capacity mass transport route (HCMTR)
2. Construction of DP roads on riverbanks.
3. Construction of tunnel from Baramati Hostel to MIT college (Paud Road)
4. Concretization of major approaches to the city
5. Development of roads on canal banks.
6. Construction of RP & DP roads
7. Ongoing DP roads in the budget
8. Development of RP roads in newly merged villages
9. Development of roads in the congested area of the city.

The concretization of roads is given utmost importance. The details regarding concretization are given in table 9.1

Table No. 9.1 Information regarding Concretization of Roads

Completed C.C. Roads	Ongoing C.C. Roads	Proposed C.C. Roads
Mobo's hotel to Bund Garden Road	Pune-Nagar Road Gunjan Theater to Jakat Naka Bridge	Golwalkar Guruji-Gajanan Maharaj Mandir to Satara Road
Dandekar Bridge to old PMC limit	Pune-Solapur Road from Fatimanagar to Hadapsar	
University Chowk to Bremen Chowk	Pune-Bombay Road from Bhale Estate to Mariaai gate	
Mangaldas Road, Wadia College to Jehangir Hospital to R.T.O. Office.	Sinhgad Road from Rajaram Bridge to Dhayri phata.	
Dias plot Chowk to Marketyard Chowk (Nehru Road)		
Karve Statue to Warje Jakat Naka (almost completed)		
Kondhwa- Bibvewadi Road Completed for PMC limit.		
Panchami Hotel to Katraj Dairy (Satara Road)		

Source: Road Department, PMC

CONCRETIZATION OF ROAD WORK IN PROGRESS

CONCRETIZATION OF ROAD AFTER COMPLETION

Bridges in Pune City

The first Bridge in Pune was built by Nanasaheb Peshwe, known as "Lakdi Pool"; it was reconstructed as an Arch Bridge in the year 1949-50 by PMC In order to cater to the needs of growing transportation. PMC took up several bridge projects over the Mula-Mutha River, which were successfully completed.

- Chhatrapati Rajaram Bridge.
- Yashwantrao Chavan Bridge.
- Maharshi Vitthalrao Shinde Bridge near Balgandharva.
- Dengale Bridge.
- Yerawada Bridge.
- S.M. Joshi Bridge.
- Kakashaheb Gadgil Bridge.
- Shivaji Bridge.
- Harris Bridge.
- Sangam Bridge near R.T.O.
- Bridge Connecting Kalyani-Nagar to Koregaon Park.
- Rajiv Gandhi Bridge at Aundh
- Bridge connecting Mundhwa and Kharadi.
- Sangamwadi (Work in progress)
- Ashtabhuja Devi
- Wellesley Bridge

Source: Road Department, PMC

Flyovers

BIRD'S EYE VIEW OF CONSTRUCTION OF FLY OVER BRIDGE AT SASWAD JUNCTION ON SOLAPUR ROAD

Along with bridges, the MSRDC has also constructed a few flyovers in the city. The details are:

Completed-

- Seven Love Chowk
- Hadapsar- Saswad Phata
- Karve road -Paud road

Maharashtra State Road Development Corporation (MSRDC) will implement the following projects in and around Pune in the near future.

- Swargate.
- Balgandharva.
- University and Senapati Bapat road.
- Simla office Junction.
- Nehru Road Junction.
- Nalstop Junction
- Rahul Talkies Junction.
- Vetal Chowk.
- Alka Talkies Junction. Panmala Sinhgad Road.
- Mundhwa.
- Sancheti Hospital Junction.
- Marked Yard Junction.

Source: Road Department, PMC

The foundation for the University flyover was laid on July 17, 2004 by the State's Honorable Chief Minister.
Source: Traffic Department, PMC

Railway Flyovers

For building Railway Flyovers, the land acquisition is done by the PMC and construction is done by MSRDC.
Under this same sscheme, the construction of Mundhwa, Sasane Nagar and Uday Baug Kawde Road railway flyovers will be done by MSRDC.

Widening of Railway Fly overs

- Wadia College (Work in progress)

Other road works

The PMC has undertaken a few other road works, the details regarding the same are given in Table 9.2

Table 9.2 Status of work

Name of the Road	Status
Mundhwa- Kharadi Road.	Completed
Katraj-Kondhwa-Hadapsar Saswad Road	Work in progress
Widening of Wakad-Aundh Road	Completed
Baner Road	Completed

Source Traffic Department, PMC

Parking

Everyday approximately 435 new vehicles are registered in Pune City, which calls for 0.25 hectares of parking space. It is roughly estimated that out of 8760 hours in a year, the car runs an average for only 400 hours, leaving 8360 hours when it is parked. Hence, PMC has to provide the city with large parking places to avoid congestion on roads.

Table No. 9.3 Details of Parking Lots

Sr. No.	Name of the Lots	Total cost (Rs.)	Area (m^2)	Capacity Two/Four Wheelers	Status
1.	Minarwa near Mahatma Phule Mandai.	1.10 Crore	5000	1000/200	Under Construction
2.	671,Narayan Peth, Opp. N.M.V School (Mechanized)	1 Crore 5 Lakh	480	-/44	Proposed
3.	Aryan near Mahatma Phule Mandai.(3 Floors)	90 Lakh	5000	1000/200	Completed
4.	Sambhaji Park	1.05 Crore	-	-/44	Proposed
5.	Vaikunth Smashan Bhumi	24 Lakh	5000	1000/250	Completed
6.	Bhau Maharaj Bol	2 Lakh	200	70 /-	Completed
7.	Sangam Ghat	60 Lakh	1000	70/15	Completed
8	Hamalwada, Narayan peth	94.00 Lakh	4500	900/180	Completed
9	PMC parking	150.62 Lakh	4800	800/80	Completed
10	Petit estate	18.15 Lakh	3500	-/200	Completed
12	Dhankwadi Octroi	54.0 Lakh	12000	300 trucks	Completed
13	Moledina hall (Multi Storied)	375.0 Lakh	-	1350/400	Proposed
14	Valenkar High School (Narayan Peth)	6.0 Lakh	1600	300/100	Completed
15	Natraj parking (1 floor)	6.0 Lakh	2000	400/130	Completed

Source Traffic Department, PMC

MULTI STORIED PARKING AT MANDAI

PARKING TERMINUS FOR TRUCKS AT DHANKAWDI

Signals

Signals are very important for the effective regulation of traffic in highly congested chowks. As the traffic in the city is increasing and many rotaries prove insufficient, the traffic department has overseen the installation of several signals in the city. At present, Pune has a total of 120 signal points. Some of the traffic signals are switched on only during peak traffic hours.

Junction Survey

To study the volume of vehicles on a road, the vehicles are measured in passenger car units. Turning movement counts were conducted for 8 hours of the day. 4 hours in the morning from 8.00 a.m. to 12 noon and 4 hours in the evening from 4.00 p.m. to 8.00 p.m. Total 8 hours' volume and percentages of different types of vehicles is mentioned in Table 9.4.
A survey was carried out for the passenger car units in the year 2001. The details are as follows:

Passenger Car Unit (P.C.U) - When the traffic is composed of different types of vehicles, for the convenience of counting traffic, it is converted to equivalent passenger car units (P.C.U's), by using certain equivalency factors. This flow is expressed in vehicles per hour or vehicles per day.

Table No. 9.4 Passenger Car Unit

Name of Junction	8 hrs. Vol. In PCU	Peak Hour Vol. PCU	Percentage
Baner	10917	1569	14.4
Lower Chandani chowk	15778	2193	13.9
Upper Chandani chowk	9212	1314	14.3
Warje	21956	3335	15.2
Wadgaon (BK)	21542	3258	15.1
Wadgaon (Dhayari)	14400	2150	14.9
Ambegaon	14719	1914	13.0
By Pass Junction Katraj	30857	3791	12.3
Katraj	24814	3528	14.2
Kondhwa	7829	1116	14.3
Mohammadwadi	8817	1194	13.5
Manjri- Solapur road	19088	2654	13.9
Mundawa	12256	1933	15.8
Wadgaon sheri	7912	1088	13.8
Chandan nagar	21753	3220	14.8
Lohegaon	5050	948	18.8
Dhankawadi	6534	988	15.1

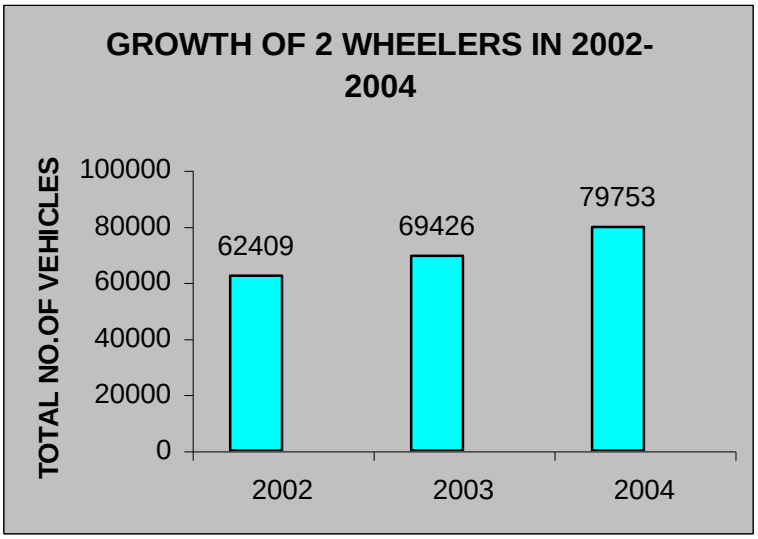
Source: Traffic Department, PMC

The number of 2 wheelers has increased by nearly 10000 since 2002. It can be seen that motorcycles are the preferred type of two wheelers found on road. This rise in the number of vehicles implies greater exhaust emissions.

Table No. 9.5 Two Wheeler Vehicles registered in the year 2002-2004

Sr. No.	Type of Vehicle	No. of vehicle Registered in 2002	No. of vehicle registered in 2003	No. of vehicle registered in 2004
1.	Motor Cycles	46625	48466	56018
2.	Scooters	10357	14244	15678
3.	Mopeds	5427	6716	8057
	Total 2 wheelers	**62409**	**69426**	**79753**

Source: Traffic Department, PMC



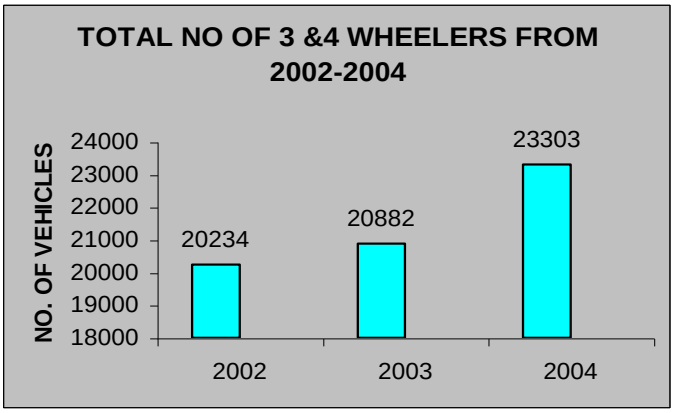
Source: Traffic Department, PMC

The number of three and four wheelers Pune roads has seen a rise in the types of vehicles and also the number of three/four wheelers. The rise indicates more people settling for cars instead of two wheelers. Though this can be interpreted as an increase in the living standards, it also indicates the congestion, which will arise because of the same.

Table No. 9.6 Three and Four Wheelers registered in 2003-2004

Sr. No.	Type of vehicle	2002	2003	2004
		No. Vehicles Registered	No. of Vehicles Registered	No. of Vehicles Registered
1	Cars	11010	11125	13464
2	Jeeps	1813	1638	1688
3	Stn. Wagons		3	2
4	Taxies carbs	259	485	678
5	Auto rickshaw	3046	3062	2124
6	Stage carriage	28	282	719
7	Contract carriage	119	249	219
8	School buses			160
9	Pvt. Ser. Vehicles			23
10	Ambulances	24	19	21
11	Trucks and lorries	523	548	708
12	Tankers	77	54	111
13	Del. Van (4 wheelers)	740	894	1115
14	Dev. Van (3 wheelers)	1323	1778	1806
15	Tractors	659	379	245
16	Trailers	586	341	195
17	Others	27	25	25
	Total	**20234**	**20882**	**23303**

Source: R.T.O. Office



Source: R.T.O. Office

As shown in the graph, the number of 3-4 wheelers has increased since 2002. This rise could be a reason for the rise in pollution levels within the city (refer chapter on pollution).

Law enforcement

Patrolling the roads is as important for reducing traffic-related problems as is infrastructure development. The RTO is very active in doing the first and has penalized 24,529 defaulters in the year 2003-04

Table 9.7 No. Of offences recorded in the year 2003-2004

Sr. No.	Offence	Number of Cases
1	Without license	3618
2	Certificate of fitness	4048
3	Issue of C.F.C.	1016
4	Permit	3704
5	Insurance	4463
6	Overload passenger vehicle	1044
7	Overload goods vehicle	3635
8	Suspension due to non-registration	820
9	Clandestine operation	2181
	TOTAL	**24529**

Source: RTO office.

The traffic department also holds the right to penalize people who do not follow other simple traffic rules, not directly related to driving. These offences though seemingly minor can help in making the traffic free flowing. The traffic department collects the fines from these defaulters and the details regarding the same are given in the table below.

Table 9.8 Amount collected by the Traffic Dept.

Sr.No.	Type of offence	2003		2004	
		No. of cases	Amount collected (Rs)	No. of cases	Amount collected (Rs)
1.	Rash driving	182	497350	196	98000
2.	Horn	285	97950	44	11400

3.	Illegal Public transportation	1571	1557000	419	418100
4.	Extra Passengers	6251	349250	3244	1834500
5.	Zebra crossing	1793	179000	270	45050
6.	Signal cutting	31584	3141150	22008	2109350
7.	Lane cutting	2103	223900	342	33650
8.	No entry	1945	986200	6107	603800
9.	Corner parking	8947	1163300	3025	118600
10.	Mobile	7482	794950	4576	466900
	TOTAL	**62,143**	**85,42,430**	**40231**	**5,176,364**

Source: Traffic Commissioner, Pune

Accidents and Fatalities

Though the number of people killed on city roads continues to decline over the years (refer table 9.9), finding solutions to reduce the number of fatal mishaps are still a traffic planner's nightmare. Police officials claim that the traffic branch can do very little until proper bypasses and outer ring roads are constructed. Statistics reveal that trucks and other heavy vehicles are involved in almost 50 percent of the fatal mishaps. The traffic department feels that if arrangements are made to divert the heavy traffic around the city, the number of road mishaps could definitely be reduced. But the corollary to this argument is that the city should have bypasses and ring roads. The city, on an average has three fatal mishaps every 10 days besides about 12 serious road accidents. Fatalities account for a staggering 60% of all accidents within the PMC limits.

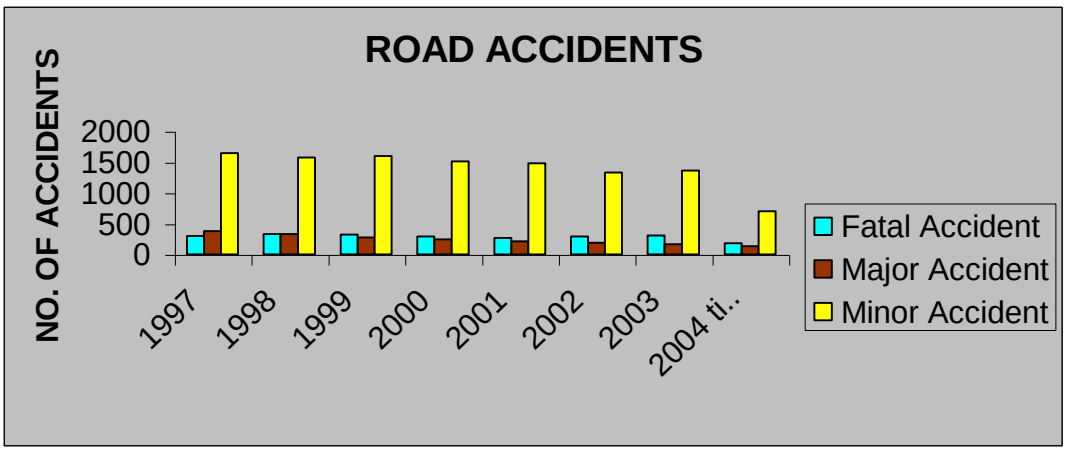
Accident Studies

The table below shows accidents that occurred in Pune City, from 1997 to 2004 (till June). It shows a reducing trend in accidents over the last few years.

Table No. 9.9 Road Accidents

Sr. No.	Year	Fatal		Serious		Minor	
		Accident	Dead	Accident	Injured	Accident	Injured
1	1997	302	320	376	457	1644	2047
2	1998	334	369	329	405	1574	1873
3	1999	325	371	273	386	1598	1944
4	2000	288	306	245	320	1510	1922
5	2001	268	282	210	241	1479	1813
6	2002	293	309	186	201	1331	1714
7	2003	305	204	168	207	1360	1521
	2004 till June	180	187	130	150	697	734

Source: Traffic Commissioner, Pune



Source: Traffic Commissioner, Pune

Reasons

The accidents are caused due to rash and negligent driving, overtaking, defying traffic rules, technical snags in vehicles and driving in inebriate conditions. But most of the fatal accidents occur mainly due to the heavy traffic. It can be seen that their concentration is increasing every year (refer table 9.6). Use of sub-standard construction material and the absence of safety measures while re-asphalting roads are another cause of the accidents.

Traffic and Transportation

Pune faces a major problem of congestion on its narrow roads within the city. This problem is aggravated by an increase in the number of private vehicles and less dependency on public transport.
A study carried out by the Rajashree Parmar Foundation shows that in the last four decades the population of the city has increased 4 times, whereas the vehicle population has increased 87 times. In spite of this the length of roads including the carriage way has increased only 5 times.

The option of increasing the road surface is not feasible. At present the roads and flyovers are the most expensive of all infrastructures provided by the PMC. Any increase in the road surface will directly increase the level of air pollution, which is quite high now. Neither of the two solutions will reduce the traffic congestion, on a long term basis. The evidences from the other parts of the world show that new roads act as magnets for even more vehicles.

Therefore, there is no alternative to choosing the other option of traffic reduction, which can be achieved through 'Traffic Demand Management (TDM)' and optimization of existing road surface through a more rational and efficient flow of traffic. This is the need of the hour and must be tackled on a war footing if we are at all serious about the problem of traffic.

Traffic Condition in Pune

TRAFFIC JAM

There are several reasons for deterioration of the traffic status in Pune. These can be outlined as:

1. There is no segregation of slow moving non-motorable traffic and fast moving motorable traffic. Unless this is achieved, the traffic condition is bound to remain unsatisfactory. Road hierarchy, adequate road width, central dividers and channeling islands at junctions are some of the measures necessary.
2. There are innumerable intersections in the road network and no access control. This increases conflicts, reduces vehicle speeds, and also increases the chances of accidents.
3. Due to the lack of parking space in majority of the private premises, vehicles are parked on the kerb sides of roads hampering free flow of traffic.
4. There is absence of road hierarchy in the old PMC area. There is no provision of service roads along major arterial roads.
5. If wider footpaths are proposed (more than 2M wide), these are likely to be encroached by hawkers and hutment dwellers. Footpaths will therefore be restricted to 2-M width.

Work done by PMC

- There is a proposal to build a Vehicular Subway near Parnakuti Chowk at Nagar Road and a Pedestrian Subway at Zilla Parishad Chowk.
- Every week, a traffic awareness visit is arranged for School children at the Traffic Park of Chittaranjan Vatika by P.M.C.

- **Chowk Beautification**

Dhanukar colony chowk, Blue Diamond Chowk, Katraj Chowk, etc.

- **Road Dividers and Railings**

Shivajinagar Court, Bibvewadi road, Cental building, Jangli Maharaj road, Kondhwa road etc.

- **Setting up of Timers at the Signal:**

Kunte Chowk, Vetal Chowk, Parihar Chowk, Modern Café Chowk, Good Luck Chowk, Sanas ground chowk Swargate to Katraj road etc. P.M.C. has proposed to set up Area Traffic Control System for Pune City. Centrally located computer will be controlling the signals of various junctions depending on the flow of traffic at the junctions. DIT (Dept. of Information Technology) and C-DAC are helping the PMC with the same.

- **Parking lots**

Parking facility already exists at the centrally located Aryan Theatre but was inadequate and there was no place for parking around the Mahatma Phule

Mandai. To improve the situation, single floor parking facility is being developed on the ground floor at Aryan Parking lot.

- **Elevated parking lots on BOT principal**

There is a proposal to build ten elevated parking lots on experimental basis based on the BOT principle along the Jangli Maharaj Road, Fergusson Road, Alka Talkies Square, Mandai (Shanipar and Minarva Square), Shivaji Nagar, Pune Railway Station, Sarasbaug.

- **Truck terminus**

Plots of land measuring 10,000 square meters at Dhankawadi, 16,000 sq. meters at Katraj, 60,000 sq.meters at Hadapsar, and 16,320 sq. meters at Balewadi have been reserved for constructing truck terminuses.

- **Light Railway Transit**

The Pune and Pimpri-Chinchwad Municipal Corporations have jointly undertaken the Light Railway Transit (LRT) Project, considering the ever-expanding traffic problem of the twin cities. A railway enterprise owned by Government of India called 'RITES" has prepared a project report. This project would be executed on BOT basis. A total expenditure of Rs. 4326 Crores is expected for the same.

- **Sky Bus Project**

A mass transport, in the form of Sky bus, promoted by the Konkan Railways is proposed to solve the transportation problems in the congested city areas of Pune. Structures above the road dividers will be constructed, on which the railway tracks will be developed. Cable car operator bogies will travel on these tracks. Existing roads can be used for this system to obviate land acquisition without disturbing the existing traffic system. The estimated cost of this system will be around Rs. 50 Crores per Km. Konkan Railway is working on a detailed project report for the sky bus project in Pune City.

- **Area Traffic Control System**

Electronic Research and Development Center of India, (ER and DCI) at Tiruvanantapuram, a scientific society under the development of Information Technology, Ministry of Communication and Information Technology, Government of India in association with the PMC has decided to develop an Area Traffic Control System (ATCS) of city roads. This will help in Managing the road traffic in Pune more efficiently and reduce frequent stops and delays. It has a direct effect on the level of pollution created by the automobiles and fuel consumed by them. Due to this system the citizens will save the time spent on traveling. The project is expected to cost Rs. 3 Crore.

Pune Municipal Transport

Urban area plays a major role in national development – economic, social, political and cultural. Sustainable development and management of urban areas is crucial for national development. In turn the sustainability of urban areas, their productivity and their quality of life of its people depends on the quantity, quality, efficiency and effectiveness of their infrastructure.

The importance of an efficient and effective transport system to support and promote rational development of urban areas need hardly be stressed. It is noted, "Urban transportation is the most important single component instrumental in shaping urban development and urban living." A sizable proportion of work trips in our cities is concentrated on the city centre with its commercial, service, government and distributive trade activities. Impacts of such activities on travel characteristics, particularly in medium and larger cities, have strong emphasis on radial movements towards the city centre and dependence on road based public transport, the competitiveness of a city's economy suffers due to adverse effect on labor availability, and individuals spend much more time and money commuting.

Other than the economic benefits, the public transport also fetches social environmental benefits contributing to the overall city development. The following benefits of PMT system can be listed:

- Mobility of masses, in the interest of better mobility and on equity basis.
- Better road safety of citizens and minimization of vehicular traffic and congestion.
- Prevents the health hazards due to air and noise pollution's conserving the city environment.

In fact, a city bus system is an infrastructure for uniform and effective development of the city and to elevate and improve the standard of city life. It is important to appreciate the dimensions of urban travel demand and identify practical and effective policies for its planning, development, operation and management.

Importance of Bus Transport System in Mass Transit System

While most transport systems are made up of modes – walking, bicycles, bus, trains, autos and boats, buses form the backbone of most urban transport systems.

Buses are an affordable means of transportation, and provide a high degree of flexibility and convenience when compared to other means of mass transport. They are relatively easy and inexpensive for government planning bodies to organize and implement, and are amenable to operation by the

private sector, competitive practices, changing conditions. Through appropriate management, they can effectively carry as many as 20,000 passengers per hour in high demand corridors, or can serve sparsely populated areas cost effectively.

Formation of city bus transport in Pune

With the spread of the city, distances and accessibility became longer and the induction of auto modes became inevitable. Thus, the Pune Municipal Corporation established a separate body called Pune Municipal Transport (PMT) in 1950, under Bombay provincial Municipal Corporation Act, 1949 with the objective of providing better economic accessibility within the city. It serves the areas under the Pune Municipal Corporation.

Infrastructure facilities of PMT

Start with a fleet size of just 50 buses Pune Municipal Corporation has grown up into a big public sector organization with 849 buses, 7593 employees catering 5.5 lakh population per day. Presently if has a daily income of around 30 lakhs.

Table 9.10 Infrastructure facilities

Infrastructure facilities	PMT
Number of buses	849
Number of employees	7593
Number of workshops	1
Number of Depots	6
Bus: staff ratio	1:9

Source: Pune Municipal Transport

The total operational area of Pune Municipal Corporation is 6500 sq. Km while the total route length is 2820 Kms. Total numbers of routes in operation are approximately 205.

Public Transport Scenario in Pune

Pune Municipal Corporation (PMT) was established under the umbrella of Pune Municipal Corporation (PMC). PMC has never really considered PMT as its department. In fact, through the operation of PMT, PMC has commitment towards the adequate and efficient supply of public transport service to the commuters, as a public utility.

A uniform development of city is possible only through an effective transportation system, which is accessible, adequate, efficient and affordable and ensures mobility of masses. Road network in a city, traffic management and road safety are duties of the city administration. These objectives can be achieved only by an efficient city bus corporation, which can improve mobility with better speeds and less accident. Moreover, protecting the health of citizens and keeping hygienic environment are the

obligatory functions of the city administration. Flood of auto vehicles on city roads causes severe air pollution and intense noise pollution. It should be prevented by city administration. This objective can only be served by efficient bus system again, which will effectively minimize the use of small capacity and other modes of transport.

Table No. 9.11 PMT Buses purchased in the given year

Model	No. of Buses
1984	2
1986	41
1987	71
1988	29
1989	44
1990	53
1991	30
1992	111
1993	54
1994	78
1995	91
1997	50
1998	--
1999	--
2000	136
2001 - 2002	100
2003	N.A.
2004	N.A.

Source: Traffic Department, PMC

Table No. 9.12 PMT Buses Age as per in the year 2003

Buses driving for years	No. of Buses
1 to 10 Years	409
11 to 14 Years	238
15 to 20 Years	143
Above 20 years	59
TOTAL	**849**

Source: Traffic Department, PMC

Why a public transport system is needed in a city?

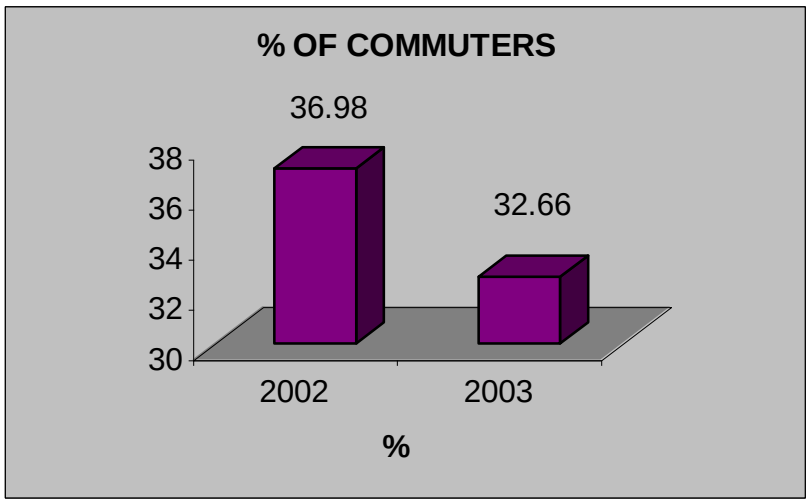
- Rapid physical and economic growth of the city
  The city of Pune consists of three main areas, which needs connectivity with each other as well as within these areas.
- Economic activities in PMR region.
  The growth in commercial establishments, which includes the shops, hotels and theatres, has been with their employment potential, which has almost doubled in last 10 years. The growth of these kinds has increased the trip generation in the highly congested areas of old city like Laxmi Road, Kumthekar road, Tilak Road as well as on the newly developed commercial areas like Deccan, Paud Phata, Yerwada, etc.
- Problems caused in absence of an efficient PT system in the city

The rapid increase in the number of private mode of transport and illegal modes of the transport has caused less preference for the public bus transport in the city. There is high demand for a convenient and frequent accessibility in the city. This eventually gives rise to other environmental problems like noise pollution and air pollution. It adds up to the congestion and traffic on the roads. If a proper system of public transport is evolved all the above problems can be minimized to a large extent.

- Percentage of people using public transport
  Considering the present situation the important factor justifying the importance and need of the mass transport system.

Number of Commuters using the PMT

According to the statistical information from the Pune Municipal Transport, out of the total population of 20.47 lakhs within the Pune Municipal Corporation area about 36.98 % of the people used bus PT system at daily basis in the year 2002. While in the year 2003 it toppled down to about 32.66 %. Inspite of this decrease there are a considerable number of people who are reliant on the public buses for their daily commuting needs. Hence, the city is demanding an efficient mass transport system, which can be created if properly managed and operated.



Graph: % of total commuters using PMT buses

Source: Pune Municipal Transport

Table 9.13 Types of Income

Types of income	2002 – 2003%	2003 – 2004 %
Fare collection	65.72	67.24
Student and general passes	17.46	10.12
Occasional contracts and luxury buses	3.02	1.05
Rent from the property	2.47	1.15
Financial aid from municipal corporation	0	8.66
Grant from municipal corporation (for losses)	11.03	2.15
Others	1.41	2.03

TOTAL	**100**	**100**

Source: Source: Pune Municipal Transport

Table 9.14 Types of Expenditure

Types of expenditure	Year 2002 - 2003	Year 2003 – 2004
Personnel costs	48.27	44.26
Taxes	2.64	5.07
Material costs	37.31	26.92
Interest	4.16	6.42
Depreciation	5.41	4.15
Misc. and others	2.21	5.89
TOTAL	**100 %**	**100 %**

Source: Source: Pune Municipal Transport

Recommendations for improvement of mass public transport in Pune:

- Public transport should not be considered as an inefficient activity
- An institutional framework needs to be set up for the management and funding of urban transport system.
- Restructuring the local level framework, rules and regulations.
- Alternative sources of funding should be opted for funding the public transport system.
- Facilitation of private enterprises and investment in the Urban Transport Development and Operation.
- Encourage a shift in demand from the private mode of transport to public transport.

Suggestions given by the Municipal Commissioner, Dr. Nitin Kareer on the meeting held at YASHADA (Yashwantrao Chavan Academy of Development Administration), on 20th July 2004.

Dr. Nitin Kareer suggested improving the public transport system by increasing the number of buses, which runs economically. Traffic and parking are two concerns that need to be addressed immediately. With more than 13.54 lakh cris- crossing the narrow roads of Pune, things are becoming increasingly difficult. Nearly 2.25 lakh people come, leave or cross Pune, which adds to the traffic density pressure. Parking on both sides of the road just aggravates the situation was said by him. It was suggested that buses in Pune should be in a loop system. Under this system, bigger buses are run on longer routes with enough carriageways while smaller vehicles may pass through narrow roads.

With respect to Pune, smaller buses can be run in Old City area while bigger buses ply on longer routes. The loop system, besides de – congesting the roads, will also mean that buses run by Pune Municipal Transport (PMT) make less pollution, if any. Given the fact that only 15 out of 150 routes are profitable for PMT, the loop system justifies restricting bigger buses only on longer routes. It was suggested that PMC should allot a big corpus to the PMT to acquire more buses. But the only condition for PMT would be to run these buses on breakeven basis to justify the burden on exchequer. It was suggested that instead of running an inadequate fleet with huge losses, its

better to have extra buses, which provide reliable service and run at breakeven.

CHAPTER-TEN

Gardens

"*Love for nature resides amongst all of us.*"

Gardens in any city play a very important role. They increase the aesthetic value of the city. They also help in improvement of the air quality, as trees are known to purify foul air. Gardens are also a tourist attraction and thus, are an economic asset for the city. People visit these gardens, refresh themselves and enjoy nature. The garden department of PMC has taken up different works for the improvement of present gardens, developing new gardens and also for afforestation. In the last decade many "Green Pune" schemes were undertaken and several public gardens were developed.

A master plan for activities of this department has been prepared after considering the already existing trees and the natural slopes of the areas. This plan is important not only from the environmental perspective but also from the tourism point of view. The PMC has also taken up a beautification scheme under which the 2.5 km of Ambil nala and 4.5 km of Bhairoba nala will be developed. Because of this, barren land stretches around the nala will be greened and also the encroachment near the nalas will be restricted. This will help in the overall improvement of the nala ambience. Similar schemes have been implemented at various nalas in Kothrud and also along a part of the Nagzari nala. In this way, the PMC has developed 64 gardens.

Table No. 10.1: List of developed gardens

Sr. No.	Gardens developed by the PMC	Approx. Area (hectares)
1	Sambhji garden – Deccan Gymkhana, Shivaji nagar	4.8
2	Katraj Vanvihar – Katraj	66
3	Kamala Nehru park – Erandwane, Botanical garden	1.6
4	Chittaranjan Watika garden – Shivaji nagar, Hareram Harekrishna path, senior citizen park	2
5	Narveer Tanaji garden – Shivaji nagar	0.4
6	Dr. Jaiprakash Narayan garden – near Pune Railway Station	0.4
7	Dr. Babasaheb Ambedkar garden – Sasoon Road	0.2
8	Mahatma Ghandhi garden – Bundgardern	2.8
9	Dr. Chima garden – Yerawada	0.8
10	Jijamata garden-Kasaba Peth	0.2
11	Sarasbag – Sadhashiv Peth – Seasonal flowers	3.6

Sr. No.	Gardens developed by the PMC	Approx. Area (hectares)
12	Shrimant Ghorapade	1.61
13	Shahu garden – Somwar Peth	1
14	Lt. Tatyashaheb Thorat garden – Kothrud	1.6
15	Kamalnayan Bajaj garden – Pune – Mumbai Road	0.6
16	Marutrav Gaikwad garden – Aundh	0.8
17	Chhatrapati Shivaji garden – Bopodi	0.6
18	Late. Shivarkar garden – Wanawadi	2.8
19	Maharana Pratap garden – Sadhashiv Peth	1
20	Late. Kakashaheb Gadgil garden – Padmavati	0.4
21	Savitribai Phule garden – Tadiwala Road	0.4
22	Samarth Ramdas garden – Wadarwadi	1.2
23	Sant Rohidhas garden – Gurunanaknagar	0.2
24	Late. Yashvantrao Chavan garden – Parvati Darshan	0.8
25	Late. Rajivade garden – Sahakarnagar no. 2	0.6
26	Hutatma Smarak - Yerawada	1.4
27	Limka Jogging Park – Bundgardan	1.6
28	Samarth Akalkot Swami Children garden – Bhavani Peth	0.6
29	Late. Vasantrao Eknath Bagul garden – Sr. no. 43/ A, Sahakarnagar	3.2
30	Dr. Rammanohar Lohiya garden – Hadapsar	2.4
31	Lokmanyanagar Jogging park - Lokmanynagar	1.2
32	Late. Raja Mantri garden – Erandwane	0.4
33	Sr. no. 191, Yerawada Housing Board	0.6
34	Late Anuraya Bankar garden – Matang Vasti –Hadapsar	0.8
35	Krantishlaka Aruna Asafali garden, Maharshi nagar Housing board, Maharshinagar	0.2
36	Paigambarvasi Haji Gulam Rasul Abdulbhai Pansare Children garden, Maharshinagar, Gultekdi	0.2
37	Gul Punavala garden – Gultakdi Salisbari park, plot no. 467	1
38	Late. Shankarao Ramchandra Kavre Udhyan – Tavre colony, Sahakarnagar	0.6
39	Shri. Sachin Tendulkar Jogging Treck – Rajendra nagar	0.2
40	Late. Sanjay Mahadev Nimhan garden – Someshwarwadi, Pashan	1.6
41	Hajrat Shidhiki Shababa garden and lake – B. J. Medical, Pune	1.4
42	Dr. Shamrao Kalmadi garden – Ekbote colony, Pune	0.4

Sr. No.	Gardens developed by the PMC	Approx. Area (hectares)
43	Shahu Modak garden – Koregaon park, Pune	0.6
44	Damodhar Galinde Jogging Treck, Kalyani nagar	1.4
45	Let. Bhimathai Thakare Children garden – Kasba peth	0.8
46	Mother Teresa gargen, Dattawadi	0.6
47	Mahatma Jyotiba Phule-Phule Nagar	0.5
48	Jagatguru Maharshi Valmiki Garden- Mohan Wadi	1
49	Vijayanagar Colony Garden- Sadashiv Peth	1
50	Sant. Dnyneshwar Garden- Erandwane	0.6
51	Late Jayantrao Tilak Rose Garden- Sahakarnagar	1.2
52	Sant Gajanan Maharaj Garden- Gokhalenagar	1.6
53	Lakaki, lake Garden, Model Colony	2
54	Gokhale Nagar Hou. Board, Sr. No. 87	1.6
55	Wakdewadi, Sr. No. 20+22	1
56	Erandwane, Sr. No. 37	0.2
57	Pashan Sr. No. 111, part No.18/1, Pashan lake	2
58	Vijaynagar colony, Plot No. 32 & 32B	0.4
59	Hingane, Sr. No. 61/1	1.6
60	Indraprastha, Yerawada	3.2
61	Major Pradeep Thathawade Garden	1.2
62	Madhavrao Shinde garden	1.2
63	Shivaji housing society garden	1.2
64	Sathe Colony garden	N.A.

Source: Garden Department, PMC

MOTHER TERESSA GARDEN

SARAS BAGH GARDEN

PMC office gardens

The PMC has also developed a number of gardens within their office premises. The details regarding these gardens are given in the following table.

Table No. 10.2 Pune PMC office premise gardens (PMC Properties)

Sr. No.	Name of gardens	Approx. Area (Hectares)
1	PMC Bhavan Shivajinagar	0.4
2	Vaikunth Smashan Bhumi	2
3	PMC Mudranalaya	0.2
4	PMC Commissioner house	0.8
5	Swargate Water kendra	0.4
6	Sonavare Maternity garden	0.2
7	Kamla Nehru Hospital	0.2
8	Balgandharva Rangmandir	0.4

9	Samata Bhumi – Ganj Peth	0.2
10	Shanivarwada	0.4

Source: Garden Department, PMC

Proposed Gardens

Although the city has 64 gardens, which are developed and maintained by the PMC, more gardens are proposed to increase the number of open green spaces in the city. The PMC needs to be credited for showing a futuristic attitude due to the same.

Table No. 10.3 List Proposed Garden for Year 2003-2004

Sr. No.	Proposed gardens	Approx. area (in hectares)
1.	Mutha river garden , Babavhire Bridge to Mhatre Bridge	1.5 Km
2.	River side Garden, Mutha garden-30 m width.	Length 1.5 Km
3	Parvati Survey No.10,11,12 Proposed hillside garden	0.6
4	Janata Vasahat to Parvati	1.6
5	Wanawadi Shivarkar Garden ,extenssion	2
6	Vimanagar – Lohagaon Sr. no. 205	1.4
7	Chandannagar Kharadi, Near Ayruved Shala	1.2
8	Tingare nagar, near Pratiknagar	0.8
9	Tingare nagar , Morya udyan	0.6
10	Vadagoansheri Bombay sappers colony	1.2
11	Patwardhan Bagh garden (Beautification, Play equipment)	1.2
12	Pashan S.no.140/6 garden (Beautification, play equipment	0.6
13	Kachara depot, Kothrud	11.6
14	State Bank nagar Pashan	1.2
15	Pashan S.No. 111/8	1.2
16	Mayur Colony Kothrud	0.2
17	Bhusari Colony S.No. 94,95,96,97. Open plot no. 2	1.2
18	Bhusari Colony S.No. 94,95,96,97. Open plot no. 3	1.6
19	Ayurvedic Garden, Kondwa	1.8
Sr. No.	**Proposed gardens**	**Approx. area (in hectares)**
20	Riverside garden, near Omkar temple, Narayan Peth	2.4
21	Sathe Colony, Shukrawar Peth	0.8
22	Garden Rajendra nagar, PMC colony	0.4
23	Children Environmental information Park at Duttawadi	0.8
24	F. P. No. 427, Maharshinagar	19.28
25	Sr. no. 639/666, Appar, Indiranagar garden	0.8
26	Bibvewadi Otha	0.2
27	Sarang Soc. Near Sahakarnagar garden	5 Are

28	Ashok Soc. Near Sahakarnagaar garden	5 Are
29	P.L.Deshpande Garden at Sinhgarh road	14
30	New garden at Wadachi, Ganapati, Dattawadi	N.A.
31	Swami Samarth Udhyan	N.A.
32	Peshave garden	N.A.

Source: Garden Department, PMC

Table 10.4 Locations under development

Sr. No.	Locations under development	Approx. area (in hectares)
1	Kothrud Kachra Depo Garden	12
2	Energy Park- at Peshwa Park	2.4
3	Rail Museum- Katraj	3.2

Source: Garden Department, PMC

PATWARDHAN GARDEN

Nalla Gardens

The PMC has recognized that the rivers and the nallas of Pune are in a dilapidated condition. Taking this into mind, the PMC has started introducing Nalla Gardens over many Nallas within the city. These Nalla Gardens are based on the concept of the Ohso Nalla Park, in Koregaon Park.

Table No. 10.5 Existing Nalla gardens

Sr. No.	Existing Nalla gardens	Approx. length
1	Ambilodha beautification (Nala park), Sahakarnagar	2.5 K.M.
2	Bhairoba nala beautification (Nalapark),Kondhaawa	1.0 K.M.
3	Nagzari nala	0.07K.M.
4	Kothrud space (2 nala's)	-
5	Late Minatai Thakere	-

Source: Garden Department, PMC

NALLA GARDEN SAHAKARNAGAR BHIROBA NALA AFTER BEAUTIFICATION

Table No. 12.6 List of proposed Nalla garden for year 2003-2004

Sr.No.	Name of the nalla gardens	Length
1	Kasturbha Society,Vishrantwadi	L-600m
2	Nagjira Nala, Nashtra udyan, Marharchi Nagar	L-250m
3	Ambilodha, Mitra mandal colony	L-700m
4	Bhairoba nala,Kondwa	L-500m
5	Nagjira nala, Genesh peth ,Behind Ayurvadic college	L-500m

Source: Garden Department, PMC

Renovation Works

The PMC is also carrying out renovation of a few gardens, which were in dire need of repairs. This is undertaken with an aim of maintaining all the gardens in the city, to take full advantage of the open spaces.

Zoos

The Peshwe park zoo is now converted into a garden cum playground. The animals are shifted into a bigger zoo called the Late. Rajiv Ghandhi Zoo and Wild animal research center, located at Katraj. This zoo is build with an aim of improving the living conditions for all the animals and also to develop a wildlife research center.

Table No. 10.7: List of Zoo in PMC

Sr. No.	Name of the zoo	Approx. Area (in hectares)
1	Late. Rajiv Ghandhi Zoo and Wild animal research center, Katraj	66

Source: Garden Department, PMC

LATE. RAJIV GHANDHI ZOO AND WILD ANIMAL RESEARCH CENTER, KATRAJ

Playgrounds

Playgrounds are as important as garden in the holistic development of any city. Hence, the Garden department also emphasizes on maintaining some of the playgrounds within the city. The playgrounds under the garden department are enlisted in the following table.

Table No. 10.8 List of Playgrounds

Sr. No.	Name of the play ground	Approx area (in Hectares)
1	House no. 1064 to 1068, Sadhashiv Peth, Kavadi	0.4
2	Shukruwar Peth Sr. no. 1154 / 55, 1159 to 1162 (T.	

	P. scheme no. 3)	-
3	Tulshibagwale colony, Sahakarnagar	1.2
4	Viman nagar	1.2
5	Mitramandal chowk, Marathon Trust	0.2
6	Sr. no. 85/86, Hadapsar	-

Source: Garden Department, PMC

Other Activities by Garden Department:

1. Flower shows.
2. Drawing competition on the environment.
3. Fort model competition.
4. Games related to planting of tree. ("*Dhava ani Zade Lava"*)
5. "Rhriksa Mitra" Award.
6. Transplantation of trees.

NURSERY ACTIVITY AT KONDHWA

Projects undertaken by the garden department:

- Nalla beautification (proposed 2005)
- River side beautification
  The garden department beautified the Ramnadi – Pashan area
- Road side beautification
  1) Pune Satara concrete road
  2) Bibawewadi – Kondhwa road
  3) Pune Ahmednagar road
  4) Airport road
  5) J.M.road
  6) Karvey Putala to Warji
  7) Gulewani Maharaj Path
  8) Rajwan road
  9) Aundh Concrete road

Road side beautification

The beautification of roadsides is under the control of the garden department. The beautification of roads is done after widening by the road department. It consists of beautifying the central and side dividers by planting lawns, flowerbeds and large ornamental trees. Special provisions are made for the beautification of the dividers, which are about 1– 1.5m in width. Lawns and flowerbeds are also grown in this area.
This project will increase the greenery in the city, which will reduce the air pollution levels. Tree plantation will, in this way, increase the aesthetic and environmental values of the city.

Projects undertaken by the Garden Department for tourism development in Pune City

- **Sanyukth Wan development**
  PMC and the Forest department together, have undertaken a project to develop the forests situated at Bhamburda, Panchgao and parvati. This area comprises of 160 hectares of land. This development will help in promoting the concept of Eco-tourism in Pune, which would generate some income for the city, through tourism.

- **Late Rajiv Gandhi zoological park and wild life research centre, Katraj**
  This is a zoo, developed at Katraj covering an area of 66 hectares. The aim of this zoo is to conserve wild life and create research opportunities. Most of these animals are kept in their natural habitats. A snake park is also built at the same place. A hospital is under construction for the treatment of these animals. The development of this zoological park is an asset for the city as it can increase tourism.

LATE RAJIV GHANDI ZOOLOGICAL PARK

- **P.L. Deshpande Udhyan**
  This garden is proposed on the Singhaghad road, on a 12 hectares area. The development of the internal roads is already complete. The trees inside this garden are planted according to the Mughal and Japanese styles. This garden is being built with an intention of attracting children and old people alike. The development cost of this garden is approximately 5 crores.

- **Energy Park**
  This park is a joint venture between the PMC, State Govt., and the Central Govt. Here, the PMC will be providing the land, and the central govt. will provide the financial help. This park will exhibit instruments using non conventional energy resources. The aim of this park is to motivate children and the people of the city to make use of non conventional resources in their daily lives. The development cost of this garden is approximately 3 crores.

- **Railway Museum**
  The PMC is building this park in accordance with the railway and the Central govt. It would be situated in Katraj covering about 3 hectares of land. Here, the PMC will provide the land, the Railways donate the exhibits and the Central Govt. will again provide financial help. A museum exhibiting rare photographs of the railways is to be developed. This project will take about 2 years cost approximately Rs. 1 crore.

- **Bund garden**
  A ropeway from Bundgarden to the Parnakuti hillock is proposed and the PMC has started the procedure for land acquisition. The budget for this year has already allocated Rs.50 lakhs for the same. This project will be constructed on the basis of BOT. It will act as an added attraction for the tourists visiting the city.

Tree census

Trees are on of the most important elements of a landscape, both due to biomass and diversity. It is observed that there is an increase of about 1 lakh trees every year. For this, the PMC is carrying out plantations along roadsides and on vacant plots. To maintain an environmental balance within the city, schemes like Forest Park on available lands, re-plantation and protection of trees are necessary. PMC should implement these schemes and carry them out on the lands acquired under the river development scheme and also on the Parvati hill. Various NGO's have offered help, and could help in the future for making this a successful possibility.

According to the tree census, the total number of ornamental and fruit-bearing plants in Pune is 32,88,205. The highest number of ornamental plants is found on the land of the Deputy Conservator, Department of Forestry. Highest numbers of fruit bearing plants are found in the Shivajinagar area. It is also observed that there are more ornamental plants than the fruit bearing ones.

Along with the development of gardens in the city, a project for the construction of a zoological park was taken up. The development of the zoological park is a big achievement, as this is a tool to conserve the wild life and increase tourism in the city.

The Osho nala Park is a great pride for the city. The hills of Law College, Symbiosis, Panchgoan, Parvati and Gokhale Nagar (Mafco) are excellent examples of planted forests within the city. Planting of trees is made compulsory according to building laws. Cutting trees without permission is punishable. Gardens like the Rajiv Gandhi garden, Lake Garden along Belsali road and the Yashwantrao Chavan garden at Erandwana not only served as recreational centers but also contributed to the beauty of the city.

Table No. 10.9 List of varieties of trees in PMC gardens

Sr. No.	Local name	Sr. no.	Local name
1	Kate savar, Dev Kapus	32	Undin
2	Bhendi	33	Wel
3	Shirish	34	Fern tree
4	Pangara	35	Shisam
5	Akashling	36	Jangli badam
6	White savar	37	Kadab
7	Gulmohar	38	Parijatak
8	Bhava	39	Pimpal
9	Kashid	40	Vad
10	Kdulimb	41	Gourakh chinch
11	Saman tree	42	Karanj
12	Cordia sebestina	43	Swargataru
13	Jacaranda mimosaefolia (N. O. Bignoniyasiz)	44	Ashoka
14	Sonchafa	45	Palas
15	Panacha Ashoka (Aaspal)	46	Saman
16	Rio trampet flower	47	Dhal tree
17	Sitaranjan	48	Cassia grandis
18	Lignam vita	49	Kanchan
19	Chendufali	50	Persian limbara
20	Brinjal	51	White chafa (Khair chafa)
21	Behada	52	Ranratali
22	Putravati	53	Sagvan
23	Moha	54	Kadulimb
24	Kailaspati	55	Mahogoni
25	Morten Be chest nut	56	Ritha
26	Gliricidia maculata (Mandra Tree)	57	Dividivi
Sr. No.	**Local name**	**Sr. no.**	**Local name**
27	Sterculiaceae	58	Nilgiri
28	Muchkund	59	Bakul
29	Khed sherni	60	Chanderi oak
30	Karnja	61	Rubber
31	Keshri		

Source: Garden Department, PMC

Tree plantation along roadsides

Tree plantation along the roads is an ongoing process conducted by the Garden Dept, PMC. About 200-250 plants were required per side according to the space available. Some sites where the process has started are:

a) Sinhagad Road
b) Baner Road
c) Satara Road
d) Katraj Kondwa
e) Bibvewadi - Kondwa
f) Kondwa - Kharde Road

g) Baner swich Road
h) Nagar Road
i) Solapur Road
j) Warje Malwadi
k) Pashan Road (University to Pashan)

Development of Open space:

Plantation undertaken by the Garden Dept., PMC:

1) Mutha riverside: The plantation work is in process in the area from the Sangam Bridge to Mhatre Bridge. The PMC is also making a fence along the riverside and also constructing a jogging track.
2) Pashan Lake: 60% of the plantation work is completed.
3) Recently PMC has started plantation along Roads, Hospitals, Schools, Open space and barren lands.

Tree Authority

PMC has constituted a Tree Authority, comprising of twenty members including a few elected corporators and a few nominated 'concerned citizens' of the city. This Authority meets from time to time and takes decisions regarding permissions to cut trees etc. This authority implements the Tree Conservation Act of 1975. The citizens of Pune have to pay a tree tax to the PMC under this Act. As per provision of this Act, if any tree is cut without the permission of the Authority, the defaulter can be punished anywhere between Rs.1000 to Rs. 5000 or/and face imprisonment of 7 days to 365 days. The Municipal Commissioner of PMC acts as the chairman of this Tree Authority.

Forest Encroachment

Even as the PMC takes efforts to conserve the forests in the city, they are under immense threat due to the high pace of urbanization. The forests, which cover a total area of 338.64 hectares, are already under encroachments of different types ranging from Slums to domestic schools. The encroachment has already risen to an alarming 13.8 %. The details regarding the forest encroachments are given in table 13.10.

Table No. 10.10 Forest area and encroachment in forest area

Village name	Survey number	Total area Ha.	Encroachment Ha.	Encroachment type
Warje	34	5.85	12	Slums
	35	17.95		
	36	24.91		
Bhamburda	97	55.33	0.40	Quarry
	96	39.33		
Katraj	85	2.37	2.37	PMC water supply
Wanawadi	49	25.52	0.6	Slums
Hadapsar	108,109	22.9	0.27	Slums
Hadapsar	68	34.8	2.0	Slums
	62	7.68	2.0	Agricultural land
Khadki	972	0.29	0.29	Encroachment
Kondhwa (Bk.)	21	11.89	11.89	Encroachment

Wadgaon Sheri	57	2.13	2.13	Slums
	54	1.11	1.11	Cremation
Khadki	304	3.74	1.00	Dwelling
Lohgaon	304	16.00	3.00	Domestic schools
Buhdgaon	78	66.84	8.00	Dispensary, Houses and school
Total		338.64	47.06	

Source: Forest Department

The role of the Garden department in conservation of forests:

- Joint Forest Management:
  The PMC has started a joint forestry practice in the Bhamburda Ban Vihar and Pachgoan Parvati forests from this year.
- The work done by PMC for conservation of forest and hill slopes are as follows:
  1. Strengthening the fencing.
  2. Planting local, indigenous and evergreen tree to attract birds.
  3. Formulation of a committee to encourage people's participation.
  4. Provision of permanent water supply.
  5. Playing equipment for children visiting these sites.

- PMC also encourage private developers to undertake plantation schemes on their lands. A noted example is massive tree plantation on Chaturshingi Hill (opposite NCL). About 40 hectares of private land in the 'Hill top-Hill slope zone' is developed by the owners, M/S Walchan agar Industries Ltd. Garden Department of PMC not only gave technical support in planning the project, but also supplied various types of trees. A joint venture to get the Pashan lake water to a stone quary on the top of hill through a pipeline is being considered. This could help in the process of greening the area, commonly known as Bamburda. This 240 hectares Aundh-Kothrud-Pashan hill range, once well developed, could be a reflection of heaven on the earth.
- PMC has started a Forest Medicine Project at Kondhwa Kausarbag (1 hectare) to provide general information and create awareness about the medicinal values of plants through an awareness centre.

Other Projects undertaken by the PMC:

- The construction of the Railway Museum at Katraj mentioned earlier has already started.
- The development of the riverbed gardens near the Omkeshwar Temple as well as on the land from Baba Bhide Bridge to Mhatre Bridge has started. The PMC is also planning a big garden and a planetarium on the same land.
- The Garden department has taken effort's to convert various nallas (natural drains) into beautiful gardens.

- PMC has taken initiative in acquisition of six plots, of 14 hectares, owned by the Irrigation Dept., Govt. of Maharastra, for tree plantation.

  While there are many success stories, the Garden Department, PMC is worried about the excess construction in the residential areas, particularly through the use of TDR.
  It has noted that some of the provisions in the Development Control Rules, of the Building Permissions Department, are detrimental for the proper growth of green areas. Excessive parking requirements and 50% allowed ground coverage by the building encourages the land owner to pave/tar most of the remaining plot area. Thus, hardly any space is left for water to percolate down and increase the underground water table. Also there is no space left for tree plantation. The Garden Department would like a change in the DCR, which will compel the owner to retain less ground coverage and would leave a minimum of 30% area free from conversion into a hard surface (bldg./tank/pavement/road). This area should be left only for tree plantation. The department also suggests disallowing the construction of any building, like a clubhouse or swimming pool, on the mandatory open spaces in large layouts. Moreover, a swimming pool is free of FSI, but is a built structure, which further reduces the land available for the earth to breathe and for plantation of trees. Hence it can be seen that these provisions of DCR are detrimental for increasing the green coverage within the city.

  Hariyali, an NGO promoted by citizens residing on Bhandarkar Road/BMCC road had proposed a strip garden, on BOT basis, like the Osho Park on lands under the Irrigation Department. This land, like other similar strips of the left bank canal of the Khadakwasla dam is being converted into a road. Various NGOs are opposing such road construction, including one passing through the Fergusson College. At present this issue is under public debate.

CHAPTER-ELEVEN

Health

Introduction

WHO has defined normal health as follows: "Normal health means a state of complete physical, mental and social well-being of an individual i.e., a state of positive health." To promote and maintain a state of positive health an individual needs the following prerequisites:

- Supply of fresh air and sunlight
- Safe and potable water supply
- Balanced diet
- Healthful shelter
- Adequate clothing
- Hygienic environmental sanitation
- Protection from communicable and other avoidable afflictions
- Complete sense of protection and security both socially and economically
- A congenial social and cultural atmosphere

Health is a fundamental human right and for this right the individual, the community, the nation and the government all have to play their respective roles collectively, actively and in a constructive manner.

The following are the objectives to achieve the goal "Health for all"-

1. Health education
2. Adequate food supply and nutrition
3. Safe and potable water supply and hygienic sanitation
4. Maternal and Child Heath Services
5. Family Planning programme
6. Integrated immunization programme
7. Control and prevention of communicable diseases
8. Basic curative care
9. Adequate provision of essential drugs

For a society to flourish, it is essential that it stays healthy. The critical nature of health in the environmental status of a city can be understood from the following examples.

- Respiratory diseases, among hundreds and millions of people, are caused or exacerbated by indoor or outdoor air pollution

- Hundreds and millions are exposed to unnecessary physical and chemical hazards in the work place or wider living environment (including the 50,000 who die every year as a result of road accidents)
- 4 million infants and children die every year from diarrhea diseases
- Hundreds and millions of people suffer from debilitating intestinal parasite burdens
- Two million people die from malaria each year and 267 million around the world are infected with plasmodium
- 3 million people die every year from tuberculosis and there are other 20 million in whom the disease is active and hundreds and millions who suffer from under nutrition (including those who suffer seasonally or during times of drought)

Transmissible diseases

Transmissible diseases are caused by living organisms (such as a bacterium, virus, protozoa, or parasite) and can spread from one person to another. The infectious agents are called *pathogens*, and are spread by air, water, food body fluids, some insects (such as mosquitoes, flies and ticks), animals (such as rodents and monkeys) and other non-human carriers called *vectors.*

Factors affecting the spread of Transmissible diseases

Outbreaks of the transmissible diseases often occur because of a change in the physical, social, or biological environment of disease reservoirs, carrier vectors, or hosts. For example, travel, migration, deforestation, loss of biodiversity, agriculture, urbanization, climate change and natural disasters all contribute to the introduction and spread of infectious agents in new populations.

Migration to the urban areas increases the probability of infection for diseases such as tuberculosis, cholera and sexually transmitted diseases. Conversely, migration to uninhabited rural areas and deforestation can expose people to new diseases and disease vectors. Further, the increased outbreaks of the tropical infectious diseases such as malaria is related to reducing biodiversity by destroying forests and wiping out of species that help control disease vectors. For example, as people clear more of the forest areas, they come in contact with the monkeys and other similar animals, which harbor unknown viruses that humans are susceptible to when they come in contact with them.

Considering the diseases in Pune, a five-year analysis reveals that the problem of Gastroenteritis is more severe with Cholera and Jaundice problems next (refer table 12.1). This disease pattern indicates that the drinking water quality of Pune is poor, though improving, as all these are transmitted by water borne pathogens. Further treatment and improvement of drinking water quality will help in improving the health of Pune people. The percentage of people affected

by these diseases is decreasing as indicated by the following table. This is because better treatment at the source and also because of careful inspection of the residual chlorine levels, which help in combating the contamination during distribution.

Table No. 11.1 Patients suffering from communicable diseases

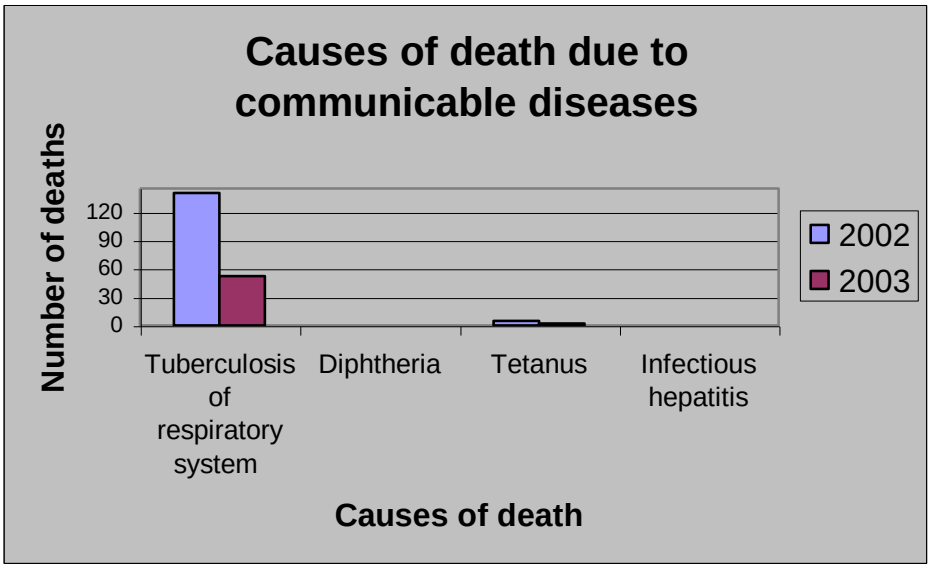
Diseases	1999	2000	2001	2002	2003
	Total	Total	Total	Total	Total
Gastroenteritis	1585	2250	1349	1110	986
Cholera	18	78	15	7	11
Jaundice	77	75	64	65	47
Typhoid	31	42	17	15	32
Polio	0	0	0	0	0
Diphtheria	10	6	4	3	2
Whooping Cough	0	2	0	0	0
Tetanus	17	23	5	15	13

Source: Health Department, PMC

Table No. 11.2 Number of Deaths and their causes during the year 2002 and 2003 due to communicable diseases

Sr. No.	Causes of Death	2002	2003
		Total	Total
1	Tuberculosis of respiratory system	140	52
2	Diphtheria	0	0
3	Tetanus	5	2
4	Infectious hepatitis	0	0

Source: Health Department, PMC



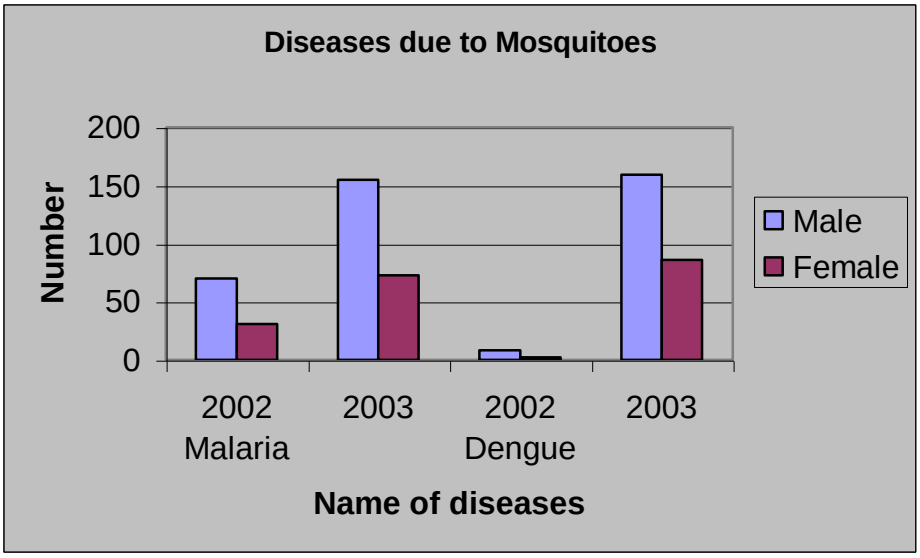
Source: Health Department, PMC

As mentioned earlier, malaria is also a type of communicable disease, which uses the female mosquitoes as vectors. Though malaria has been under control over the years, there have been reports of the dreaded dengue fever, which is also spread by mosquitoes. The details regarding these two diseases are given below.

Table No. 11.3 Diseases due to Mosquitoes (Year 2002-2003)

	Malaria		Dengue	
	2002	2003	2002	2003(Suspected)
Male	70	155	8	159
Female	31	73	2	86
Total	101	228	10(Suspected)	245

Source: Health Department, PMC



Source: Health Department, PMC

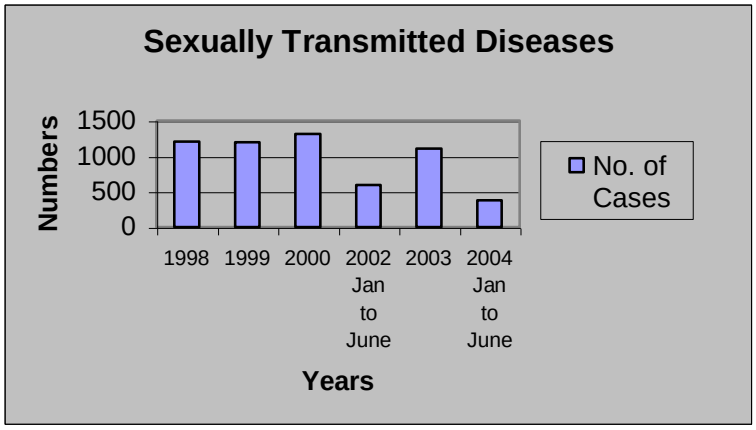
Sexually Transmitted Diseases (STD)

In Pune, sexually transmitted diseases are primarily found in the women of the lower caste structure, the number of STD cases have shown a variable trend in the four years, first a decrease from 1204 in 1998 to 1195 in 1999 and then an overall increase to 1313 in 2000. But in 2002 the number decreases up to 594. These diseases can be controlled through safe sex practices.

Table No. 11.4 Sexually Transmitted Diseases (STD) cases 1998 –2004

Sr. No.	Diseases	No. of Cases
1	1998	1204
2	1999	1195
3	2000	1313
4	2002 Jan to June (Screening Patients)	594
5	2003	1,106
6	2004 Jan to June	378

Source: Dr. Kotnis Hospital (Gadikhana), PMC



Source: Dr. Kotnis Hospital (Gadikhana), PMC

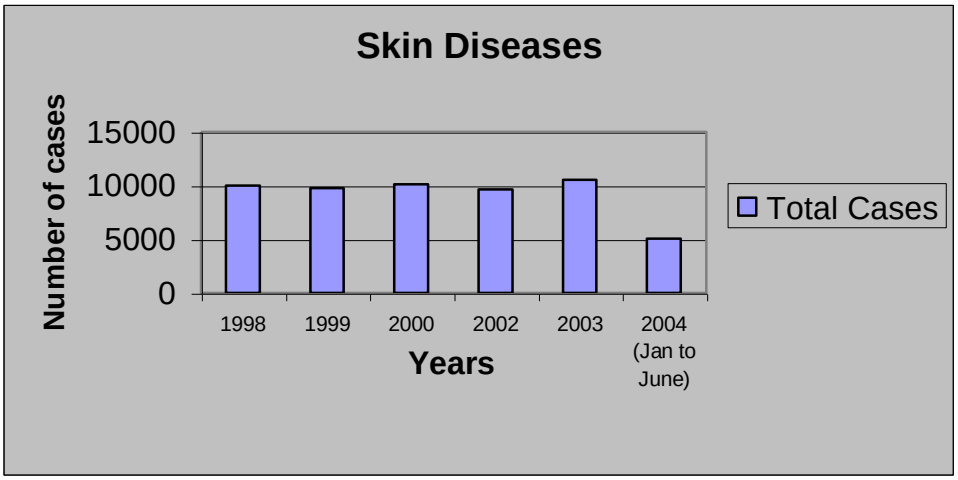
Skin diseases

Skin diseases are primarily due to fungal growth, which is favored in moist and polluted climate and environment. The number of skin diseases has increased in the three years from 9989 to 10,130 and in 2002 it has reduced to 9,631. Reducing the pollution levels and general cleanliness can control this.

Table No. 11.5 Total number of cases of Skin diseases in last 6 Years

Sr. No.	Year	Total Cases
1	1998	9989
2	1999	9777
3	2000	10130
4	2002	9631
5	2003	10,541
6	2004 (Jan to June)	5,067

Source: Dr. Kotnis Hospital (Gadikhana), PMC



Source: Dr. Kotnis Hospital (Gadikhana), PMC

Births and deaths

The reasons for these differ from case to case. As can be seen, a total of 1241 stillbirths and 1217 infant deaths were observed in the year 2002, while in 2003 the values were 1273 and 1561 respectively. The details regarding birth and mortality are given in the table below.

Table No. 11.6 Number of Births/Deaths/Infant Deaths in the year 2002

Month	Birth			Death			Still birth			Infant Deaths		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Jan	2170	1789	3959	1081	741	1822	43	34	77	53	59	112
Feb	1835	1464	3299	961	638	1599	60	36	96	66	54	120
Mar	2018	1626	3644	989	672	1661	46	38	84	61	62	123
Apr	2036	1779	3815	1013	653	1666	62	38	100	51	41	92
May	1962	1673	3635	1008	640	1648	53	48	101	62	41	103
Jun	1923	1614	3537	885	656	1541	65	47	112	58	33	91
Jul	1852	1472	3324	1130	695	1825	64	51	115	73	37	110
Aug	1911	1634	3545	1112	777	1889	54	51	105	62	55	117
Sep	2141	1756	3897	1041	677	1718	51	52	103	43	33	76
Oct	2265	1955	4220	966	680	1646	66	55	121	46	43	89
Nov	2142	1894	4036	991	680	1671	68	53	121	58	33	93
Dec	1870	1637	3507	939	607	1546	60	46	106	50	41	91
Total	24,125	20,293	44,418	12,116	8116	20,232	692	549	1241	683	532	1217

Source: Birth / Deaths Census Department, PMC

Table No. 11.7 Number of Births/Deaths/Infant Deaths in the year 2003

Month	Birth			Death			Still Birth			Infant Deaths		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
JAN.	1902	1558	3460	1084	672	1756	57	68	125	58	43	101
FEB.	1759	1475	3234	954	585	1539	49	37	86	70	41	111
MAR.	2118	1645	3763	1048	744	1792	59	62	121	75	55	130
APR.	2024	1682	3706	1064	670	1734	51	42	93	81	52	133
MAY.	1224	1081	2305	1061	713	1774	59	47	106	74	67	141
JUN.	1958	1679	3637	933	645	1578	56	55	111	71	53	124
JUL.	2076	1763	3839	1031	743	1774	67	47	114	75	60	135
AUG.	1941	1632	3573	1165	824	1989	58	54	112	89	64	153
SEP.	1763	1765	3528	1181	718	1899	51	42	93	73	62	135
OCT.	2127	1843	3970	1073	688	1761	49	59	108	64	39	103
NOV.	2213	1991	4204	985	657	1642	56	44	100	83	63	146
DEC.	2009	1825	3834	1221	730	1951	67	37	104	91	58	149
TOTAL	23,114	19,939	43,053	12,800	8,389	21,189	679	594	1,273	904	657	1,561

Source: Birth / Deaths Census Department, PMC

Stray animals

Pigs - Catching is undertaken depending upon the complaints.

Dogs - Daily around 30 dogs are caught. All are handed over to Blue Cross Society for sterilization

Table 11.8 Patients with rabies admitted at Dr. Naidu Hospital from 1998 to 2003

Year	Female	Male	Total
1998	1	8	9
1999	1	6	7
2000	1	6	7
2001	2	4	6
2002	3	2	5
2003 (Jan-Nov)	-	4	4

Source: Health Department, PMC

Action against Rabies

Last year about 19,021 cases of dog-bite occurred in Pune; & all cases were attended by Pune Municipal Corporation's Gadhikhana clinic for treatment. Because of the high risk of catching rabies infection, each case of dog-bite requires evaluation of the risk of infection as an emergency and immediate protection through treatment of wound, guidance for further care and post-exposure immune-prophylaxis with anti-rabbies vaccine and hyperimmune serum, if indicated. Unfortunately, the entire experience of the long-drawn process of immunization is quite bothersome and painful. Apart from the physical and psychological trauma, financial burden is high. Under these circumstances, it is desirable for the Pune Municipal Corporation to institute public health measures for preventing dog-bite so as to mitigate the avoidable suffering and eliminate deaths due to rabies. This proposal is a follow-up activity of a public seminar cum panel discussion on 'the control of stray dogs in Pune' which, was held under its programme of 'Health Sciences for the Society' of the School of Health Sciences, University of Pune, held at the School on 26th August 2000. The proposal is also based on the advocacy of the World Health Organization on rabies control and its elimination.

Epidemic Control

Health Dept. of PMC provides primary health care to the citizens of Pune. An Epidemic control unit was set up in the year 2000, to control various epidemics, water born diseases, etc. Late Dr. Naidu Hospital (for infectious diseases) takes care of admitted patients of diarrhea, dysentery, Gastro-enteritis, Hepatitis etc.

Thus there is a decline in total number of patients of infectious as well as water born diseases during the last 3 years, indicating an improvement in the water quality.

Measures taken to control the epidemics and infectious diseases:

1. An Epidemic control unit was set up in the year 2000 to prevent and control epidemics, infectious diseases, water born diseases etc. The unit includes Medical officers, ANM and Nursing. This is a mobile unit and visits new villages and high-risk areas to survey, investigate, treat and advise the patients in the respective areas. If necessary, the patients are shifted to the Late Dr. Naidu infectious diseases Hospital immediately.
2. Potable (properly chlorinated) water supply is essential to prevent epidemics and water bone diseases. PMC supplies chlorinated water as a precaution. The PMC laboratory routinely collects water samples from various terminal sites and checks samples from 70 sites for contamination, turbidity, percentage of chlorine, chemicals, bacteria, amoeba, etc. If the samples are found unsatisfactory, proper measures are taken to make the water supplied potable.
3. The PMC area is divided into 14 wards. Every ward office takes care of solid waste management, road sweeping, cleaning of public urinals and toilets etc. The Divisional Sanitary Inspectors (D.S.I.), Sanitary Inspectors (S.I.) and their staff take care of public hygiene.
4. Every year before the monsoons, leakages in water lines and drainage lines are checked and corrective measures are taken at the ward office level. Nallahs and gutters are also cleaned.
5. O.T. test (Orthotoludine test) is essential to check the chlorine content of water. At various terminal sites, in newly included village areas and other terminal areas in the city, water samples are taken and the O.T. is performed to check the chlorine content. O.T. registers are maintained by Ward Officers. If O.T. is negative, proper chlorination and other corrective measures are taken. If necessary, water is provided by water tankers until the test is positive.
6. In some areas due to in-adequate supply of water, people consume water from bore wells or uncovered wells. The people in these areas are advised to boil the water before drinking. They are also advised to use 'mother solutions' (chlorine solutions) to purify the water.
7. Areas with inadequate water supply are routinely provided water by water tankers.
8. People consume roadside drinks, sugar-cane juice etc. with ice in summer seasons. If the ice is contaminated, it leads to the spread of infectious diseases, hepatitis etc. People should be advised, via media, not to consume ice, roadside drinks, and sugar cane juice containing contaminated ice.

9. Water storage tanks on top of buildings as well as underground water tanks should be cleaned every 6 months. Private societies are advised to clean the water storage tanks within their premises. The D.S.I. and S.I. should supervise and monitor the cleaning of water storage tanks.
10. Citizens are advised not to drink water from uncovered wells.

National Health Program
Pune Municipal Corporation initiated the following programs:

Family Welfare

The family Welfare department of the PMC carries out various procedures for family planning in Pune. The details for the last two years about the activities covered under this are given below. The target for Operation has reduced in 2004 as compared to 2003, whereas for I.U.D, the target was increased. This has resulted in a marginal increase the actual achievement.

Table No. 11.10A Number of operations carried out by Family Welfare Dept. April 2002- March 2003

Preventive Measures	Target	Achievement	Percentage (%)
Operations	18000	15888	88.27
I.U.D. (Intra Uterus Device)	11370	10618	93.39
O.P. Users (Oral Pill Contraceptive Users)	6940	3048	43.92
C.C. Users (Conventional Contraceptive Users)	No Target	8787	-

Source: Family Welfare Department, PMC

Table No. 11.10B Number of operations carried out by Family Welfare Dept.for the year April 2003- March 2004

Preventive Measures	Target	Achievement	Percentage (%)
Operations	17000	15238	89.63
I.U.D. (Intra Uterus Device)	12480	10648	85.32
O.P. Users (Oral Pill Contraceptive Users)	3720	3031	81.48
C.C. Users (Conventional Contraceptive Users)	0	8242	0

Source: Family Welfare Department, PMC

National Blindness Program

The PMC had launched a program for the control of blindness within the city. With respect to the same, the PMC has conducted 25,245 eye operations this year as compared to the 24,213 operations last year. The distribution of vitamin A as a precautionary measure was not as effective as last year.

Table No. 11.12 National Blindness Control Program:

Name	Target	Achievement		Percentage (%)	
		2002-03	2003-04	2002-03	2003-04
Vitamin-A Distribution	51174	27399	24938	53.54	48.73
Eye Operation	24000	24213	25245	100.89	105.19

Source : Medical Officer of Health, PMC

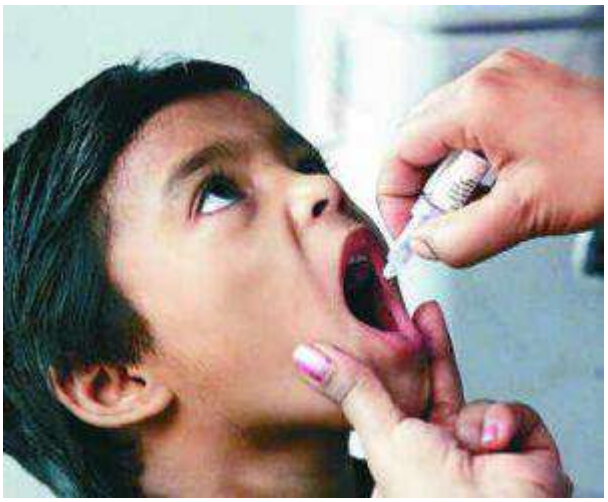
Vaccination Program

The PMC also conducts various vaccination programs as mentioned in the table below. These are very essential as they can help eradicate dreadful diseases like polio and measles.

Table No. 11.13 National Vaccination Program:

Indicators	April 2002- March 2003			April 2003-March 2004		
	Target	Achievement	Percentage	Target	Achievement	Percentage
DPT Third Dose	51174	36361	71.05 %	51174	34924	68.25
Polio Third Dose	51174	40857	79.84 %	51174	38708	75.64
B.C.G.	51174	53974	105.47 %	51174	51153	99.96
Measles	51174	35893	70.14 %	51174	32923	64.34
Vitamin A1	51174	27399	53.54 %	51174	24938	48.73
Vitamin A2	51000	21589	0	51000	20497	40.19
Vitamin A 3-5	56348	37191	0	56348	44891	79.67
DPT Booster	51000	28691	56.26 %	51000	26807	52.56
Polio Booster	51000	37751	74.02 %	51000	35879	70.35
D.T.	56079	29894	53.31 %	56079	32387	57.75
T.T. Mother	58092	27487	47.32 %	58092	29266	50.38
T.T.(10 years)	60877	43009	70.65 %	60877	42757	70.24
T.T.(16 years)	56184	44385	79.00 %	56184	42402	75.47

Source : Medical Officer of Health, PMC



POLIO VACCINATION PROGRAMME

Integrated Population & Development Project PMC (Assisted by UNFPA)
This project was started in November 2000, in Pune at 553 places for nearly 9 lakh people and is funded by National Population Fund

Aim of the Project:

1. To provide qualitative services for reproduction to the people who come under the project area & for that improving Reproduction, Child health, Family Planning Services.
2. To improve educational as well as social status of the women under the project area.

Objectives:

1. To provide qualitative integrated services for Reproduction & prepare a system for that.
2. To strengthen management for services like family planning and reproduction & child health.

Main Program:

1. Training
2. Improvement in health services
3. Medicine
4. Improving local government representation in social communication programs
5. Plans for Improving Management
6. Improvement in services
7. Field Research
8. Information, education, communication program

Nuisance Detection:

Pune Municipal Corporation has undertaken special cleanliness drives since 1999, with its enforcement through the nuisance detection (ND) squad. A total of 48 retired personnel from the police, army, navy, airforce, home guards are recruited in the ND squad on contract basis. The teams, each consisting of 3 personnel, are assigned to each ward office to implement this drive. The ND squad members penalize the erring citizens causing nuisance like throwing garbage on roads, spitting, passing urine on the road, etc. The Government of Maharashtra has banned use of plastic carry bags below the thickness of 20 microns and the sale of gutkha and tobacco within 100 meters of Government and semi Government offices and educational institutions. The members of ND squad have effectively regulated the ban as it existed earlier and would do so in respect of the total ban as per the latest decision of the State government.

These members have been authorized to recover the administrative charges from the erring citizens on the spot under sections 3 (a) 4 and section 376 of BPMC Act, 1949. Accordingly, the ND squad has so far collected the administrative charges of Rs.2,31,22,042 by penalizing about two lakh citizens since its inception.

Table No. 11.14 Action against Defaulter Creating Nuisance:

Sr. No.	Details of Cases	Total No. of cases		Amount collected as charges (Rs.)	
		2002-2003	2004 (Jan-June)	2002-2003	2004 (Jan-June)
1	Spitting on the road	61,812	354	8,69,592	7670
2	Passing Urine on the road	42,713	679	5,42,675	14555
3	Advertisement, Posters and Banners	10,571	1	70,71,381	7000
4	Plastic carry bags below 20 microns	1,716	14	4,36,135	3650
5	Gutkha and tobacco sales	1,549	3	4,03,326	650
6	Unauthorized parking on roads	707	1	4,36,970	5,03,990
7	Waste, building material dump	77	115	2,22,190	54,155
	Total	**3,63,277**	**1,167**	**2,31,22,042**	**87,680**

Source: Health Department, PMC

Table: 11.14 Health area clinics

UNDER PUNE MUNICIPAL CORPORATION AREAS HEALTH CLINICS								
Sr. No.	NAME OF HOSPITALS							
	O.P.D.	**Maternity Home**	**Family Planning Center**	**Hospitals**	**I.C.D.S.**	**Matabal Sangopan Center**	**Family Welfare Center**	**Vaccination Center**
1	Erandwane Hospital	Ambilodha Maternity Home	Bopodi Maternity Home	Kamala Nehru Hospital	Ambilodha Maternity Home	Aundh Kuti Hospital	Shivaninagar Family Welfare Center	Narayan Peth Vaccination Centre
2	Bhavani Peth Hospital	Aundh Kuthi Hospital	Dalvi Hospital	Naidu Hospital	Bhavanipeth Hospital	Somawar Peth Hospital		
3	Dattawadi Hospital	Bopodi Maternity Home	Health Camp Maternity Home		Hadapsar Maternity Home	Sonavane Maternity Home		
4	Ganj Peth Hospital	Dalvi Maternity Home	Kamala Nehru Hospital			Dalvi Maternity Home		
5	Hingane Hospital	Hadapsar Maternity Home	Sahakarnagar Hospital					
6	Lions Club Hospital	Health Camp Maternity Home	Sonavane Maternity Home					
7	Mangalwar Peth Hospital	Kothrud Kuthi Hospital						
8	Kavadepatil Hospital	Mundhwa Kuthi Hospital						
9	Narayan Peth Hospital	Pashan Kuthi Hospital						
10	Nana Peth Hospital	Sonavane Maternity Home						
11	Ravivar Peth Hospital	Vanawadi Maternity Home						
12	Vishrantwadi Hospital	Kondhva Maternity Home						
13	Sahakarnagar Hospital	Guruwar Peth Maternity Home						
14	Shaniwar Peth Hospital							
15	Shivajinagar Hospital							
16	Laxminagar Hospital (Yeravada)							
17	Mobile Health Center							
18	Aundhroad Hospital							
19	Ganesh Peth Hospital							
20	Kalyaninagar Hospital							
21	Lohogaon Hospital							
22	Maharshinagar Hospital							
23	Gynaec Section							
24	Kelevadi Hospital							
25	Gandhinagar Hospital							
26	Bhimnagar Hospital							

Source: Health Department, PMC

CHAPTER-TWELVE

Pollution Monitoring and Abatement

Introduction

Pollution is defined as, “any alteration or addition to air, water, soil, or food, which threatens the health, survival, capability, or activities of not only humans but also any other living organisms”. In simple words, it is the unwanted concentration of substances, which are beyond the environment's capacity to assimilate. Pollution is formed when wastes are released from the extraction, processing and utilization of resources. It can be in any form - solid, liquid effluents or gaseous emissions.

Pollutants originating from human activities have greater impacts on the environment and human health through physico-chemical, biological and ecological factors. Many techniques and strategies have been employed to mitigate the effects of pollution. Major principles in pollution management are dilution and concentration. Unfortunately these strategies are expensive to implement and may take years to have the desired effect because they give rise to another form of pollution problem. However pollution levels have increased much in amount and toxicity over the period of time.

The key strategy should be the pollution prevention rather than clean up or control. The pollution prevention through waste mitigation and recycling of useful components reduces the load on environment. This is what exactly happens in the nature. In the natural ecosystem, all the substances are processed through a complex network of biogeochemical cycles, e. g. the nitrogen and carbon cycles. The essential nutrients, substances are taken up by plants, circulate through the food chain to larger and more complex organisms, and when they die, they are broken down into simpler forms by detritivores to be used again when they are taken up by plants. Biodegradable substances are those that can be broken down by nature's own biological systems.

Pollution occurs when the environment becomes overloaded beyond the capacity of these normal-processing systems. Modern, High-tech civilization and industrialization have given birth to the wastes, which are not easily assimilated in the environment result into the pollution of natural resources. In the human system, development is done at the cost of environment. The NIMBY (Not In My Backyard) and THROW AWAY principles are the outcomes of the modern world's economy. Keeping the environment clean by pollution control is an external cost for the manufacturers and users. The "Polluter-pays

principle" should be enforced. The polluter should bear the costs of mitigating pollution, or remediating its ill effects.
The basic theme of the Pollution chapter is to emphasis the deterioration of the urban environment in the Pune City due to pollution, as well as the discussion of state, impact and responses thereto. The major focus is on pollution monitoring. There are multiple strategic visions noting the need for the prevention of pollution, and implementation actions. The Pollution chapter gives an overview of the current state of pollution in Pune City with a specific focus on air, water, noise and land pollution.

Overview of the Pollution in the Pune city

The sources of pollution are well known in the Pune City - such as human population and vehicular population, which are ever increasing. This tremendous pressure is taxing the environment for various resources out of which mainly the space, water and energy. The city limits have increased multifold in last few decades concurrent growth in population having the current average population density about 10,412 per sq. km.

The other salient features are -

Supply of water	- 800 MLD for 30,25,000 people i.e. 264.40 litres per person per day 195 litres per person per day (after adjustment for leakage)
Generation of wastewater	-450 MLD Sewage is generated by 30,25,000 people i.e. 148 liters per person per day
Water	The ratio of water supplied to wastewater is 1: 0.75 Rest of the water is either consumed, or lost by seepage or evaporation.
Generation of solid waste	-1450 metric tons is generated by 30,25,000 people i.e. 0.48 kg per person per day Dry waste/Wet waste- 50% : 50% 1450 metric tons is generated in 246.96 sq. km i.e. 5.87 metric tons per sq. km
Vehicles	- 12,00,000 vehicles are being used by 30,25,000 people i.e. 2.5 People per motorized vehicle

Traffic growth:

Table 12.1 Two, Three and Four Wheelers registered in the year 2002-2004

Year	2 Wheelers	3 & 4 Wheelers	Total
2002 (Jan-Dec)	62,409	20,234	82,643
2003 (Jan-Dec)	69,426	20,882	90,308
2004 (Jan-July)	79,753	23,303	1,04,056

Source: Traffic Department, PMC

There are approximately 12,00,000 vehicles in Pune City. This year the growth rate of vehicles has been doubled. The trips of the vehicles have also increased. Thus the growth rate of traffic is 25%.

Average fuel consumption	-	1800 kilolitres of both petrol and Diesel per day i.e. 1.5 litre per vehicle
Air pollution (Estimated)		
Particulate Matter 6 tons per day	-	36.885 kg per sq. km per day
SO_2 gas 300 kg per day	-	1.845 kg per sq. km per day
CO gas 20 tons per day	-	122.97 kg per sq. km per day
NO_x gas 1.707 tons per day	-	10.50 kg per sq. km per day
Noise pollution	-	Excess of noise near the Sensitive zones because of Traffic and celebrations

From the above data, it can be calculated that a Punekar emits following waste every day –

Wastewater	**:**	**148 litres / day**
Solid Waste	**:**	**0.48 kg / day**
Particulate Matter	**:**	**3.543 g / day**

Effects of the Pollution

Contamination of Rivers

Pune is situated on two rivers mainly Mutha and Mula. Mutha River flows through the heart of the city about 8 - 10 km. Mutha joins Mula near the Government Engineering College. Stretch of the Mula River in the Pune City is about 16 - 18 km. At most of the places it is the boundary of the Pune city.

Two more rivers Pavna and Indrayani traverse the outskirts of urban area and two more small rivers - Ram and Nagzari have lost their course in the urbanization.
One of the British authors has referred the **status of Mutha River** near Sangam Bridge by showing as the **River of Black Flowers**. The flow of the Mutha river is blocked upstream by dams and it gets recharged with numerous nallas carrying wastewater from the urbanized, semi-urbanized areas of Pune city. The same is for other rivers also.

Contamination of Lakes

Pune City has numerous ponds and lakes, to name a few are Katraj, Pashan, Lakaki etc. that are the beautiful spots in the city. With population growth in the catchment area of these lakes, these lakes receive waste streams. Corporation has diverted wastewater nalla, which brought water to Katraj Lake.

Changes in the Water bodies

Wastes discharged into the waterbodies change the physico-chemical, biological and ecological characteristics of the aquatic system. It promotes the growth of certain weeds like Water Hyacinth, Ipomea etc. Eradication of which becomes a tickling problem. Water Hyacinth is a nuisance in city water bodies because it facilitates the enormous growth of mosquitoes and it produces stinky substances in copious amounts. Its grows very fast - a single plant multiplies and covers the whole surface of the water body in a month's time. These altered characteristics of the rivers and lakes lead to extinction of clean water species of plants and animals. More than 50 varieties of fishes of the Mutha have been lost in last few decades.

Changes in the Tree Cover and Biodiversity

Apart from the cutting of the trees for construction of building and roads, the green cover of the Pune city is under stress due to the air pollution. Gases like sulphur di-oxide and nitrogen oxides are harmful for the sensitive plants. Though the process of effect of air pollution is slow but it is definite that it affects its physiology and growth. It's a slow poisoning of man's friend - A Tree. Thus the biodiversity of the urban ecosystem reduces over a period of time.

Indoor Pollution

Due to increase in vehicular pollution and decrease in green cover, the threat of the exposure to air pollution in the houses has augmented multifold.

Effect on the Human Health

From one of the surveys carried out regarding the health of the citizens with respect to the increasing air pollution and water pollution, it can be stated that the outgoing persons irrespective of gender and age get affected more than that of the persons staying back at the home / office. The major initial symptoms noted were eye irritation, skin irritation, cold, coughing, sneezing, and gastric disorders etc. The impact on kids was more as compared to the elder ones. About 800 persons and 20 doctors were interviewed from the Pune and Pimpri - Chinchwad area. It is estimated that a common man has to spend average Rs. 200/- per month for the health recovery.

Properties and Monuments

Buildings, structures and monuments are severely affected by especially sulphur dioxide in the air. It dissolves in water and forms acid. It literally eats up the material. This is also slow poisoning - weakening of buildings and structures. Many times, the monuments are neglected for years together. That's why they severely affected due to the unscrupulous waste throwing habits.

Economic losses

In order to revert the impact and disorder caused by the environmental pollution some money, energy, materials and man-days are spent to supply the commodities like water. With the recent spate of newspaper reports, it can be said that water has be purified at every step from lifting, through purification at water works, distribution networks, temporary storage and use. As per one estimate, depending on the contamination, the purification requires 20% - 50% extra costs. All these costs affect the GDP of the city also.

There is one more economic impact as a fall out of globalization that due to the high levels of pollution in the city, foreign investments and visitors are distracted.

Pollution Levels in the Pune City

Pune Municipal Corporation has set an environmental laboratory - only one of its kind in India to monitor the pollution levels on regular basis. The results of sampling and analysis of river water, air and noise throughout the year by the laboratory has been given in following tables -

Ambient Air Quality and River Water Pollution Monitoring Report 2003-2004

Table 12.2 Regulatory Standards for Ambient Air

Pollutant	Time Weighted Average	Concentration in Ambient Air		
		Industrial Area	Residential, Rural and other Areas	Sensitive Area
Sulphur Dioxide (SO_2) µg / m^3	Annual Average*	80	60	15
	24 Hours Average**	120	80	30
Oxides of Nitrogen as NO_2 µg / m^3	Annual Average*	80	60	15
	24 Hours Average**	120	80	30
Suspended Particulate Matter (SPM) µg / m^3	Annual Average*	360	140	70
	24 Hours Average**	500	200	100
Respirable Particulate Matter (Size less than 10µm) (RPM)	Annual Average*	120	60	50
	24 Hours Average**	150	100	75
Lead (Pb) µg / m^3	Annual Average*	1.0	0.75	0.50
	24 Hours Average**	1.5	1.0	0.75
Carbon Monoxide (CO) µg / m^3	8 hour Average	5.0	2.0	1.0
	1 Hour Average	10.0	4.0	2.0
Ammonia (NH_3)	Annual Average*	0.1 mg / m^3		
	24 Hours Average**	0.4 mg/ m^3		

* Annual Arithmetic mean of minimum 104 measurements in a year twice a week 24 hourly at uniform interval.

** 24 hourly/8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days.

NOTE

National Ambient Air Quality Standard: The levels of air quality necessary with an adequate margin of safety, to protect the public health, vegetation and property.

Whenever and wherever two consecutive values exceed the limit specified above for the respective category, it would be considered adequate reason to institute regular/continuous monitoring and further investigations.

The State Government / State Board shall notify the sensitive and other areas in the respective states within a period of six months from the date of notification of National Ambient Air Quality Standards.

Table 12.3 Ambient Air Quality and at Phule Mandai:

Date	PM_{10} (µg/m³)
16/04/04	120.88
27/04/04	53.41
07/05/04	96.28
10/05/04	72.54
13/05/04	58.84
17/05/04	123.17
20/05/04	211.68
09/06/04	55.87

Source: Environment Lab, PMC

As compared with the National Ambient Air Quality Standards (NAAQS), the PM10 - Respirable Particulate Matter (Solids) exceeded standard limit all the time round the year at the sampling station - Phule Mandai.

Noise Pollution status

Table 12.4 Noise Levels at Phule Mandai:

Date	dB(A)
16/04/04	78
27/04/04	79
07/05/04	85
10/05/04	77
13/05/04	68
17/05/04	70
20/05/04	65
09/06/04	72

Source: Environment Lab, PMC

In comparison with the following noise pollution norms, the noise is much higher at the sampling station - Phule Mandai.

Table 12.5 Regulatory Standards for noise

Code	Category of Area	Limits in dB(A),Leq	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence Zone	50	40

Note:
1. Day time is reckoned in between 6 a.m. and 9 p.m.
2. Night time is reckoned in between 9 p.m. and 6 a.m.

3. Silence zone is referred as areas upto 100 meters around such premises as hospitals, educational institutions and courts. The Silence zones are to be declared by the Competent Authority.

Noise standards for automobiles, domestic appliances and construction equipments have been notified in Part 'E', Schedule-VI of Environment (Protection) Rules, 1986,as amended on 19th May, 1993,as given in the Tables below.

Table 12.6 noise levels of vehicles

Category of Vehicle	Noise limit in dB(A)
(a)Motorcycle, scooters and three wheelers.	80
(b)Passenger Cars	82
(c)Passenger or commercial vehicles upto 4 MT	85
(d)Passenger or commercial vehicles above 4 MT and upto 12 MT	89
(e)Passenger or commercial vehicles exceeding 12 MT	91

Table 12.7 Noise levels

Category of Domestic Appliances / Construction Equipment	Noise limits in dB(A)
(a)Window air conditioners of 1 ton	68
(b)Air Coolers	60
(c)Refrigerators	46
(d)Diesel Generator for domestic purposes	85 – 90
(f)Concrete mixers,Cranes(movable), Vibrators and Saws	75

River Pollution

Rivers of the Maharashtra have been classified into 4 categories A-I, A-II, A-III and A-IV as a guideline for best designed usage and industrial location. The standards have been notified for these classes. Mutha river stretch from Vitthalwadi to Confluence with Mula has been declared as Class IV. The notified standards for this class are given as –

Table 12.8 Standards

Parameters	Values
Ph	6.5 – 8.5
Total ammoniacal Nitrogen	50 mg/l
Chlorides	600 mg/l
Sulphates	1000 mg/l
BOD_5 at 20^oC	30 mg/l
COD	150 mg / L
Dissolved Oxygen	>2 mg / L

Table 12.9 River Water Pollution Monitoring

Date	Site	pH	Con (µs)	Tur. (NTU)	TSS	TDS	T.A.	D.O. (mg/l)	COD	Cl mg/l	T H mg/l
28/5/03	VI	7.63	341	7.3	22	200	200	1.0	48	35.5	130
	GA	7.62	420	43	51	220	250	0.0	152	42.6	130
	SA	7.44	378	21.4	35	205	250	1.6	112	35.5	140
	BU	7.58	485	46.1	63.0	240	250	0.0	152	56.8	180
	KH	8.31	79.4	5.4	29	57.0	50	8.2	16.0	14.2	30
18/6/03	VI	7.86	593	24.6	131	216	300	0.0	96	63.9	210
	GA	7.79	469	66.3	396	233	250	0.0	168	49.7	170
	SA	7.74	473	51.0	239	233	250	0.0	184	63.9	150
	BU	7.52	526	41.6	387	263	250	0.0	152	56.8	180
	KH	8.32	79.4	10.8	112	31	75	8.4	16.0	14.2	40
03/07/03	VI	7.71	395	6.7	15	250	200	1.0	48	35.5	150
	GA	7.63	314	46.5	179	264	200	0.0	176	49.7	160
	SA	7.39	476	20.8	33	257	250	0.0	88	49.7	180
	BU	7.50	341	12.4	49	162	200	0.0	80	35.5	140
	KH	8.40	73	3.6	09	58	50	8.6	16	14.2	40
16/07/03	VI	7.91	452	7.7	75	202	200	1.6	48	42.6	170
	GA	8.18	466	20.8	66	255	250	0.0	88	56.8	150
	SA	8.07	478	26.4	179	289	250	0.0	112	63.9	180
	BU	8.23	372	22.1	48	189	200	1.2	72	35.5	140
	KH	8.40	108.6	6.6	12	88	50	8.6	16	21.3	50
19/08/03	VI	8.32	497	14.1	78	82	200	1.0	80	49.7	160
	GA	8.25	458	15.4	91	105	200	0.0	88	53.25	170
	SA	8.05	498	18.7	56	89	250	0.0	88	56.8	180
	BU	8.48	434	16.2	44	107	250	0.0	64	57.51	170
	KH	7.41	154.7	13.3	18	26	50	8.2	24	21.3	60
03/09/03	VI	7.65	795	23.3	165	128	200	1.0	72	49.7	200
	GA	7.62	450	34.1	140	153	250	0.0	80	42.6	170
	SA	7.09	511	45.3	167	189	250	2.2	96	56.8	210
	BU	7.73	401	22.6	72	178	250	0.0	80	49.7	210
	KH	8.38	135.5	9.3	22	94	50	8.0	16	21.3	50
24/09/03	VI	7.70	542	26.1	49	270	200	0.0	48	56.8	200
	GA	7.83	490	39.8	41	283	200	0.0	120	49.7	180
	SA	7.27	532	54.2	118	308	200	0.0	152	49.7	190
	BU	7.62	471	15.3	48	265	200	3.4	104	42.6	190
	KH	8.37	107.3	3.4	28	69	50	8.4	24	14.2	60
17/10/03	VI	8.40	329	2.2	34	182	200	5.4	32	28.4	160
	GA	7.77	432	44.0	43	240	20	0.0	88	49.7	180
	SA	7.43	514	37.4	155	289	250	0.0	80	56.8	170
	BU	7.66	520	13.2	39	286	250	2.0	88	49.7	210
	KH	8.68	99.1	1.2	14	68	50	8.4	24	14.2	60
19/11/03	VI	7.51	62.5	3.6	59	139	40	5.4	22.84	9.94	36
	GA	8.02	74.0	4.3	66	160	80	4.04	29.40	12.78	46
	SA	7.95	107.3	6.8	74	150	100	3.83	32.04	15.62	50

	BU	7.84	107.9	7.1	60	148	110	3.83	33.71	19.88	40
	KH	7.65	132.0	6.8	22	186	120	3.23	39.89	21.30	50
10/12/03	VI	7.5	66.7	2.1	20	57	120	5.6	14.9	9.94	24
	GA	7.7	301	1.3	27	142	140	1.8	17	25.56	126
	SA	7.6	427	41.2	46	237	160	0.0	64	36.92	118
	BU	7.3	470	34.6	1446	272	230	0.0	128	35.50	170
	KH	7.5	452	11.7	15	270	180	0.6	17	39.76	120
31/12/03	VI	8.01	88.7	5.8	34	20	70	3.8	--	8.52	48
	GA	7.83	252	3.1	33	60	140	1.0	--	19.88	100
	SA	7.54	420	69.4	35	163	200	0.0	--	34.08	118
	BU	7.28	488	19.2	21	240	200	0.0	--	44.02	136
	KH	7.5	426	34.4	29	208	170	0.0	--	32.66	116
28/01/04	VI	6.8	67.1	1.8	32	55	60	6.3	6.8	9.94	50
	GA	7.6	295	3.5	63	121	160	1.2	13.7	32.6	130
	SA	7.6	431	47.1	300	246	200	0.0	109.2	35.5	128
	BU	7.5	415	35.4	170	240	190	0.8	59.2	32.6	114
	KH	7.4	523	26.5	57	290	240	0.4	29.6	36.9	146
14/02/04	VI	7.5	69.12	3.7	33	59	55	1.1	15.7	30.0	120
	G	7.4	278	4.2	59	84	161	0.0	150.2	35.4	118
	SA	7.5	406	46.5	290	359	290	0.0	69.1	42.3	104
	BU	7.5	100	39.5	183	241	187	0.0	30.4	54.1	126
	KH	7.9	568	29.6	60	98	250	7.4	5.9	6.8	40
04/03/04	VI	7.8	84	2.9	41	62	59	1.4	13.2	35.0	60
	GA	7.4	207	4.2	47	58	152	0.0	98.6	42.0	142
	SA	7.3	428	49.3	270	314	193	0.0	56.2	49.3	132
	BU	7.2	150	29.0	171	251	180	0.0	21.3	44.2	109
	KH	8.0	400	20.1	49	102	207	6.8	4.2	7.9	37
12/05/04	VI	7.1	79	2.8	--	--	44	1.0	111.3	42.9	140
	GA	7.1	205	5.1	--	--	172	0.8	58.7	13.7	119
	SA	7.3	471	40.3	--	--	204	0.0	110.3	48.8	92
	BU	7.5	120	34.2	--	--	198	0.7	79.3	35.2	176
	KH	7.4	498	19.7	--	--	239	7.2	5.1	8.4	48

Source: Environment Lab, PMC

VI: Vitthal Wadi ; **GA:** Garware Bridge ; **SA:** Sangam Bridge ; **BU:** Bund Garden ; **KH:** Khadakwasla

As per the comparison with standards, the river at sampling stations like Garware Bridge, Sangam Bridge, and Bund Garden is highly contaminated with organic substances. COD Chemical Oxygen Demand - the measure of strength of organic pollution - was very high at 75% of the sampling stations.

Table:12.10 Nalla Water Pollution Monitoring

Date	Site	PH	Cond. (µs)	Tur. (NTU)	TSS	TDS	T. A.	D.O. (mg/l)	COD	Cl (mg/l)	T - H (mg/l)
09/04/03	AO	7.4	451	51.9	139	289	200	0.0	184	49.7	130
	GN	7.05	496	91.3	57	332	250	1.2	296	56.8	132
	NN	7.47	474	86.2	70	334	200	0.0	248	63.9	140
	TN	7.38	462	74.5	38	294	250	0.0	176	42.6	140
30/04/03	AO	7.68	464	72.2	113	313	200	0.0	192	56.8	100
	GN	7.33	441	97.1	201	290	250	0.0	280	49.7	110
	NN	7.46	493	58.6	227	324	200	2.2	224	56.8	110
	TN	7.13	619	70.4	200	389	200	0.0	176	106.5	140
22/05/03	AO	7.48	403	81.2	621	205	200	0.0	144	42.6	100
	GN	7.42	373	98.3	360	220	200	1.0	320	42.6	120
	NN	7.56	480	87.8	735	252	250	0.0	288	49.7	130
	TN	7.44	463	74.6	73.4	248	250	0.0	274	56.8	130
4/6/03	AO	7.52	423	70.6	565	265	250	0.0	208	49.7	120
	GN	7.49	433	80.3	105	267	250	0.0	248	49.7	130
	NN	7.25	414	92.0	551	241	200	0.0	312	56.8	120
	TN	7.52	460	81.8	152	256	200	0.0	264	56.8	130
25/6/03	AO	7.09	445	59.1	130	256	100	0.0	128	56.8	140
	GN	7.6	452	63.7	57	277	200	0.0	208	56.8	160
	NN	7.84	463	66.0	87	262	250	2.4	184	49.7	150
	TN	7.66	470	51.6	97	276	200	0.0	136	53.25	160
09/07/03	AO	7.56	537	64.0	90	312	250	0.0	152	56.8	170
	GN	7.59	465	80.6	374	300	250	0.0	256	42.6	160
	NN	7.69	587	85.1	137	319	200	0.0	272	78.1	180
	TN	7.52	491	65.4	69	286	250	0.0	176	63.9	160
06/08/03	AO	7.68	455	27.8	45	255	200	0.0	96	49.7	150
	GN	8.14	459	406	69	298	250	2.8	112	42.6	160
	NN	7.98	450	58.2	77	269	250	0.0	136	56.8	150
	TN	8.12	503	41.0	64	290	300	0.0	104	49.7	180
27/08/03	AO	7.80	490	81.3	444	271	250	0.0	192	49.7	140
	GN	7.51	460	86.8	540	251	250	0.0	224	56.8	150
	NN	7.56	522	54.5	132	276	200	0.0	160	42.6	160
	TN	7.65	581	67.9	169	344	300	0.0	128	85.2	180
17/09/03	AO	7.40	525	91.1	173	330	150	0.0	232	49.7	160
	GN	7.93	446	58.3	60	303	200	0.0	128	42.6	150
	NN	7.53	526	85.4	163	328	250	0.0	208	49.7	160
	TN	7.58	493	52.2	158	316	250	0.0	224	42.6	200
09/10/03	AO	7.66	517	81.0	80	255	200	1.4	208	49.7	170
	GN	7.69	521	52.8	102	287	250	1.1	192	56.8	180
	NN	7.81	502	76.5	124	300	200	0.0	200	63.9	160
	TN	7.75	486	40.8	88	254	200	0.0	168	56.8	160
	AO	7.10	524	78.6	556	337	70	0.0	339.2	51.12	132
	GN	7.42	619	47.8	68	389	80	0.0	270.9	44.02	204

	NN	7.34	560	88.7	396	350	70	0.0	307.2	52.54	240
	TN	7.38	616	89.3	140	364	85	0.0	270.9	55.38	184
28/11/03	AO	7.76	422	65.0	--	--	400	0.0	121.05	41.18	120
	GN	8.07	585	44.2	--	--	560	0.0	116.48	48.28	178
	NN	7.90	437	88.1	--	--	400	0.0	117.62	46.86	118
	TN	*7.65*	*510*	*68.1*	--	--	*420*	*0.0*	*118.76*	*45.44*	*108*
04/02/04	AO	7.10	490	67.5	181	76	240	0.0	155.28	49.7	134
	GN	7.54	450	44.7	1709	254	230	0.0	82.16	38.34	126
	NN	6.71	575	68.4	516	301	130	0.0	274.08	42.6	124
	TN	7.11	443	50.6	13	53	200	0.0	73.04	35.5	124
25/02/04	AO	7.12	510	64.5	-	--	210	0.0	154.9	58.9	123
	GN	7.09	497	79.4	--	--	220	0.0	129.3	47.3	134
	NN	7.44	354	38.1	--	--	150	0.0	168.1	51.2	134
	TN	7.54	523	49.3	--	--	200	0.0	182.9	58.3	205

Source: Environment Lab, PMC

AO: Ambil Odha ; **GN :** Gaikwad Nala ; **NN :** Nagzari Nala ; **TN :** Tanajiwadi Nala

Where,

Cond. = Conductivity Tur. = turbidity
TSS = Total Suspended Solids TDS = Total Dissolved Solids
T. A. = Total Alkalinity D. O. = Dissolved Oxygen
COD = Chemical Oxygen Demand Cl = Chlorides T - H = Total Hardness

From the report it can be concluded that -

Though all these nallas were natural courses of water, now these have become drainage system to take the wastewater to the river. The COD values are much more as compared with any natural stream.

Turbidity of the nalla waters is too high. In comparison with the drinking water it is about 8 - 18 times.

Critical Observations

Data is available for PM10 parameter for only one site - Phule Mandai.
Maximum sample collection, analytical work is done on river pollution.

Comparison with Previous Observations

The contamination level of the Mutha river is not improved.
The nallas are still highly polluted and bring the contaminated water to the river.

Noise levels are very high at the sensitive zones and residential zones as compared to the standards prescribed.
The air pollution is increasing with the increase in number of vehicles.

Soil Pollution:

The loss of the fertility of the soil is known as soil pollution. These are caused due to the depletion of the important soil constituents. The nitrates and the phosphates are the important constituents of the soil and the depletion of these are done by the industries and the excessive use of the land for the development of houses and industries. Many harmful constituents are added to the soil due to rapid industrialization and discharging chemicals and solid waste into the land thereby polluting the fertile and topsoil. When the crops are grown in this soil the plants tend to die and if they live they become immune to such chemicals and starts absorbing them and when these are consumed by the human – beings or animals it causes harmful effects in them.

Soils have been cultivated intensively for at least 5500 years. Yet these centuries of intensive crop production have contributed relatively little scientific knowledge about soils. About 2000 years ago some crude fertility relationships were proposed. But, only in the past two centuries has appreciable scientific knowledge become known. Soil science, as we know today, embraces knowledge accumulated mostly in the last 60-80 years. Soils are the loose (unconsolidated) mineral or organic matter surface of the earth's crust capable of supporting plant growth. Soil sustains innumerable microbes and a large number of plants and animals along with plenty of mineral reserves for purposeful exploitation. Soil has different meaning to different people. Chemists consider the soil like an object endowed significantly with high buffering capacity while to a geologist, the soil is a means for asserting the age of the earth from a large number of isotopes present in it. Land is a valuable but fast depleting resource with increasing population. It has been estimated that the total surface area of the earth is 3,15,14,640 square kilometers. About 30 percent or 91,56,800 square kilometers is land surface. The human population is living on 75.2 market square kilometers. Presently there are more than 75 people living per square kilometers of land. India is losing 6,000 million tons of topsoil per year in the Ganga basin alone caused by ruthless deforestation, thus leading to severe erosion problem.

Table 12.11 Standards of soil

Sr. no	Soil quality	Gradiation in order of production potential based on specific value/range		
	Parameters	Soil with high production potential Grade 'A'	Soil with average production potential Grade 'B'	Soil with poor production potential Grade 'A'
1.	PH	6.5 – 8.5	5.5 – 6.5 or 8.4 – 9.0	<5.5 or >9.5
2.	Electric conductivity mho/cm	0.2 – 0.5	0.5 – 4.0	>4.0 & 0.2
3.	Cation exchange capacity meq/100ml	>30	10 – 30	<10
4.	Exchangeable Na %	<5	5 - 15	>15
5.	Available P Kg/ha	40 - 60	20 - 40	<20
6.	Available k Kg/ha	>280	110 - 280	<110
7.	Organic Carbon %	>0.75	0.5 – 0.75	<0.5

CHAPTER-THIRTEEN

Steps taken by PMC for the Improvement of the City's Environment

Pune Municipal Corporation has not only prepared the eighth Environmental Status Report, but also formulated an action plan to improve the environment and to reduce the pollution in the city. PMC is aware of its responsibility of providing most of the services, which directly impinge on the environment. It is also aware that the environment can be improved only with people's participation. This attitude of the PMC will ensure an environmental balance and lead towards a sustainable development of the city. An effective environmental management strategy must cover the issues pertaining to promotional activities, regulatory measures and citizens interface. The following environmental management strategies address the basic environmental concerns of the city. The given table throws light on various mechanisms to help realize the basic objectives in the given time frame.

KEY OBJECTIVES:

- Reduction in air pollution within the city by 50% within two years.
- Increasing the green cover by 50% within two years.
- Sanitizing the river flow by increasing the quantum of treated effluent from the existing 20% to 75%
- Rehabilitating 10% of existing slums in formal housing within the next two years.

Sr.No.	Initiatives	Status
1.	**GENERAL ADMINISTRATION**	
	• Ward Level committees were formed to guide ward level administration	Initiated
	• Gadgebaba cleanliness drive was undertaken to improve health and hygiene of citizen.	Initiated
	• Evolving criteria for evaluating ward-level administration through competition.	Initiated
	• Preparing ward level Map based Information system. (MIS)	Initiated
	• First energy park with MEDA at Peshve Park.	Initiated
	• E – governance – efforts to provide computer to all departments and at ward level for effective administration and using I.T. particularly for tax and octroi departments of PMC.	Initiated

	• Encouraging NGO initiatives to clean river INTACH along with other NGOs and corporate sector has initiated actions to clean and beautify river system. PMC has committed necessary support for the above.	Initiated
	• List of Heritage structures is finalized for old PMC area and similar work for newly added villages is being started.	Initiated
2.	**DEVELOPMENT PLAN**	
	• Preparation of a Development Plan for newly merged area considering the environmental aspects i.e. to integrate environmental planning with the DP to make them compatible with each other.	Initiated
	• While preparing the Development Plan, it is to be ensured that proper land suitability study is conducted and plan is evolved for harmonious development.	Initiated
	• Use of satellite imageries, Geographical Information System and other modern equipments must be used for the perfection of the data	Initiated
	• Prevention of unauthorized constructions	Initiated
	• Assess the need for midterm revision of the existing Development Plan, in order to integrate it with the proposed development plan of the new area	Scheduled verification due in 2007
	• Preparation of new town planning schemes for the thorough implementation of existing development plan and also fully implement the sanctioned TP schemes	Not started
	• Integration of the internal roads of the layouts with the public roads wherever necessary to facilitate mobility	Initiated
	• Preparation of a comprehensive plan for alignment of roads U/S 205 of the BPMC Act, in the peripheral areas of the old DP where DP roads are insufficient	Initiated
	• Initiate modifications in the DC rules to promote use of non conventional energy sources, conservation and reuse of water and waste segregation and onsite Vermiculture composting methods	Partly initiated

	• Formulation of a strategy for the development of open spaces of private layouts for recreational purposes	Initiated
	Reviewing the existing strategy of preservation of hill top and hill slope and also the green belts against the backdrop that they become easy target for informal housing.	Initiated
3.	**SLUMS**	
	• Implementation of revised Appendix 'T' for slum rehabilitation project	Initiated
	• Creation of Transit Camps to facilitate SRPs	Proposed
	• Construction of the third phase of Sulabh Toilets Scheme	Initiated
	• Implementation of Identity Card for Slum Dwellers	Initiated
	• Rehabilitation of Slum Dwellers through the Valmiki Ambedkar Aawas, Lok Aawas Schemes	Initiated
4.	**WATER SUPPLY**	
	• Development of a water supply system for newly added areas	Under implementation
	• Replacement of old pipelines	Under Implementation
	• Shifting of water lines under road widening	Under Implementation
	• Performing water and energy audits for water supply	Initiated
	• Formulation of a policy for groundwater tapping and water harvesting	Initiated
	• Procurement of new water pumps and a 100% standby for the existing water supply system	Undertaken
	• Automation of pumping system and procuring and fixing of Automatic Power factor control units	Undertaken
	• Using modern techniques of communication for synchronization and for increasing the efficiency of water supply system	Proposed
	• Keeping complaint redressal cell, alert and active	Initiated
	• Using modern techniques and equipment for efficient operation and maintenance of the system	Initiated
	• Preparation of water quality and water pressure profile	Data collection profile is done
	• Using DI pipes for laying distribution systems in new areas to prevent the unauthorized tapping of water	Initiated

	• Energy audit is to be prepared with professional consultant and in association with USAEP – Alliance.	Initiated
5.	**HEALTH AND SOLID WASTE MANAGEMENT**	
	• Further streamline the zero garbage concept	Initiated
	• Improvements at Uruli Devachi site: Construction of compound wall, introduction of Geo-textiles for land fill	Initiated
	• Disposal of the Bio-medical waste in a proper manner	Initiated
	• Optimal routing of SWM vehicles to lessen running costs	Initiated
	• Modernization of fleet vehicles	Initiated
	• Ban on use of plastic bags and punishment for violators	Initiated
	• Implementation of Integrated Population and Development Project under UNFPA for population control	Initiated
	• Setting up of Bio-gas/waste to energy modules project.	Initiated
	• Dry-waste recycling	Initiated
	• Decentralized methods of segregation and composting technology.	Initiated
	• Prevention of unauthorized Chinese and other food stalls	Proposed
	• Health awareness programme in collaboration with social organizations	Initiated
	• Appointments of NGOs to collect dry recyclable at various transfer stations.	Initiated
	• Construction of a taruma hospital at Bopodi	Proposed
	• Provision of academic facilities at Kamla Nehru Hospital	Proposed
	• Extension of health facilities and various national programmes to the newly added areas	Initiated
	• Impose ban on gutkha of all types	Initiated
	• Take strict action against swines and stray dogs	Initiated
6.	**SEWERAGE AND DRAINAGE**	
	• Revision and fresh delineation of natural drainage system of the city as the DP provisions are insufficient	Proposed
	• Completion of SPSs and STPs at Bhairoba, Tanaji wadi, Bopodi and Erandwane with capacity of 215	All most completed

	MLD and to set up an integrated system of biogas plants to utilize liquid and solid waste	
	• Commencement of STP works at Vitthalwadi and Tofkhana, with a capacity of 33 MLD	Initiated
	• Construction of Pumping Stations at Botanical Garden and Mental Hospital	Proposed
	• Completion of Nala canalization work	Initiated
	• Development of sewer lines in newly added area	60% work done
	• Creation of up to date databases.	Proposed
7.	**ROADS AND TRANSPORTATION**	
	• Measures to implement the proposal of bypasses around the city	Partly initiated
	• Further impetus on removal of encroachments from roads and footpaths	Initiated
	• Strict imposition of ban on six-seaters and heavy vehicles on remaining major roads	Initiated
	• Creation of pedestrian walk-ways and compulsion of bicycles in certain areas of the congested city	Proposed
	• Strengthening of the PMT fleet to improve public transport	Proposed
	• Completion of the various projects like fly-overs, ROBs, FOBs, other road widening works and concretization programs initiated by the PMC and Maharashtra State Road Development Corporation.	Initiated
	• Introduction of Countdown Timers and Area Traffic Control System at all the major intersections	Initiated
	• Synchronization of traffic signals on all arterial roads	Initiated
	• Shifting of 23 statues from certain chowks, which are causing obstruction to the traffic	Initiated
	• Construction of an exclusive cycle track along the alignment of Mutha left bank canal passing through Shivaji nagar TPS, construction of other roads along the embankment of other canals as decided in the meeting The Hon. Irrigation Minister.	Initiated
	• Expedite implementation of the project for shifting of Juna Bazar to ease traffic congestion near Maldhakka	Proposed
	• Further co-ordination between various utilities operations in the city to avoid duplication of works and constant digging of roads	Initiated

	• Discourage use of road spaces for dumping of construction material through necessary regulations, particularly in the congested area	Initiated
	• Balance the use of road space for traffic vis-à-vis parking	Proposed
	• Move the State Government and Central Government authorities to introduce the CNG and LPG dispensing centers with adequate infrastructure in the city.	Initiated
	• Move MPCB for remittance of grant in aid for purchase of new buses for PMT as decided in the meeting held in Mumbai.	Initiated
	• Imposition of bans on registration of new diesel three and six seaters rickshaws in the city.	Initiated
	• Modernization of the vehicle fleet in service of the Pune Municipal Corporation.	Initiated
	• Stricter Implementation of PUC rules	Initiated
	• Reduce dust nuisance on roads	Proposed
	• Shifting of the goods yard from Pune Railway Station	Proposed
8.	**ECO – CELL**	
	• Preparation of Air pollution maps, greenery maps etc.	Proposed
	• Strengthening of the Environment Laboratory	Initiated
	• Awards for environment friendly layouts/societies on following criteria; Vermiculture, segregation of household waste, development of open spaces, conservation and reuse of water, parking facility, landscape, use of non-conventional resources etc.	Proposed
	• Preparation of Disaster Management Plan	Finalized
	• Enhance environmental awareness through citizen participation	Initiated
	• Expansion of school education program to other schools	Initiated
	• Creation of silence zones	Proposed
	• Disseminate information on pollutants through Pune Municipal Corporation's website at www.punemahapalika.org	Initiated
	• Plan for a database and pro-active MIS for	Initiated

	monitoring and evaluation of environment management	
	• Increase daily work schedule timing from morning 6AM to night 11PM	Initiated
	• Strengthening the Nuisance Detection squad to reduce noise pollution (citizen education campaign)	Proposed
	• Check each plastic manufacturer if they are producing degradable plastic bags.	Proposed
9.	**GARDEN/ RIVER/ LAKE/ NALLAS:**	
	• Implementation of the concept of 'Nalla Garden' on the basis of BOT	Work Started
	• Surveying of the green spaces and preparation of a green map of Pune and to carry out the tree census for the city	Work Started
	• Afforestation program at Pachgaon Parvati hill with 300 hectares of land	Land acquisition Started
	• Transplantation of trees during road widening	Over more than 1000 trees are transplanted and the afforestation continued.
	• Development of an Energy Park at Peshwe Garden	Work started
	• Prepare an action plan for the preservation of various lakes in the city	Started
	• Expedite implementation of remaining works under the Mutha River Improvement Project	Work Started
	• Empowering the Nuisance Detection Squad to detect the wastes thrown into the rivers	Initiated
	• Maintaining cleanliness of the Khadakwasla Dam backwaters and along MRBC	Initiated
	• Construction of an athletic track at Sanas ground meeting Olympic standards	Initiated
	• Development of theme parks in the city • Desilting of Katraj lake.	Work started
10.	**FIRE BRIGADE**	
	• Purchase of more and better equipment to improve efficiency	Initiated
	• Establish fire stations in newly added areas, improve access to habitations for fire control	Proposed

Fact Sheet of Environment of Pune City

FORM OF GOVERNANCE : Urban Local Body

NUMBER OF CORPORATORS : 146 Elected and 5 nominated members

ECONOMIC ACTIVITIES : Industrial
Service organized sector
Unorganized sector

NUMBER OF ADMINISTRATIVE WARDS : 14

NUMBER OF ELECTORAL WARDS : 48

LOCATION AND CLIMATE

- Pune lies at 18 degrees 32 minutes North; 73 degrees 51 minutes East at about 550 meters above mean sea level.
- Temperature at Pune ranges from 15^0C to 40.7 ^{0}C with 68cm (annual average) rainfall.

LANDUSE

- Total area of extended Pune City : 243.96 sq.km.
- Old PMC area : 146.13 sq.km.
- 23 villages included in 2001 : 97.83 sq.km

STATUS OF DEVELOPMENT PLAN

- D. P. for old PMC area was approved in 1987. Draft D. P. for newly added villages was published in 2002. The committee appointed by the State Government is hearing Objectives/suggestions from public.

POPULATION

- Total population 2000- 2001 : 25,40,089
- Approximate population, 2003 – 2004. : 30,25,000
- Projected population 2021 : 44,44,000

BUDGET OF PMC 2003 - 2004 : Rs.907.11 crores

SLUMS

- Population of slum dwellers in Pune : 34% of the total population
- Total slums : 503
- Declared slums : 353
- Population of slum dwellers (approximate) : 10,25,000

WATER SUPPLY AND TREATMENT

- Parvati water works supplies : 470 MLD
- Lashkar water works supplies : 270 MLD
- Other water works : 57 MLD
- Per capita per day supply : 195 liters (after adjustment for leakage)

- Other problems
  1. Inequitable distribution of water due to low water pressure and insufficient distribution network.
  2. Leakage in old pipelines.
  3. Pipelines of smaller diameters than required.

SOLID WASTE MANAGEMENT

- Waste generated everyday : 1325-1465 metric tons
- Dry waste / Wet waste : 50% : 50%
- Waste generated per person per day : 0.48 Kg
- Number of vehicles : 206
- Dustbins cleaned : Every 1, 2,3 days or weekly.
- Transfer center : Hadapsar
- Kothrud depot : 11.6 Hectares, closed in 1999
- Urli Devachi : 17.2 Hectares, present disposal site
- Cost of collection and transportation per ton : Rs. 1421/-
- Number of Incinerators : 3

SEWAGE

- Sewage generated : 450 MLD
- Sewage generated per person per day : 148 liters
- Number of existing treatment plants : 6
- Area covered by these treatment plants : 183.7 sq. km.
- Total capacity of treatment plants (complete) : 215 MLD (47.75 %)
- Total installed capacity after completion Treatment plants in 2005 : 243 MLD (54.00%)

NALAS

- Major nalas in old PMC/new PMC : Total = 14
- Ambiloda nala : 25 MLD
- Bhairoba nala : 30 MLD
- Gaikwad nala : 12 MLD
- Nagzari nala capacity : 20 MLD

ROADS AND TRANSPORTATION

- Estimated No. of vehicles in Pune City : 12,00,000
- No. of vehicles registered, 2004 : 1,03,056
- Percentage of Bus commuters : 32.66%
- People per motorized vehicle : 2.5

ACCIDENTS

- The population has increased 4 times and number of vehicles has increased 87 times in the last 40 years.
- Number of accidents till June 2004 : 1007

GARDENS

- Number of gardens : 64
- Area of gardens in Pune City : 139.11 Hectares
- Number of proposed gardens : 32

FOREST

- Total forest area in Pune : 338.64 hectare
- Encroached forest-land : 47.06 hectares

TREE

1996-1997 tree census : 32,88,205 Trees (ornamental and fruiting trees)

Estimated tree population in 2001

Old PMC limits	146.13 sq. km.	: 25,00,000 (approximately)
Added 23 villages	97.83 sq. km.	: 20,00,000 (approximately)
Total PMC area	243.96 sq. km.	: 45,00,000 (approximately)

HILLS

Hill and hill slopes in Pune : 10-15%

AIR POLLUTION

The data below shows the air pollution levels:

- Fuel used (petrol +diesel) : 1800 Kilo liters per day
- Pollution caused by vehicles : 70% of total pollution
- Maximum levels of PM_{10} in 2004 : Phule Mandai 211.68 $\mu g/m^3$
- Particulate matter 6 Tons/day : 36.885 Kg per Sq. Km/day (3.543 g per day per person)
- SO_2 gas 300 Kg/day :1.845 Kg per Sq. Km/day
- CO gas 20 Tons /day : 122.97 Kg per Sq. Km/day
- NO_X gas 1.707 Tons /day : 10.50 Kg per Sq. Km/day

NOISE POLLUTION

The data below shows the noise pollution levels:

- Maximum levels of noise in 2004 : Phule Mandai 85 dB

HEALTH

Diseases	Cases
• Number of malaria cases 2003	: 228
• Number of dengue cases 2003 (suspected)	: 245
• Number of cholera cases 2003	: 11
• Number of Gastro cases 2003	: 986
• Number of Jaundice cases 2003	: 47

Number of stillbirths and infant mortality has increased in 2003 as compared to one in 2002.

EDUCATION

- Total number of Municipality Schools : Primary schools : 18
  : Secondary schools : 109

Foreword By The Municipal Commissioner

Everything that surrounds us impinges on our lives. All these things together comprise our Environment. And it is in this environment that we earn our daily livings. The environment determines the way in which all living beings, whether man or other animal, live.

All round development of any settlement is based on certain criteria. These criteria can be satisfied through the use of planning tools such as proper policies, long-term plans and projects. These projects should be designed in such a way that they improve the living standards of the citizens with a collaborative approach. In fact an environmentally sensitive planning can be achieved only through environmental awareness. This can be catalyzed by networking the civil society viz. elected representatives, administrators, academicians, NGOs, traders, and industrialists as well as deprived sections as the key players. The Pune Municipal Corporation can step forward as a convener of such collaborative networks. We can help connect these key players and assist in getting them started by providing resources. We must note that collaboration may not eliminate litigation, but it can minimize it. Collaboration doesn't take us away from hard decisions, but it improves acceptance. I am convinced that formalized collaboration is the next great leap in environmental productivity and therefore the Pune Municipal Corporation should lead the way.

The aim of any sustainable developmental is to maintain the balance between environment and development. In ancient days, this balance was maintained as man used to work in accordance with his natural environment. But thanks to the development in the form of civilization and the resultant urbanization, man has manipulated nature using modern technologies. This has no doubt increased his living standards, but has also separated man from his supportive environment. The corollaries of this unchecked development are perils such as water, air and noise pollution. These have not only affected human beings but also affected the bio-diversity in general, resulting in a change in the balance of nature.

In fact on the backdrop of this imbalance, that the 74th Amendment Act of 1992, section 234, para 12, subject number 8, Maharashtra State Municipal Corporations and Municipal Council Act 1994, section 67A were adopted to make it mandatory for Municipal Commissioners to table a report on the status of environment in front of the general body of the Municipal Corporation before 31st July of each year.

In accordance with the above, I am pleased to place this ninth successive report on "**Status of Environment**" of Pune city for 2003 – 2004 before the

General Body of PMC. This year, we felt it appropriate to involve Maharashtra Social Housing & Action League (MASHAL) in the preparation of the detailed report. MASHAL has the required experience and expertise and has prepared ESRs for Pune, Navi Mumbai, Aurangabad, Nanded, Jalgaon, Bhusawal, Ahmednagar, Sangli-Miraj and Bhiwandi Municipal Bodies in the past.

Merely eight weeks ago, I joined as the Municipal Commissioner of Pune. The days since, have been spent getting acquainted, listening and beginning the important process of understanding the imposing civic issues and determining how best to focus administration to tackle them. Nevertheless during this short span, the views and perception of elected corporators, city administrators and of common citizens regarding the environmental issues were considered during the preparation of this Environmental Status Report. For this, MASHAL circulated fact-sheets, maps and questionnaires and collected the necessary feedback.

As expected in 74th constitutional amendment act Pune Municipal Corporation has successfully decentralized administration and has formed fourteen administrative wards to respond to local situation and encourage people's participation. Recently concluded 'Sant Gadge Baba Urban Cleanliness Drive' and efforts to map ward level infrastructure for effective administration are main features of grass root administration.

My main agenda during the course of the next year would be to fix certain targets towards the betterment of city's environment since the nature of the problems and challenges we face today are extraordinarily imposing. The new dimension is that we also have to realize them faster in order to remain competitive with leading cities of the country. Pune needs to deal with all the environmental issues very carefully in order to maintain its position as a cultural, educational and modern industrial center. PMC would like to see that the city life is not adversely affected by environmental deterioration. Accordingly, key initiatives have been broadly spelt out with a time bound action plan. We will work on them more systematically during the course of the year.

I am given to understand that in the past one year the print and electronic media has reported on various environmental issues within the city. These reports were also considered while drafting this report.

We are proud to state that PMC has already initiated new technologies in its fight against pollution problems. The use of world-renowned EM technology at its solid waste management landfill site at Devachi Urali is just one of the examples. Source segregation of solid waste and vermi-culture is also practiced widely in the city. PMC has taken lead in rainwater harvesting by

effecting necessary changes in development control rules, which has received many accolades from around the country. Our Garden department has successfully completed several projects, which are detailed in this report. In the last few years PMC has started a number of projects for efficient water supply and sewage treatment. PMC also boasts of a well-equipped environmental laboratory to monitor pollution levels in the city. The report indicates several alarming trends vis-à-vis ambient levels of pollution, which need to be monitored and combated seriously. PMC has prepared an action plan for such pollution control. Certain harsh regulatory steps need to be taken keeping in mind the larger public interest and to contain the growing strain on the city's environment due to the ever-increasing activities within the city.

At the same time, the public participation is encouraged in such a way that the regulation is not for "policing" but for "sustainable development". I again emphasize that spreading public awareness about sustainable development will be the prime concern for the Municipal Corporation in the many days ahead.

Dr. Nitin Kareer, IAS
Municipal Commissioner,
Pune Municipal Corporation
July,2004.

Preface

Do not believe in what you have heard,
Do not believe in tradition
because it is handed down many generations.
Do not believe in anything
because it has been spoken of many times.
Do not believe in the written word
because it came from some old sage.
Do not believe in conjecture.
Do not believe in authority
or teachers or elders.
But after careful observation and analysis,
if it agrees with reason
and if it benefits
one and all,
accept it and live by it.'

Buddha - the awakened one
563 B.C. - 483 B.C.

These words of wisdom are guiding the *Punekars* and the Pune Municipal Corporation (PMC) in pursuing the preparation and publication of the 9th Environmental Status Report for the City.

Pune Municipal Corporation came into existence on 15th February, 1950. The Pune Municipality is an old institution found in 1858, and has a tradition of being on the forefront of urban improvement and urban development.

The first Municipal Corporation was set up in the former presidency of Madras in 1688 and was followed by similar corporations in Mumbai and Calcutta in 1762. The base of the present structure of the municipal bodies in India is Lord Ripon's resolution on local self-government, adopted on 18th May 1882. Since then the structure of the urban local bodies has not changed much except for the newly added constitutional powers to the local municipal bodies by the Constitutional Amendment Act in 1992.

As per the BPMC Act, 1949, the legal duties of PMC are categorized under Obligatory and Discretionary in Sec 63 and 66 of the Act.
Some of the obligatory functions are as follows:

- Erection of the boundary of the city defining the city limits
- Sewage services
- Streetlight services

- Maintenance of monuments and open spaces
- Maintenance of burial grounds and funeral homes
- Primary education services
- Water supply services
- Preventing and checking the spread of dangerous diseases.
- Watering, scavenging and cleansing of all public streets and places
- Drainage services
- Identification of streets and houses
- Construction of public markets and slaughter houses
- Construction and maintenance of bridges and roads.
- Maintenance of relief works in scarcity and flood-affected areas, etc.

Some of the discretionary functions are as follows:

- Construction and maintenance of maternity homes and infant welfare homes
- Swimming pools and other public health services
- Tree plantation along the roadsides
- Holding of exhibitions, athletics or games
- Construction of theaters, community halls and museums, etc
- Construction of or purchase of staff quarters
- Construction and maintenance of higher educational facilities/ institutions
- The removal of animals and birds causing nuisance
- The building or purchase of suitable dwelling units
- Surveys of building and lands
- Provision of shelters to homeless and relief to the poor

The 74th amendment to the Constitution of India passed in 1992 gave considerable powers to urban local bodies to study local environment, to adopt environment-friendly policies and to prepare projects to suit given situations to solve problems created in the process of urbanization. It was with this Amendment, preparing an Environment Status Report (ESR) and tabling it to the General Body of the elected representatives on or before 31 July of every year became an obligatory duty of the Municipal Corporations.

PMC is the only Municipal Corporation in the country that has undertaken such an exercise year after year! Further, it has taken the initiative of starting its own environmental laboratory and forming an Eco-cell to guide the citizens on environment-friendly practices. Such an initiative has helped the elected representatives and common citizens to understand their own immediate environment. In the process, it has paved the ground for building public opinion, which will lead to environment-friendly policies and projects.

From the current year, the Pune Municipal Corporation started the practice of discussing the environment issues with the public and take note of their

views and suggestions in the preparation of the ESR Report. A meeting of environment-activists, PMC officials, media representatives and concerned persons from other fields was held in June 2004 to brainstorm the process of preparing the ESR. Hon. Mr. Mohan Dharia chaired the session.

The consensus of the meeting was that the ESR should not be just an exercise of collection of information from various departments of PMC and presenting it in the form of an attractive publication. The ESR, the meeting opined, should question the very development process and bring out issues. It should also give positive suggestions and audit commitments and resolutions made in earlier ESRs. The meeting further suggested that the ESR should audit every important development project undertaken by the PMC or by any private body. Another suggestion, though not directly under the purview of the ESR, was to reflect on decentralized (ward-wise) administration of PMC.

PMC appointed Maharashtra Social Housing and Action League (MASHAL) to prepare the ESR Report for 2004 and study the city environment and recommend suitable environment-positive policies and projects. MASHAL has been associated with this work of PMC in the earlier years also. Besides, MASHAL has prepared such reports for several other cities of Maharashtra.

'Environment is a sum total of conditions that surround human beings.'

People in different places differ in their way of living, food habits, shelter, clothing and as such, environmental conditions are not the same every where. Environment is broadly divided into two categories – Physical and Cultural. Physical environment is further divided into two parts- Biotic and Abiotic. Location, topography, size and the form of the region are the physical features of a living environment. Soil, natural vegetation and animal life are all the features of the living environment. Ethnic groups, religion, form of the government, population etc. are the features of the cultural environment. Apart from the resource base, Government's attitude, ideology and approach to developmental issues determine the economic environment of the country. Local self-government's understanding of the environmental issues and its capacity to act on priority basis can improve the environment situation. Physical factors of environment are relatively more static to the cultural factors, which portray a more dynamic nature.

The winds of, Liberalization, Privatization, Computerization and Globalization have been changing cultural factors of our civilization at a very fast pace. There is a marked change in the expectations and value system of human population. Technological and scientific achievements and changes in Information Technology in particular have altered many aspects relating to human being and his environment. One notices change in the way human beings relate to each other and with the environment. The actions of a human being on environment have a very powerful effect and increases ecological disorders. Interestingly, human actions are not always

forethought or pre-planned and may not necessarily be beneficial to mankind in the long run.

Above understanding will help the Policy makers, Planners, Administrators and concerned common Punekars to be aware of the relationship of man and environment.

MASHAL, in its Report for 2004, has studied the city infrastructure and civic facilities such as water supply, sewerage, sanitation, electric and telecommunication facilities, recreational and historically important places since they have an important bearing on the environmental situation of the city.

Mr. Sandeep Joshi, Senior Environmental Scientist authored the chapter relating to pollution and reviewed the data given in earlier ESRs of the city. For the first time in the history of preparation of ESR, the report of 2004 gives trend related to pollution in the city as observed over years.

PMC completed the identification of ambient concentration of air pollutants, such as SO_2, NOx, SPM by actually monitoring ambient air quality along roadsides to capture the effects of traffic emissions. Identification of water quality (drinking water source, river, water bodies) and concentration of water pollutants pH, BOD, SS and DO are on-going process activities of the Environmental Laboratory of PMC.

Rough quantification of existing domestic and industrial waste collection was made and disposal of solid waste was studied by PMC. Information regarding existing terrestrial ecological features such as agriculture, forests, flora and fauna and animal life was collected for the purpose of holistic ESR.

MASHAL has also tried to collect environment-related views of local environmentalists, elected representatives and of concerned common citizens. MASHAL circulated a fact-sheet of the environmental aspects to all the elected members of PMC along with a questionnaire seeking their views. A large number of them gave their suggestions and opinions and some of the interested corporators invited us for longer discussions on various aspects. Environment-conscious citizens responded to our appeal and gave their feedback. It was heartening to note that the staff members of PMC took keen interest in the process of preparing ESR. The press media gave good coverage to environmental issues and helped to increase awareness amongst the citizens.

The Zonal officers, Ward officers and all the Heads of the Departments (HOD) cooperated with MASHAL in making available the required information. However, there were instances where MASHAL found it difficult in getting the required data. But such instances were very few and with some effort from the PMC, they could be avoided in future.

The environment cell of PMC is functional since 2000 and has started well-equipped environmental laboratory from September 2001. However, there is an urgent need to strengthen the facilities of this laboratory. PMC has nominated Environmental Committee comprising elected members of PMC, representatives of government departments like RTO and members of NGOs.

The Municipal Commissioner Along With PMC Staff In A Brainstorming Session With Shri Mohan Dariya And Environmentalist

MASHAL hopes that this ESR is used by the elected representatives, administrators, local NGOs, media and common citizens to improve the city environment with people's participation.

Sharad Mahajan
MASHAL

Urban Community Development

Under Suvarna Jayanti Shahari Rojgar Yojana Urban Community Development Department has developed a 3-tier community structure in all the slums irrespective of their declaration status. At present there are 2,038 NHGs (Neighbourhood Groups) which consist of 50 houses. These 50 houses elect a women representative who will work as a volunteer for the NHG. This Volunteer is called as RCV (Resident Community Volunteer). At present there are 2,100 RCVs working for NHGs. These RCVs are given short term training by UCD. Every month NHG meeting is conducted by RCV. Problems of NHG and NHG member's are discussed in the meeting. Problems are solved on the basis of self help approach. If any external help is required from any government PMC co-ordinates and supports through the NHG. RCV work is a link between NHG and developmental agencies.

NHG has undertaken various awareness programs like health education programs, anti superstition programs, aids awareness programs, cleanliness drive, tree plantation drive. It is very encouraging that NHGs has taken big initiative to clean their areas on their own in "Sant Gadge Maharaj Swachata Abhiyan". Municipal commissioner recognized the importance of NHGs participation in this drive and he himself conducted meetings with RCVs and appealed them to keep their area clean. Because of this NHGs participated very enthusiastically. NHGs participation in this drive has helped Pune Municipal Corporation to win 2nd prize in competition. In this drive NHGs have also undertaken 80-tree plantation drive in open area available near the slums. Tulsi saplings were distributed to all the NHG members. Now Tulsi Saplings has become a symbol of NHG membership in many slums. During the tree plantation and cleanliness drive, awareness about environment was also focused. Members were educated about the importance of clean environment, saving of water, keeping drainage system clean, importance of cleanliness for health and the role of NHGs to maintain clean environment. There are 1,450 saving groups in Pune slums which has 16,500 members and saving of Rs. 86,00,000/-. Saving groups has given loan of Rs. 1,11,00,000/- to 13,000 members. In saving groups monthly meetings importance was given to 'cleanliness for health'.

For creating awareness street plays were developed by NHG members themselves and these groups performed street plays in different slums. A clean NHG competition was also organized by the UCD and most of the NHGs have qualified for "A" Grade. K. Nanasaheb Parulekar Charitable Trust has independently conducted the inspection of this competition and has appreciated the cleanliness and enthusiasm and participation of NHGs.

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Mayor	:	Ms. Dipti Chowdhary
Deputy Mayor	:	Mr. Dilip Barate
Standing Committee Chairperson	:	Ms. Sangita Devkar
Municipal Commissioner	:	Dr. Nitin Kareer, I.A.S.
Additional Municipal Commissioners	:	Mr. D. S. Zagade, I.A.S. Mr. D. Rajurkar, I.A.S.
ESR Co-ordinator	:	Mr. Vivek Kharwadkar (D. E. Water Supply)
PMC Officers	:	Mr. Arun Patil (Joint Municipal Commissioner) Mr. Ashok Kalamkar (Joint Municipal Commissioner) Mr. Shirish Yadav (Dy. Municipal Commissioner) Mr. Lahuraj Mali (Dy. Municipal Commissioner) Mr. Damse (Dy. Municipal Commissioner) Mr. Anil Gaikwad (Dy. Municipal Commissioner) Mr. Prashant Waghmare, City Engineer Dr. P. S. Dhaigude (Medical Officer, Health Dept.) Mr. Shrinivas Bonala, (D.E., Traffic Planning.) Mr. Madhav Latkar (D.E, Sewerage Operation.) Mr. Manoj Khairkar (D. E. Road Dept) Mr. Laxman Raut (Chief Fire Officer) Mr. Yashwant Khaire (Garden Superintendent) Dr.R.R.Pardeshi(Dy.MedicalOfficerHealth, Mr. P.S. Beldar (Drainage Dy. City Engineer.) Mr. Prakash Kanbarkar Dy. C.E. (P.W.W) Mr. V. R. Khadake (HOD, Census Department.) Mr. Aniruddha Pawaskar (A. E., Development Plan) Mr. N. V. Kulkarni, (A.E., Traffic Department.) Mr. Dharmalkar (A.E. Water Supply) Mr. Dilip Kulkarni (Depot Superintendent, Municipal Solid Waste.) Mr. Mangesh Dighe, (J.E., Traffic Department.) Mr. Nitin Sable, (J.E., Traffic Department.) Mr. Jadhav, (J.E., Traffic Department.)

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Mr. Rahul Jadhav, (Jr. Scientific Officer, Environment Lab.)
And All the Zonal Officers, Ward Offices and Ward Level PMC staff

Others : Hon. Mr. Mohan Dharia, Vanrai
Mr. Vijay Paranjpye, GOMUKH
Mr. Sujit Patwardhan, Parisar
Ms. Aneeta Benninger, Director, CDSA
Ms. Ushaprabha Page, Ecoscape/ Ecological Society
Mr. Sandeep Joshi, Environmental Technologist, Clean River Committee
Mr. Jayant Kelkar, Secretary, Vanrai
Mr. Shridhar Sadhale, Kirloskar Consultants
Mr. Nandu Kulkarni, Nisargpremi
Mr. Parag Karandikar, Sakal
Mr. Shaswat Gupta Ray, Herald
Mr. Ajay Kamble, Dinman

Corporators : Most of the sitting and Ex. Municipal Corporators

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Ms. Sneha Telang, Architect Planner- trainee
Ms. Shubhangi Kadam-Shirole, Architect Planner
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Mr. Ashok Kulkarni
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Mr. Balaji Waghmare, Draftsman
Mr. Arun Kolte, Draftsman
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