Chapter II

STUDY AREA

2.1 Introduction
2.2 Pune Municipal Corporation (PMC)
2.3 Pimpri Chinchwad Municipal Corporation (PCMC)
2.4 Location and Extent (PMC & PCMC)
2.5 Physiography
2.6 Climate
2.7 Drainage
2.8 Demography
   2.8.1 Population Growth Trends (PMC)
   2.8.2 Population Growth Trends (PCMC)
   2.8.3 Population Growth Trends in PMC and PCMC
2.9 Landuse of PMC and PCMC
   2.9.1 Land use (PMC)
   2.9.2 Land use (PCMC)
2.10 Landuse/Landcover of PMC and PCMC area based on SOI
    Toposheet, LANDSAT ETM+ and IRS P6 LISS-III Classified Images
2.11 Landuse change (PMC)
2.12 Landuse change (PCMC)
2.13 Pune City Growth
2.14 Pimpri-Chinchwad Growth
2.15 Conclusion
Chapter II

STUDY AREA

2.1 Introduction

Pune’s origins can be traced small agricultural settlement called ‘Punyak’ in 8th century A.D. In mid 18th century, Pune became a seat of ‘Peshava’ then it become a predominantly market place and mixed landuse prevailed. Pune’s political importance diminished with defeat of Peshva’s in the battle of Panipath in the year 1761 and finally after defeat of Maratha’s. Political fortunes of Pune came in hands of British in year 1818. Under British rule Pune Municipality came into existence. Today it has three cantonment areas which are within the geographical limits of Pune Municipal Corporation (PMC). The head quarter of Southern Command and Indian Army is situated in Pune.

After independence, until 1960, Pune’s socio-cultural life was dominated by intellectuals, writers, scholars. By 2000 A.D. Pune has taken lead in engineers, software, automations, automobiles, machines & machine tools and electronic industries.

Alongside, Pune has been functioning as one of the engines powering the Indian economy. The Mumbai-Pune corridor has emerged as the most vibrant economic belt of the nation. Pune has capitalised on its strategic positioning, its close proximity to India’s commercial capital Mumbai. The industrial development in Pune began in 1953 with the establishment of Hindustan Antibiotics at Pimpri and Kirloskar Engines at Khadki. In later years, several other establishments followed.

Pimpri-Chinchwad is situated towards the northeast of Pune and 160 km. from Mumbai. The city of Pimpri-Chinchwad is predominantly an industrial area, which has developed largely during the last four decades. Pimpri Chinchwad is a relatively newly developed urban area of Pune city. Pimpri was basically established as a centre for refugees from Pakistan. Industrialisation in Pimpri area commenced with the establishment of Hindustan Antibiotics Limited in 1956. The establishment of the Maharashtra Industrial Development Corporation (MIDC) in 1961-62 considerably facilitated industrial development in the area. The establishment of large-scale core industries has led to the growth of ancillary and small-scale industries in and around this industrial belt. With each passing year, the landscape saw significant changes, long stretches of farmland giving way to clusters of enclosed factory campuses. Just as the manufacturing prowess of Pune is well documented and acknowledged, it is
difficult to ignore that the first Software Technology Park (STP) of India had its home in Pune. Pune has emerged at the forefront of the Indian software technological revolution that has changed the business dynamics of the service industry of developed economies.

As industry developed and the employment base widened, migrant population from all over flocked to Pune. Pune witnessed two types of immigration – that of impoverished rural laborers and highly qualified professionals from other states. Pune is now no longer regarded as a pensioners’ haven or just an administrative and educational centre as before; it has transformed into a young city with more and more professionals flocking into the city. These changes led to urban development in a ribbon form around the city along its eipheries. The demographic profile of Pune too acquired a cosmopolitan touch as the city’s ambience changed from sedate to upbeat.

It is not surprising that in the early 18th century, when Pune was under British control, the city was barely 5 sq. km. in size. Today, it has catapulted to emerge as the eighth largest city in the nation. In 2005, the city measured 243.9 sq. km. with a population of close to 30 lakhs. Pune has had a glorious past and has been successful in developing a good balance between industry, services, education and cultural activities. Few cities can boast of such an eminent positioning in diverse aspects of modern day life.

2.2 Pune Municipal Corporation (PMC)

Established in 1950, PMC is governed by the Bombay Provincial Municipal Corporation (BPMC) Act, 1949. As per this Act, PMC is obligated to provide basic infrastructure like water supply, drainage, sewerage, and roads and services such as conservancy, fire fighting, streetlights, education and primary health.

The administrative wing of PMC is divided into 14 wards, each headed by a ward officer. The total strength of officers and employees at PMC is about 16,731, as against the approved employment level of about 17,986.
2.3 Pimpri Chinchwad Municipal Corporation (PCMC)

The origin of Pimpri and Chinchwad can be traced back to two rural settlements situated on the outskirts of Pune. Pimpri Chinchwad is a newly developed urban area of Pune city and was basically established as a centre for refugees from Pakistan. Industrialisation in Pimpri area commenced with the establishment of Hindustan Antibiotics Limited in 1956. The establishment of the Maharashtra Industrial Development Corporation (MIDC) in 1961-62 considerably facilitated industrial development in the area. In the last five decades, Pimpri-Chinchwad has developed as a major industrial centre and is home to large industrial conglomerates like the Tatas and Bajajs as well as other large Indian and multinational companies. The presence of large-scale industries has spawned the development of a large ancillary sector, particularly Small and Medium Enterprises (SME) and Small Scale Industries (SSI). The city provides employment to industrial workers and of late has emerged as an affordable urban destination for low-level residential purposes. In order to plan, manage and regulate development the Pimpri-Chinchwad Municipal council was formed in 1970 by merging four villages, namely Pimpri, Chinchwad, Bhosari and Akurdi, which led to the upgradation of civic life in the area.

In order to meet the problems of rapid industrialization and the resulting need for better infrastructure and basic facilities, the Pune Metropolitan Regional Planning Board suggested the establishment of Pimpri-Chinchwad new township at distance of approximately 15 kilometers from Pune city. The main objective was to create a planned environment for the working population in the vicinity of their work place.

The chronology of events, which led to development of Pimpri and Chinchwad are as follows:

a) 1975 – Status of Municipal Council was changed from ‘C’ class to ‘A’ class
b) 1982 – formation of Municipal corporation by merging seven surrounding villages in the Municipal Council, Sangavi, Rahatni, Thergaon, Wakad (part), Pimple Nilankh, Pimple Gurav, Pimple Saudagar and PCNTDA area covering a total area of 86 sq. km.
c) 1997- Further increase in the area of PCMC adding 18 new villages (extended area of 84.51 sq. km.), thus leading to a total of 170.51 sq. km. area under the command of PCMC.
The Pimpri-Chinchwad area is the most developed industrial belt in the state of Maharashtra. It accommodates some of the most reputed industrial companies of the country such as Hindustan Antibiotics, Telco, SKF, Bajaj Auto, Philips, Alfa Laval, Bajaj Tempo etc.

The establishment of Hindustan Antibiotics and MIDC marked the beginning of industrialization in the area. State government of Maharashtra strict the expansion of industries in Mumbai and Thane coupled with the availability of necessary infrastructure facilities for industrialization, the Pimpri-Chinchwad area attached national and multi-national companies to setup establishments along rail corridor. Due to rapid growth of industries in this area there was a pressing need to cope with the demands for housing, social and physical infrastructure and other amenities. In the transport world this part of Pune metropolis is now recognized as the Auto Nagar or the Detroit of India due to the presence of several automobile ancillary units. Rapid increase in the population of PCMC and presence on existing basic services is a major consequence of its development and industrialization.
2.4 Location and Extent (PMC & PCMC)

Pune and Pimpri-Chinchwad lies between 18° 25’ to 18° 42’ North latitude and 73° 42’ to 73° 57’ East longitude. The study area covers 414.90 sq. km. Pune (PMC) area covers 243.31 sq. km. composed of 144 general electoral wards according to 2007 which comes under 14 administrative wards of Pune Municipal Corporation. The city is located in saucer shaped basin at an average altitude of 560 m. from mean sea level. The area surrounded by offshots of Sahyadri hills extends mostly from west to east. Pune is slight hollow on bank of Mula and Mutha Rivers on Deccan plateau.

Pimpri-Chinchwad (PCMC) area covers 171.59 sq. km composed of 105 general electoral wards according to 1997 which comes under 4 administrative wards of Pimpri-Chinchwad Municipal Corporation. The PCMC is situated in to the Northwest of Pune on the Mumbai-Pune National Highway at an average altitude of 530 to 566 m. from mean sea level. The east-west ridge running midway between Indrayani and Pavana rivers separate this area into two parts. The northern portion slopes towards Indrayani river while the southern portion slopes towards Pavana river.
2.5 Physiography

PMC and PCMC are situated on the banks of Mula, Mutha, Pavana and Indrayani Rivers, at an average altitude of 530 to 566m. above mean sea level. Nested in the picturesque Sahyadris (Western Ghats) just, 150 km. southeast of Mumbai, the study area is situated near western margin of the Deccan Plateau, and on leeward side of the Western Ghat crest. Mumbai the state capital of Maharashtra is just at distance of 160 km. from Pune by road. PCMC area is having two Rivers, R. Pavna and R. Indrayani traverse the northwest outskirts of Pune. The Mula and Mutha Rivers latter empties into Bhima River. Thus the city is located in upper Bhima basin. The city is surrounded by hills on west and south side. The highest point within the city is located in Wetal hill whereas highest point maintains the height of surrounding is of Sinhagad fort situated 20 km. west of the city.

Contour map (Fig. 2.4) of the study area shows the gentle slope in central, East and North side, contour interval between 2 lines are very high it shows low gradient of the area and the southern and western side becoming steep due to high elevation of the surface. The distance between two contour lines is less in northern side as compared to southern side. The trend of elevation increased from north to south and from east towards the western side.

The Triangulated Irregular Network (TIN) is generated from contours, shows elevation information. TIN is used to study the surface topography of the study area.

Fig. 2.5 shows the TIN of the PMC and PCMC. From the map one can easily make out that the general trend of slope is from West to East. PMC and PCMC area is having hills and hill ranges in the western side within average altitude of 600 - 800 meters. The city is well bounded by East-West stretching. Katraj hill range in the Southern side whereas the eastern part of the city is having gently sloping topography. In general, city has overall slope towards East with hill and rugged topography at its extreme West, Southwest and South.

Pune is situated on the Sahyadri Hills. Earlier, due to the presence of trees on the hills and mountains, the city’s weather was pleasant and comfortable. But in recent years the climate has considerably changed due to 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, these 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
Contour Map of PMC and PCMC area

Legend
- Contours
  CI = 10 meter

Fig. 2.4
Triangulated Irregular Network (TIN) of PMC and PCMC area

Legend

Height in meters (ASL)

- 540 - 580
- 580 - 620
- 620 - 660
- 660 - 700
- 700 - 770

Fig. 2.5
2.6 Climate

The city has a typical tropical climate, with three distinct seasons- summer, monsoon and winter. The Leeward location with reference to the Western Ghat has made the city’s climate moderate and pleasant. The mean daily maximum and the minimum temperature for the hottest month - May is around 40°C and 23°C respectively. The evening sea breeze from west-northwest keeps the city cool during summer nights. For the coldest month of December the temperature ranges from 30°C to 12°C. The relative humidity ranges from 36% in March to 81% in August. Three fourth of the annual rainfall of 70 cm is received during June to September. Average annual rainfall at Pune, Pimpri-Chinchwad is about 850 mm.

2.7 Drainage

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 River Ambi and River Mose, tributaries of the River Mutha have dams upstream, 40.23 km west of the Pune City. River Ambi’s Tanaji Sagar dam has a catchment area of 12,030 hectares and yields about 304 million cubic meters of water annually. River Mose’s Veer Baji Pasalkar dam has an 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 km. 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 floodwater passes through the River during the monsoon at the rate of 700 cubic /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 /sec. Since the River, without a definite channel and low water level, is 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 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, pebbles and shingles as well as rubble to the extent of approximately 60,000 cu. m.

2.8 Demography

2.8.1 Population Growth Trends (PMC)

The population of Pune city as per Census 2001 is close to 25 lakhs. In the last 50 years, the city’s population has grown by more than five times. The growth in population testifies to the Vibrancy of its economic activity.

<table>
<thead>
<tr>
<th>Census year</th>
<th>Total Population</th>
<th>Decadal Change</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>400902</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1961</td>
<td>794052</td>
<td>393150</td>
<td>98.07</td>
</tr>
<tr>
<td>1971</td>
<td>1029466</td>
<td>235414</td>
<td>29.64</td>
</tr>
<tr>
<td>1981</td>
<td>1202848</td>
<td>173382</td>
<td>16.84</td>
</tr>
<tr>
<td>1991</td>
<td>1566651</td>
<td>363803</td>
<td>30.24</td>
</tr>
<tr>
<td>2001</td>
<td>2540069</td>
<td>973418</td>
<td>62.13</td>
</tr>
</tbody>
</table>

*Source: Census of India*

India has a very young population with a median population age of 24 years; about 65% of the total population is less than 35 years old. Pune is also reflective of this demographic characteristic with the median age being closer to the national level. But, 62 percent of the total population is under the age of 30 years. In Pune, the 25-34 age group forms a larger proportion of the total population compared to that prevailing at the national level. It would not be incorrect to say that the tendency to migrate will probably be the highest within this age bracket. It is estimated that about 50 percent of the population increase is on account of in-migration. This probably explains Pune’s relatively larger share of population in the 25-34 age groups.

For the last decade, the decadal growth rate of population has been in the range of 60% while the previous three decades witnessed population growth in the range of 15-30%. Between 1951 and 1961 the decadal growth rate of population has
been 98%. The population of Pune city as per 2001 Census is 2540069 persons. The current population is estimated to be in the range of 30 lakhs.

2.8.2 Population Growth Trends (PCMC)

Pimpri Chinchwad provides employment to industrial workers and of late has emerged as an affordable urban destination for residential purposes. The increasing demand for industrial and residential areas led to continuous addition of areas and upgradation of the erstwhile Municipal Council to Corporation.

<table>
<thead>
<tr>
<th>Census year</th>
<th>Total Population</th>
<th>Decadal Change</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>26367</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1961</td>
<td>39654</td>
<td>13287</td>
<td>50.39</td>
</tr>
<tr>
<td>1971</td>
<td>98572</td>
<td>58918</td>
<td>148.58</td>
</tr>
<tr>
<td>1981</td>
<td>251769</td>
<td>153197</td>
<td>155.42</td>
</tr>
<tr>
<td>1991</td>
<td>520639</td>
<td>268870</td>
<td>106.79</td>
</tr>
<tr>
<td>2001</td>
<td>1006417</td>
<td>485778</td>
<td>93.30</td>
</tr>
</tbody>
</table>

*Source: Census of India*

For the last two decades, the decadal growth rate of population has been in the range of 100% while the previous two decades witnessed population growth in the range of 150%. The population of Pimpri-Chinchwad as per 2001 Census is 1,006,417 persons. The current population is estimated to be in the range of 12 lakhs.

It is pertinent to note that the population dynamics in Pimpri-Chinchwad is a cumulative causation of demographic and economic changes in Pune and vice-versa. Hence, it is essential to gain an understanding of both the cities to grasp their population dynamics and make growth projections.
2.8.3 Population Growth Trends in PMC and PCMC

Table 2.3 Population Growth Trends in PMC and PCMC

<table>
<thead>
<tr>
<th>Census year</th>
<th>Total Population</th>
<th>Decadal Change</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>427269</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1961</td>
<td>833706</td>
<td>406437</td>
<td>95.12</td>
</tr>
<tr>
<td>1971</td>
<td>1128038</td>
<td>294332</td>
<td>35.30</td>
</tr>
<tr>
<td>1981</td>
<td>1454617</td>
<td>326579</td>
<td>28.95</td>
</tr>
<tr>
<td>1991</td>
<td>2087290</td>
<td>632673</td>
<td>43.49</td>
</tr>
<tr>
<td>2001</td>
<td>3546486</td>
<td>1459196</td>
<td>69.91</td>
</tr>
</tbody>
</table>

Source: Census of India

Fig. 2.1 Total Population of PMC and PCMC area

Fig. 2.2 Population Growth Rate of PMC and PCMC
Fig. 2.1 and 2.2 shows Population and population growth rate of PMC and PCMC from 1951 to 2001. The blue line shows the population and growth rate of PCMC and red line shows population and growth rate of PMC. For the last decade, the decadal growth rate of population has been in the range of 70% while the previous three decades witnessed population growth in the range of 30-45%. Between 1951 and 1961 the decadal growth rate of population has been 95%. The population of Pune and Pimpri-Chinchawad as per 2001 Census is 3546486 persons. The current population is estimated to be in the range of 42 lakhs.

2.9 Landuse of PMC and PCMC

2.9.1 Landuse of PMC

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.

Table 2.4 PMC Landuse distribution as per Development Plan

<table>
<thead>
<tr>
<th>Land use</th>
<th>Area in Sq. Km.</th>
<th>Total</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1987 DP</td>
<td>Newly Merged areas</td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>50.58</td>
<td>53.16</td>
<td>103.74</td>
</tr>
<tr>
<td>Commercial</td>
<td>2.35</td>
<td>1.57</td>
<td>3.92</td>
</tr>
<tr>
<td>Industrial</td>
<td>7.26</td>
<td>2.62</td>
<td>9.88</td>
</tr>
<tr>
<td>Public and Semi Public</td>
<td>15.22</td>
<td>1.45</td>
<td>16.67</td>
</tr>
<tr>
<td>Public Utilities</td>
<td>1.38</td>
<td>0.00</td>
<td>1.38</td>
</tr>
<tr>
<td>Transport</td>
<td>22.00</td>
<td>9.81</td>
<td>31.81</td>
</tr>
<tr>
<td>Reserved, Forest &amp; Agri.</td>
<td>2.35</td>
<td>26.70</td>
<td>29.05</td>
</tr>
<tr>
<td>Water Bodies</td>
<td>12.04</td>
<td>2.48</td>
<td>14.52</td>
</tr>
<tr>
<td>Hills and Hill Slopes</td>
<td>12.45</td>
<td>0.00</td>
<td>12.45</td>
</tr>
<tr>
<td>Recreational</td>
<td>12.73</td>
<td>7.79</td>
<td>20.52</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>138.36</strong></td>
<td><strong>105.58</strong></td>
<td><strong>243.94</strong></td>
</tr>
</tbody>
</table>

Source: Town Planning Department, Pune
The combined land use distribution as per both the Development Plan indicates that about 42 percent is allocated for residential use. The land use plan indicates that about 13.04 per cent of the area is allocated for transport, and 11.91 per cent is for reserved and forest areas.

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 landuse 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.

2.9.2 Land use (PCMC)

In DPs for the old PCMC measuring 86 sq. km. different reservations for public purposes have been worked out on the basis of planning norms and a projected population for ten years. Zoning proposals to accommodate the population for 20 years have been distributed into different planning units.
Table 2.5 PCMC Landuse Distribution as per Development Plan

<table>
<thead>
<tr>
<th>Land use</th>
<th>Area in Sq. Km.</th>
<th>Total</th>
<th>Area in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1986 DP</td>
<td>Newly Merged areas</td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>10.16</td>
<td>22.26</td>
<td>32.42</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.40</td>
<td>0.19</td>
<td>0.59</td>
</tr>
<tr>
<td>Industrial</td>
<td>10.85</td>
<td>1.48</td>
<td>12.33</td>
</tr>
<tr>
<td>Public and Semi Public</td>
<td>0.84</td>
<td>0.82</td>
<td>1.66</td>
</tr>
<tr>
<td>Public Utilities</td>
<td>0.42</td>
<td>0.39</td>
<td>0.81</td>
</tr>
<tr>
<td>Transport</td>
<td>4.26</td>
<td>2.38</td>
<td>6.64</td>
</tr>
<tr>
<td>Reserved, Forest &amp; Agri.</td>
<td>26.27</td>
<td>33.27</td>
<td>59.54</td>
</tr>
<tr>
<td>Water Bodies</td>
<td>1.89</td>
<td>0.95</td>
<td>2.84</td>
</tr>
<tr>
<td>Quarry</td>
<td>0.22</td>
<td>2.46</td>
<td>2.68</td>
</tr>
<tr>
<td>Recreational/Open Spaces</td>
<td>0.69</td>
<td>0.01</td>
<td>0.70</td>
</tr>
<tr>
<td>Barren/Vacant Lands</td>
<td>30.01</td>
<td>20.29</td>
<td>50.30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>86.01</strong></td>
<td><strong>84.50</strong></td>
<td><strong>170.51</strong></td>
</tr>
</tbody>
</table>

Source: Town Planning Department, Pune

In case of the old DP, sanctioned for an area of 86.01 sq. km. in 1986, against a planned development of about 74% of the 86.01 sq. km., 32% of the area was developed. However, today a reconnaissance survey indicates that the entire area of 86.01 sq. km. has been developed though not in line with what was envisaged in the DP. The DP is due for revision in 2007 and a survey of the existing land use is in progress for this area.

Fig. 2.4 PCMC Landuse distribution
In the old DP, the projected population for a period of 10 years (1996) and 20 years (2006) is 8.01 lakhs and 12.32 lakhs respectively. In the sanctioned DP for old area of 86.01 sq. km, 488 sites were earmarked for different public purposes. PCMC can take up acquisition for 464 sites identified in the DP.

Even for the DP of the newly merged area in PCMC limits admeasuring 84.51 sq. km. different reservations for public purposes have been worked out on the basis of planning norms, taking into account the projected population of 10 years; zoning proposals, to accommodate the population for 20 years, have been distributed in different planning units. In the draft DP for this extended area, 643 sites are earmarked for different public purposes. The draft DP for these newly merged areas has been submitted to the state government and approval for the same is awaited.

Revision of the Development Plan for the old PCMC area of 86.01 sq. km. is due in 2007. It is considered necessary that a comprehensive Development Plan for the entire area of 170.51 sq. km. be drawn up. Hence, the draft DP for the newly added areas has to be merged into the revised DP to ensure a comprehensive plan for the PCMC area.
Landuse of PMC (1987) and PCMC (2006) area

Legend
- Railway
- Roads
- Agriculture
- Commercial
- Defence
- Hill Slopes
- Industrial
- Public Utility
- Public-Semipublic
- Recreational
- Residential
- Transport
- Water Bodies

Source: Town Planning Department Pune & Pimpri-Chinchwad

Fig. 2.6
2.10 Landuse/Landcover of PMC and PCMC area based on SOI Toposheet, LANDSAT ETM+ and IRS P6 LISS-III Classified Images

Table 2.6 Landuse/Landcover of PMC and PCMC area based on SOI Toposheet, LANDSAT ETM+ and IRS P6 LISS-III Classified Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Built-up</td>
<td>16.85</td>
<td>59.25</td>
<td>107.24</td>
<td>170.16</td>
<td>233.20</td>
</tr>
<tr>
<td>Barren land</td>
<td>167.20</td>
<td>141.21</td>
<td>127.45</td>
<td>104.09</td>
<td>88.28</td>
</tr>
<tr>
<td>Vegetation</td>
<td>160.46</td>
<td>105.18</td>
<td>105.57</td>
<td>94.80</td>
<td>62.31</td>
</tr>
<tr>
<td>Water body</td>
<td>10.44</td>
<td>9.57</td>
<td>8.65</td>
<td>7.53</td>
<td>7.20</td>
</tr>
<tr>
<td>Fallow land</td>
<td>59.95</td>
<td>99.69</td>
<td>65.98</td>
<td>38.31</td>
<td>23.91</td>
</tr>
<tr>
<td>Total</td>
<td><strong>414.90</strong></td>
<td><strong>414.90</strong></td>
<td><strong>414.90</strong></td>
<td><strong>414.90</strong></td>
<td><strong>414.90</strong></td>
</tr>
</tbody>
</table>

Source: SOI Toposheets and Satellite Image
PMC and PCMC based on SOI Topographeet (1980)

Source: & Modified from SOI  Fig. 2.7
Landuse of PMC and PCMC based on Topographical map (1980)

Legend
- Admin Ward/Committee Boundary
- Built-up
- Open Land with or without shrubs
- Vegetation
- Water Bodies

Source: & Modified from SOI

Fig. 2.8
LANDSAT ETM+ (1992) False Color Composite (FCC) image of PMC and PCMC

Source: Modified from NRSC  
Fig. 2.9
PMC and PCMC Classified Image based on LANDSAT ETM+ (1992)

Legend
- Built-up
- Barren Land
- Vegetation
- Fallow Land
- Water Bodies

Source: Modified from NRSC

Fig. 2.10
LANDSAT ETM+ (1999) Satellite Image of PMC and PCMC False Color Composite (FCC)

Source: Modified from NRSC

Fig. 2.11
PMC and PCMC Classified Image based on LANDSAT ETM+ (1999)

Legend
- Built-up
- Barren Land
- Vegetation
- Fallow Land
- Water Bodies

Source: Modified from NRSC

Fig. 2.12
IRS P6 LISS-III (2004) False Color Composite (FCC) Image of PMC and PCMC

Source: Modified from NRSC

Fig. 2.13
PMC and PCMC Classified Image based on IRS P6 LISS III (2004)

Legend
- Red: Built-up
- Tan: Barren Land
- Green: Vegetation
- Pale Green: Fallow Land
- Blue: Water Bodies

Source: Modified from NRSC

Fig. 2.14
IRS P6 LISS-III (2008) False Color Composite (FCC) Image of PMC and PCMC

Source: Modified from NRSC

Fig. 2.15
PMC and PCMC Classified Image based on IRS P6 LISS III (2008)

Legend
- Built-up
- Barren Land
- Vegetation
- Fallow Land
- Water Bodies

Source: Modified from NRSC

Fig. 2.16
2.11 Landuse change PMC

### Table 2.7 Expansion of City limit (PMC)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Area Sq. km.</th>
<th>Area added Sq. km</th>
<th>Newly Merged Areas/Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1857</td>
<td>7.74</td>
<td>-</td>
<td>South- Shankarsheth road to Ambila road North East – Right bank of Mutha river East- Welesly road to new Modikana near Nagzari</td>
</tr>
<tr>
<td>1889</td>
<td>9.86</td>
<td>2.12</td>
<td>Area between Shankarsheth road, Satara Road and Golibar Maidan</td>
</tr>
<tr>
<td>1890</td>
<td>18.04</td>
<td>8.17</td>
<td>Erandwana and Bhamburda villages</td>
</tr>
<tr>
<td>1931</td>
<td>18.79</td>
<td>0.75</td>
<td>Parvathi Gaothan and area till Hingne</td>
</tr>
<tr>
<td>1935</td>
<td>19.05</td>
<td>0.26</td>
<td>Chaturshringi Area</td>
</tr>
<tr>
<td>1958</td>
<td>138.98</td>
<td>27.02</td>
<td>Inclusion of 18 villages</td>
</tr>
<tr>
<td>1975</td>
<td>138.05</td>
<td>(-)0.84</td>
<td>Exclusion of some part of Bhosari</td>
</tr>
<tr>
<td>1981</td>
<td>146.95</td>
<td>7.33</td>
<td>Inclusion of Sutarwadi</td>
</tr>
<tr>
<td>1983</td>
<td>146.11</td>
<td>10.01</td>
<td>Inclusion of survey_no. 79 of Ghorpadi</td>
</tr>
<tr>
<td>2001</td>
<td>243.87</td>
<td>97.84</td>
<td>Inclusion of 23 villages</td>
</tr>
</tbody>
</table>

Source: JNNURM, City Development Plan, PMC

Pune has grown from an area of 7.74 sq. km. in 1857 to 243.87 sq. km in 2001 i.e. it has increased by 236.82 sq. km in the last 144 years. In 1981, the area of old PMC was 146.95 sq. km. which increased to 243.87 sq. km. in 2001, with the inclusion of the 23 villages. The expansion of the PMC limits over the years is shown in the Table. 2.5.

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 landuse 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.

As per landuse map, comparative Toposheet and Image major landuse changes observed in built up area, then secondary agricultural and fallowland respectively. In
the present study concentration is focused on built up i.e. urban sprawl which is explained in detailed forth coming chapters.

2.12 Landuse change PCMC

<table>
<thead>
<tr>
<th>Year</th>
<th>Area (Sq. Km.)</th>
<th>Increased Area in Sq. Km.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>86.01</td>
<td>-</td>
</tr>
<tr>
<td>1991</td>
<td>86.01</td>
<td>-</td>
</tr>
<tr>
<td>1997</td>
<td>170.52</td>
<td>84.51 (After inclusion 18 fringe villages)</td>
</tr>
<tr>
<td>2011</td>
<td>170.52</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2.8 Expansion of City limit (PCMC)

Source: Census & PCMC records

Pimpri - Chinchwad has grown from an area of 86.01 sq. km. in 1982 to 170.52 sq. km in 1997 i.e. it has increased by 84.51 sq. km in the last 30 years. In 1982, the area of old PCMC was 86.01 sq. km. which increased to 170.52 sq. km. in 2011, with the inclusion of the 18 villages. The expansion of the PCMC limits over the years is shown in the given Table. 2.6.

2.13 Pune City (PMC) Growth

From a small area around Kasba Peth, Pune has grown dramatically; in 1958, small pockets of land in parts of the villages of Katraj, Dhankavadi, Lohagaon, Dapodi, etc. were added increasing the area within PMC’s jurisdiction. The last such annexation took place in 1997 wherein 36 villages with an area of 97.84 sq. km. were added to Pune city. As a result, the PMC area increased from 146 sq. km. to 243.9 sq. km. According to JNNURM Pune Development Draft Plan, new PMC area is now more than double the Chennai Municipal Corporation’s area.

To see the change occurred in economical activities of Pune city in last 150 years and how Pune city transformed from small hamlet with only 15 huts in 613 A.D. to 1.3 million in 1981 and in 2001 the population has reached to 3.5 million. In the present work emphasis is also given on how spatial changes occurred in different phases of Pune city.
Fig. 2.17 Pune city Growth map (1821 to 2011)
2.14 Pimpri - Chinchwad (PCMC) Growth

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.

2.15 Conclusion

Second chapter comprises profile of the study area that gives a detailed account of location, extent and aerial coverage of the Pune and Pimpri-Chinchwad in the Pune District, (Maharashtra, India). Physiography and climate of the Pune and Pimpri-Chinchwad. Built-up, landuse, transportation, communication and population and demographic structure with characteristics of the Pune and Pimpri-Chinchwad are also discussed in the last part of the chapter to know about socio-economic status of the Pune and Pimpri-Chinchwad.
Fig. 2.18

Pimpri Chinchwad Growth (1951-2011)

Legend
- 1951
- 1970
- 1982
- 2011

Fig. 2.18