
Chapter 4

ENVIRONMENTALLY SENSITIVE ZONES

The Central, State and/or Local Government by virtue of various existing laws and acts has certain Landuse regulations. Owing to which, industrial siting cannot be done in some specific zones such as reserved forests, protected forests, sanctuaries, mangrove and coral areas, breeding grounds, monuments of National, State and Local significances, flood-prone areas, seismic zones etc. These legal restrictions may be due to physiographic constraints, ecological fragileness, social/cultural considerations like areas for organized bathing, religious places, prime agricultural land etc. These sites are called “**Sensitive Zones**”. Siting of polluting industries in these ‘Sensitive Zones’ often lead to very high environmental risk, and hence industrial siting should be avoided in such areas.

1.1 Biological diversity in Pune district

The biological diversity zones like National parks, Sanctuaries, Botanical gardens, Zoological gardens, Gene bank, Areas with threatened (rare, vulnerable, endangered) flora/ fauna, mangrove area, reserved and protected forests, etc. are ecologically fragile zones and need to be protected from industrial siting. The areas with biological diversity identified in the district have been described below.

1.1.1 Wildlife Sanctuaries

The district has two wildlife sanctuaries, which have been declared, as ‘Protected Areas’ by the Maharashtra State Government. No specific sites for national parks and biosphere reserves are identified in the district. The details of the sanctuaries and the species found in them are given in **Annexure 1**: Table 28.

- 1. Bhimashankar Wildlife Sanctuary:** The sanctuary is located at Bhimashankar in Khed Taluka and has an area of 130.78 sq. km. It is a conserved part of a reserve forest area. This is the place where the river *Bhima* originates. The giant squirrel ‘shekru’ is typically found in this region. This sanctuary supports a variety of flora and fauna species. Animal species found here include the Panther, Mouse Deer, Wild Boar etc. Species of flora found here include Chandan, Bamboo, Jambhul, Imli, Palas, Vad, Bor, Shisham, Tendu, Umber etc.



Plate 1. Forest at Bhimashankar, Tal. Khed

2. Mayureshwar Wildlife Sanctuary: It is located at Supe in Baramati Taluka and has an area of 5.14 sq. km. This sanctuary supports a variety of flora and fauna species. Animals such as the Chinkara, Hyena, Wolf, etc. are found in this sanctuary.

1.1.2 Habitats of Migratory Birds

MoEF has proposed bird sanctuary at wetland near Bhigwan in Indapur Taluka. The sanctuary spread over an area of roughly 180 sq. kms, the wetland attracts a large number of migratory waterfowl every winter. The wetland is part of the backwaters of the Ujani dam built on the River Bhima.

1.1.3 Habitats of Endangered Species

The Wildlife (Protection) Act 1972 has been amended to prohibit trade of endangered species and derivatives thereof. Rare and threatened species of flora and fauna are found at various locations in the district. These include 15 endangered plant species and 12 critically endangered species. The flora and fauna that need protection has been given in **Annexure 1**: Tables 29 and 30.

1.1.4 Forests

The details of the forestland is described in Chapter-2: Physical characteristics, under section 2.1. The overview of the forestland in the district is as follows:

As per the Landuse and Landcover Map of MRSAC, Nagpur (2001-02) total land under forest is 3648 sq.km, which is 23.32% of the district. Major hilly portion of Taluka located at Western side of the district is covered by the forestland includes Junnar, Ambegaon, Khed, Maval, Mulshi, Bhore and Velhe Taluka. Small patches of forestland are also found in Taluka Purandhar and Haveli. The Taluka Shirur and Daund have negligible forest cover, whereas Taluka Baramati and Indapur have nil forest cover. Major portion of Taluka Mulshi, Velhe and Bhore is covered by forestland. The talukawise village location of these forest areas is given at **Annexure 1**, Table 31.

According to SOI Toposheet information, the total area under reserved forest is, 1598 sq.km having spreadover in Taluka Junnar, Ambegaon, Khed, Maval, Mulshi, Bhore, Velhe, Purandhar, Haveli, Daund and Shirur. The major area is in Taluka Maval, Khed, Junnar and Ambegaon.

1.1.5 Biological Diversity Map

The Biological Diversity Map (**Map No. 16**) shows environmentally sensitive locations which includes Reserve forest, locations of critically endangered and endangered plants species, Snake park and sanctuaries (Bhimashankar, Taluka Khed and Mayureshwar at Supe in Baramati Taluka).

In the district, location of critically endangered and endangered plants species are found in Taluka Junnar, Khed, Haveli, Velhe, Bhore and Purandhar.

1.2 Incompatible Landuse Areas

In addition to above areas, in certain zones industrial siting should be restricted due to physical constraints, social strategic restrictions, public utility and existing functions attached to it. The remaining areas may be considered for industrial establishment.

The areas with Sensitive / incompatible landuses identified in the district are described below:

1.2.1 Public Water Supply Areas

Surface water supply areas like rivers, dams, K.T. weirs, Jack wells near dams, other storage tanks and ground water supply locations have major public utility and hence need protection from industrial pollution.

Although, a major part of the district has good surface water quality, and it is evident that the industries and urban local bodies that have a potential of polluting surface water do discharge their treated effluent/sewage in nearby surface water bodies. Therefore, a few water bodies indicate substantial stress due to discharge of effluent from water polluting industries and domestic sewage.

Within the district, the industrial estates, sugar industries and other isolated industries are distributed over the entire district.

Data on locations of Public water supply in the district (**Annexure 1: Table 27**) shows the talukawise list of surface and ground drinking water intake points within the district along with the villages covered under the respective water supply scheme.

1.2.2 Ground Water Recharge Areas

In Pune district, high infiltration zone have been considered, as groundwater recharge area since no demarcated information could be available. Ground water recharge areas need to be protected to maintain water balance in the district and also to minimize contamination risk of the ground water. The areas having lineaments and fault / fractured zones in the district have been marked as ground water recharge areas. In these areas, the infiltration rate is high with high ground water potential. The recharge zones thus have to be restricted for siting of water polluting activities.

The locations with high infiltration rate (Linaments) occur in small narrow strips scattered in all Taluka except Pune city. The infiltration rate is moderate in those areas which are having unconsolidated, semi-consolidated, sedimentary beds and having sandstone, limestone, and shell formation. The linaments are found scattered in major portion of Taluka Indapur, Baramati, Shirur may be considered as high infiltration rate, whereas remaining taluka except Pune city having high and low infiltration rate.

1.2.3 Physiographically unsuitable Areas

Physiographically unsuitable areas have been classified as those areas, which are hilly areas and act as barriers for dispersion of emissions. These areas belong to the steeply sloping category (slope > 30%) i.e. 'High' physiography area.

The Western part of district along Sahyadry hill ranges and small portion at Central and South-Eastern side of the district lies in this steeply slope category area.

The steeply slope area is spread over in seven taluka namely Junnar, Ambegaon, Khed, Maval, Mulshi, Velhe and Bhor. Also small portion of taluka Haveli, Baramati and small patches of Taluka Indapur, Daund and Shirur fall under this area. The name and location of hill ranges occur in the district is given in Table XVIII.

Table I. Hill Ranges in Pune District

Sr. No.	Location
1.	Sahyadri hills ranges extend from the West to South of the district
2.	The hills of 'Harishchandra' ranges are located towards the Northern boundary of the district
3.	The Shingi, Tasubai and Mandvi hill ranges are on the South of Harishchandra ranges, which are distributed from the West to the South-East
4.	The Tamhini, Ambala and other hills of Purandhar on the Southern part of the district originate from the Sahyadri mountain ranges.

Source: District Social & Economical Review Report, Economics & Statistical Department, Pune District, 2002-03

1.2.4 Agricultural Land

As per the Landuse and Landcover Map (2001-2002), the major portion of Central, North-Eastern, Eastern, Southern and South-Eastern part of the district is well covered by the agricultural / cultivable land. The total area of this land is 4779.36sq.km i.e. 30.55% of the district. The land distribution for agricultural plantation and crop pattern is as below.

Table II. Area under Agricultural Plantations and Crop in Pune District

Sr. No.	Agricultural Landuse	Total Area (sq.km.)	% To district
1.	Agricultural Plantation	264.59	1.69
2.	Double Crop	1422.57	9.09
3.	Single Crop	3092.20	19.76
Total		4779.36	30.55

*Source: Landuse and Landcover Map of MRSAC, Nagpur (2001-02)
Season: Kharif, Rabi and Summer (2001-02)*

The incompatible landuse map shows the double crop area and the agricultural plantation area. Total land under this area is 1687.16 sq.km. i.e. 10.78% of the district. The major double crop plantation area is in Taluka Junnar along the bank of river Kukdi and Mina, Ambegaon along the bank of river Ghod, Haveli along the bank of river Mula-Mutha, Daund and Shirur along the bank of river Bhima, Indapur along the bank of river Bhima and Nira, Baramati and Purandhar along the bank of river Nira. The major kharif crops of the district are jowar, wheat, gram, nigerseed, sunflower, tur, pulses, linseed and safflower.

Small patches of agricultural plantation are spread along side of the rivers in Taluka Haveli, Baramati, Daund, Shirur, Indapur, Junnar, Ambegaon, Khed and Bhor. Total land under the plantation is 333.87 sq.km. Whereas, the floriculture area in the district is 2,771 sq.km. The major kharif crops of the district are jowar, wheat, gram, nigerseed, sunflower, tur, pulses, linseed and safflower.

1.2.5 Major settlements

Due to rapid urban growth, major settlement is taking place in and around Pune city and in Haveli taluka. Settlements are growing both vertically (multistory building culture) and horizontally (invasion of the peripheries) in this city because of job opportunities in industrial and commercial sectors.

Major settlements in the district are Pune city, Pimpri Chinchwad, Akurdi, Nigadi, cantonment Board etc. and taluka headquarters of Taluka Baramati, Indapur, Khed, Shirur, Daund and Mulshi. Distribution of urban population in the towns is disproportionate. The two Class -I towns, viz. Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation are the most populated towns covering 85% urban population in the district.

1.2.6 Places of Tourist interest

Pune District has a number of archaeological monuments (Forts, Palaces, Temples and Churches), and locations having cultural importance, which attract tourists. These areas include heritage sites and monuments of state or local significance. These locations are marked as sensitive zones for their religious, heritage, historical and cultural importance and need to be protected.



Plate 2. Sinhgad Fort, Pune

The places of historical and cultural importance are the forts and monuments like Sinhgad fort, Raigad fort, Torna fort, the birthplace and *wada* of Amartya Shivram Hari Rajguru etc. Places of tourist attraction are the Katraj snake park, Sambhaji Park, Appughar, Agakhan palace, Shaniwarwada, Jejuri, Ashtavinayak, Sarasbag, Alandi etc. The details of places of tourist attraction, heritage sites and monuments of state and local significance in Pune District are given at **Annexure 1: Table 32, 33 and 34, respectively.**



Plate 3. Aga Khan Palace, Pune

The archeological monuments attract tourist for their cultural and historical importance. They also have state significance and hence have to be protected from any kind of degradation caused by industrial pollution.

1.2.7 Scenic areas and Hill Resorts

The district is known as the ‘Queen of the Deccan’ due to its scenic beauty and rich natural resources. It is due to their

natural beauty, that such places attract the tourists. Hill resorts in the district are at Lonavala, Ryewood Park in Maval.



Plate 4. Khandala Ghats during monsoon

Taluka, Panshet in Velhe Taluka, Sinhgad in Haveli Taluka and Khandala in the Maval Taluka are a well-known location with scenic importance (**Annexure 1: Table 32 and 33**).

1.2.8 Religious Places and Pilgrim Centres

Pune District is famous from the historic days as the land of saints. The district has a sizable number of religious places and pilgrim centres at Parvati, Jejuri, Ashtavinayak, Sarasbag, Alandi, Bhimashankar etc. (**Annexure: I, Table 32 and 33**).

1.2.9 Protected Tribal Settlements

The tribal population is distributed in all Taluka of the district. The major population of tribes found in Taluka Junnar, Ambegaon and Khed, whereas low population is found in Taluka Baramati and Velhe.

The Tribal development department has prepared the “Tribal Settlement Plan” (TSP) for the Western part of Ambegaon and Junnar Taluka. The name of the villages / settlement and the tribal population covered under TSP area is given in below Table XX. The major tribes in the district are *Koli Mahadeo, Thakar, Kathodi, Katkari, Koli Dhor and Tokare Koli*. Taluka wise details of tribal population are given in **Annexure 1: Table 35**.



Plate 5. Shiva Temple, Bhimashankar

Table III. Tribal Settlements in Pune District

Taluka	Tribal settlement(s)	Tribal Population (1991 Census)	Tribal Population (%) in Taluka
Ambegaon	Chikhali, Pokhari, Gohe Kh., Gohe Bk., Jambhori, Rajewadi, Rajpur, Nigdale, Kondhaval, Vachape, Malin, Done, Patan, Ahupe, Shinoli, Supedhar, Chinchodi, Narodi, Chas, Chincholi, Ghodegaon, Gangapur Bk., Apati, Amondi, Girawali, Bhawadi, Kurwandi, Koltavade, Asane, Borghar, Dimbhe k., Gangapur Kh., Ambedara, Dhakale, Sal, Kolharwadi, Thugaon,	39,066	20.91

Taluka	Tribal settlement(s)	Tribal Population (1991 Census)	Tribal Population (%) in Taluka
Junnar	Devale, Ajanawale, Ghatghar, Amboli, Bhivade Kh., Sonawale, Ingaloon, Shivali, Chawad, Nimgiri, Khatkale, Sitewadi, Madh, Karanjale, Khireswar, Kolhewadi, Watkhole, Hadsar, Godre, Alme, Kolwadi, Mandave, Muthalne, Kewadi, Khamgaon, Aldare, Golegaon, Surale, Wanewadi, Ghangaldare, Kale, Botarde, Ralegan, Nirgude, Katede, Parunde, Chincholi, Agar, Somatwadi, Arvi, Gunjalwadi, Sukalwedhe, Mankeshwar, Khamgaon, Manikdoh, Tambe, Yenere, Khilarwadi, Datkhillwadi, Pimpalgaon, Shivneri	58,225	19.16

Source: Commissioner, Tribal Development, Pune (2003-04)

1.2.10 Flood Prone / Landslide prone Areas

Floods affect most of the Taluka within Pune district. The Talukawise information of flood-affected villages is given at **Annexure 1: Table 16**. The Table 16 shows 40 villages are likely to be affected by flood once 1 in 25 years, whereas 35 villages are flood prone once in 100 years.

In River Mula, Mutha, Pauna, Indrayani and Bhima are flood prone and likely to cause flooding in Haveli Taluka. Other areas, which are prone to frequent floods in the district, are, Taluka Shirur, Daund, Indapur and Haveli (river *Bhima*), Pune City and Taluka Mulshi (river *Mutha*), Taluka Khed, and Maval (river *Indrayani*), Taluka Ambegaon (river *Ghod*), Taluka Junnar (river *Mina* and *Pushpavati*), Taluka Indapur, Baramati and Purandhar (river *Nira*).

During the rainy season the landslide occurs along the roads in the hilly area and ghats. The locations prone to landslide in district are given in **Annexure 1 Table 17**.

1.2.11 Earthquake Prone Areas

Earthquakes are generally regarded as the most destructive among natural calamities. Due to the presence of many structured hills within Pune district, occurrences of earthquakes take place. Fault lines are scattered through out the district and these areas may be considered, as minor earthquake prone areas.

According to the IS 1893 Part I, 2002, the state has been sub-divided into three earthquake damage risk zones. In Pune district, the South-West area of Taluka Bhor and Velhe fall into high damage risk zone, the **Zone IV**. The remaining part of the district falls under is a moderate damage risk zone, the **Zone III**.

A major earthquake measuring 6.3 on the Richter scale, took place on the 30th of September 1993, at Killari in Latur District. The tremor of this earthquake was felt in 11 districts surrounding Latur including Pune.

1.2.12 Agricultural Research Institute

In the district agricultural Research Institutes/ Centres, are located in Taluka Khed, Maval, Mulshi, Pune city and Haveli. The detail of the Agricultural Research Institutes is given in the following Table XXI.

Table IV. Agricultural Research Institutes/Centres in Pune District

Sr. No.	Name of Agricultural Research Institute	Location
1.	Vasantdada Sugarcane Research Institute	Manjri, Tal. Haveli
2.	Fruit Research Centre	Ganeshkhind, Pune
3.	Onion and Garlic Research Centre	Khed, Tal. Khed
4.	Rice Research Centre	i. Wadgaon Tal. Maval ii. Lonavala, Tal. Mulshi
5.	Mushroom Research Centre	Agriculture College, Shivajinagar, Pune

Source: District Superintendent Agricultural Office, Pune (2002)

1.2.13 Air Port

Pune is well connected through domestic airlines with the entire country. The airport located at Lohegaon has recently acquired the status of an international airport and is being used to carry domestic as well as international traffic. Also, it is proposed to develop an international air-cargo hub near the same place.

1.2.14 Ferry

Water transportation is mostly used to connect the remote villages in the Sahyadri hill ranges. Ferry facility is available at village Mulshi-Kh. in the Maval Taluka and at village Varasgaon in Velhe Taluka.

1.2.15 Major Fishing Centers and Fisheries dependent villages

Surface water bodies, which are suitable for the propagation of wildlife and fisheries, support additional aquatic flora and fauna. Thus, the protection of the areas where fish cultivation is carried out helps to protect other species, which are dependant on that ecosystem.

Details of the lengths of the rivers suitable for the propagation of wildlife and fisheries have been given in **Annexure 1:** Table 36. The table shows nearest village locations of Fishing Center and fish production in these areas. Fishing centers are located on the bank of rivers in all Taluka. The total length of river in the district is 1252 km. Some of these riverbanks are suitable for propagation of commercial fishries. In the district, 77 fishing villages and 7,143 fishermen population are dependent on fisheries. The total fish production in the district is 3,815 MT/year, worth a market value of 761.74 lakh (2000-01). The total area under fisheries in district is 227.81 sq. km. Non-mechanized and other trawlers in district are about 250 in number.

1.2.16 Organised Bathing Places

There are three locations at which organized bathing places are present in Pune district. Borghat at Khandala, in the Mulshi Taluka, Dehu and Alandi in the Haveli Taluka have been identified as organized bathing places.

1.2.17 Other areas of State importance

Within the district, military areas located at Khadki and at Cantonment Board in Pune City and Dehu Road in the Haveli Taluka fall under protected areas. The Satellite broadcasting station at Arvi and India's largest meter wave Radio Telescope at Khodad in Junnar Taluka also fall in this category of sensitive areas.

The Government of Maharashtra has made restrictions for siting of certain types of industries in environmentally sensitive zones within river catchments. Vide Resolution No. MMV-2000/326/22/TB-3 dated 15th July 2000 the Environment Dept., Govt. of Maharashtra notified the industrial location policy considering environmental suitability

within river catchments through the notification '**Industrial Siting policy from environmental angle in River Catchment area**'.

1.2.18 Incompatible Landuse Map

The sensitive and unsuitable features with respect to industrialization in the Pune District have been shown in the Incompatible Landuse Map (**Map No. 17**), which includes locations of:

Agricultural research centers, air ports, ferries, hill resorts, Major Irrigation projects, nearest village location of major fishing centres, important tourist places, scenic area, and monuments of state and local significance, protected areas, reserve forest, pilgrim centres, public water supply areas from ground water and surface water, lineaments and prime agricultural lands (Agricultural plantation and double crop area), tribal settlements plan area, high physiographic areas (> 30%), major settlement areas (built up land) etc. The map also covers areas prone to natural hazards like floods. The locations of flood prone areas are marked where floods have occurred once in 1 in 25 years and 100 years.