CHAPTER II

AREA UNDER STUDY
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Pune district is situated on the Deccan Plateau almost on its Western end and lies on the leeward side of the western ghats. Altitude of Pune is 549 meters above mean sea level. It is spread between 17°54'-19°24' north latitude and 73°19'-75°19' east longitude. The district has an undulating terrain throughout its length and breadth. It is somewhat triangular in shape. The northern and western parts are beset with hills from spurs arising out of the Sahyadris.

Topography of the district is characteristic. There is gradual change from rugged hilly western side to the barren plains in the east. As a part of the Deccan Plateau, it has a continuous range of hills along western side. The crested ridges which are narrow and broken, gradually descend into the eastern plains. The district is divided into the following fourteen talukas: Ambegaon, Baramati, Bhor, Daund, Haveli, Indapur, Junnar, Khed, Maval, Mulshi, Pune, Purandar, Shirur and Velha. Physiographically, the area is much varied. Due to the gradual change from rough hilly west to bare open east, Pune district forms three belts viz. Western Belt, Central Belt and Eastern Belt. One of the major and continuous range of hills is north-south, which forms main range of the Sahyadris. The other system of hills includes narrow, broken crested ridges and bluff flat topped masses, gradually sinking into the plains. Several spurs branch off forming vallies. Northern boundary of the district is
Harishchandra range. To the south of this range are Shingi range, Kalsubai range, Mandvi range and other hills, extending from west towards south-east. Tamahini range, Ambala range, Purandar hills are towards south. All these are the branches of the Sahyadris. Their height decreases towards east or south-east. Many historical forts situated on the crests of the Sahyadris possess peculiar floristic composition. Highest of these is Harishchandra range.

Geologically the extensive Deccan Trap formation is a major part of this area. From these lava-flows of basaltic composition comes the parent material for the local soils. At higher elevations, the mountain tops are usually flat and very steep towards west; while eastern slopes are gentle and descend gradually into the lower plains. The basaltic trap capped with laterite, gives rise to red, loamy, porous and acidic soils.

The soils in the area can be classified into two types: (i) Soils developed by natural degradation of underlying rocks, and (ii) Soil transported from elsewhere and deposited in successive layers of varying thickness. These can further be classified into black, red and grey soils according to their local elevation and composition. Black soil gets mixed with gravel. Black soil occurs in many layers of flat eastern plains. Red and grey soils are very loose, coarse, gravelly and have been subjected to erosion.

The district shows mixed hygrographical features. Pune district is cris-crossed by many rivers and streams, which
take their rise in and near the Sahyadri peaks. They flow towards east and south across the district. The main river is Bhima which rises near Bhimashankar in the district and forms the eastern boundary. The main tributaries of Bhima are Vel and Ghod on the left and Bhama, Indrayani, Mula, Mutha, Nira on the right. Besides these, there are seven other rivers: Kukadi, Mina-tributaries of Ghod, the Andra-a tributary of Indrayani, Shivaganga and Karha-tributaries of Nira, Pushpavati—with its feeder Mandavi, and minor streams which flow into Kukadi. Pavana is a feeder of Mula.

The district has no natural lakes. Several artificial lakes provide a considerable supply of water for drinking and irrigation and for generation of electricity. Major amongst them are Khadakvasle, Panshet, Katraj, Pashan in Haveli taluka; Shiravate, Walwhan, Lonavale, Andra in Mawal taluka, and Mulshi lake in Mulshi taluka. In eastern part of the district are situated lakes at Kasurdi in Baramati Taluka; Bhadalwadi and Shetphal in Indapur Taluka; at Shirshuphal, Pimpalgaon (Matoba) and Khamgaon in Daund taluka and Rakh in Purandar taluka. Besides these more important lakes, there are many local tanks used mainly for drinking purposes.

Rainfall in Pune district depends upon the south-west monsoon. About 75% of the rainfall in the district is received from June to October. The north-east monsoon coming from continental interior is negligible. Usually monsoon
breaks in the first week of June, intensity of which increases steadily and rapidly till the middle of July. July receives maximum rainfall from south-west monsoon. It decreases gradually after July and suddenly becomes negligible in October.

Pune district can be divided into three zones - heavy rainfall region (Lonavala, Khandala, Mulshi, etc.) located on the crest of the ghat region. It has around 5000 mm rainfall and are mostly covered by mix moist deciduous to semi deciduous forests. The maximum and minimum temperatures are the lowest in this region.

Moderate rainfall (between 2500-1750 mm) occurs in Bhor, Velhe and Paud taluka, central part of Vadgaon and Khed, Ambegaon and Junnar. The natural vegetation in this tract of tree and shrubs is of savanna type. The soils are mainly red to brown with varying depths and textures.

Scanty rainfall region is a wider strip running parallel and on the eastern side of moderate rainfall zone and extends towards east upto the line where scarcity zone starts. This zone covers areas of central part of Bhor and eastern Paud taluka. The rainfall in the region varies from 1750-700 mm. Soil is greyish black and varying in textures. Vegetation is of scrub thorny jungles (Map 3).

Pune district has a continental climate characterised by large diurnal variation of temperature. The mean diurnal temperature is lowest in December (17°-21°C). It rises steadily thereafter until the maximum is reached in May.
(upto 40°C). With the onset of monsoon, day temperatures suddenly fall and by August the maximum temperature reaches its lowest value. From September it begins to rise until the advent of the cold season in November. The area is thus characterised by three marked seasons - wet season, cold season and hot season.

The rapid changes in rainfall influence the vegetation considerably which ranges from semievergreen to semiarid or thorny type. Pune district has varied terrain from edge of the Sahyadris at the north and north-west to the plains in south and south-east. Due to topography, hydrography, geology, soil and rainfall, varied vegetation types occur in different parts of this district.

In 1936, Champion was the first to describe the forest types of India. A revised survey was made by Champion and Seth in 1966 for India and Burma. Buit (1966) described the forests of Maharashtra. Legris and Meher Homji (1973) mentioned the vegetation over the Deccan trap of the country.

Floristically, many taxonomists studied the area part by part. There is no comprehensive account of Flora of Pune district as a whole. Important amongst them are given in Table 3.

Besides above floristic contributions, general vegetation in Pune district can be described under following categories:
1. Semievergreen forests at higher elevations and in valleys:

These are restricted to the higher elevations and crest of the western ghats in Bhimashankar, Khandala and Harishchandragad, Mulshi area, Varandha ghat and other elevated areas have around 2500-5000 mm rainfall. It has characteristic species like Actinodaphne angustifolia Nees, Litsea stocksii Hk.f., Mesua nagassarium Kosterm, are located in this forest. Memecylon-Syzygium-Actinodaphne community is the most common. These are associated with species of Glochidion, Olea, Sterculia spp., Terminalia spp., Calycoperteris floribunda Poir, Bauhinia sp., Thespisia lampas Dalz. & Gibbs. The ground cover is composed of herbaceous elements like Sida rhombifolia L., Urena lobata L., Hyptis suaveolens (L.) Poit. and grasses.

2. Moist deciduous forest:

These forests occur on smooth and gentle slopes and in plains with moderate rainfall varying between 1750-2500 mm. The area which comes under this is Bhor, Velhe, Paud taluka, central part of Vadgaon, Khed, Ambegaon, Junnar and others. The area faces a dry period of 7-8 months. These forests are of mixed type and have top canopy of semi deciduous or deciduous species with an average height of 30-40 m and middle layer with evergreen species. Bamboo thickets constitute a characteristic component in such forest. Bridelia-Syzygium-Terminalia-Ficus community is seen.
It is specially characterised by appearance of some evergreen species like Mangifera indica L. and Syzygium cumini Skeels. The top storey are Terminalia crenulata Roth., Mangifera indica L. and Dillenia pentagyna Roxb. The elements seen in middle canopy are Butea monosperma Taub., Cassia fistula L., Emblica officinalis Gaern., Erinocarpus nimmonii Grah. Grasses among bushes are species of Andropogon, Themeda and Oplismenus. Common climbers are Gymnema sylvestre R. Br. ex Schult., Clematis gouriana Roxb. ex DC., Elaeagnus conferta Roxb. The rocky cliffs of basaltic plateau are characterised by Ficus racemosa L., F. arnottiana Miq., Gnidia glauca Gilq., Woodfordia fruticosa Salisb. In crevices of the wet rocks Ensete superbium Cheesman, Impatiens acaulis Arn., Carvia callosa Bremek., Thalictrum dalzellii Hook., Delphinium dasycaulon Fres. are observed.

3. **Dry deciduous forests**:

   This type of forest occurs in area having rainfall 750-1750 mm and 7-8 months dry period. Khed, Junnar, Ambegaon, Sasvad and other areas possess such type of vegetation. Terminalia crenulata Roth., Terminalia bellirica Roxb., Tectona grandis L., Gmelina arborea Roxb., Albizzia lebbeck (L.) Willd., Albizzia procera Benth., Holoptelia integrostipa Planch. are dominant tree elements. Intermediate storey is essentially formed of Acacia leucocephloea Willd., Bauhinia racemosa Lamk., Santalum album L., Semicarpus anacardium L.f. The undergrowth is composed of Carrisa
caranotus Grah., Woodfordia fruticosa Salisb., Lantana camara L., Flacourtia latifolia Cooke. Climbers are Smilax zeylanica L., Wattaka volubilis (L.f.) Stapf. The ground cover is formed of herbs like Cassia tora L., Tridax procumbens L., Ocimum gratissimum L., grasses like Apluda mutica L., Heteropogon contortus P. Beauv. ex Roem. & Schult., Dichanthium annulatum Stapf., Haldina cordifolia Ridsd., Mitragyna parvifolia Korth. are found in humid valleys.

4. Scrub and thorn forests:

In the area having rainfall below 750 mm and dry season of 7-8 months, such type of forest can be seen. The area under this is central part of Bhor and eastern part of Paud, Daund, Indapur. Acacia and Capparis are associated with elements like Balanites aegyptiaca Delile., Ziziphus mauritiana Lamk., Cassia auriculata L., Euphorbia ligularia Roxb.

5. Ruderal vegetation:

Herbaceous plants occur on waste places, along village lands which are not inhabited or cultivated and along road side. Following species are met in such areas:-

Argemone mexicana L.  Cleome viscosa L.
Gynandropsis gynandra L.  Portulaca oleracea L.
Oxalis corniculata L.  Vernonia cinerea (L.) Less.
Polygonum glabrum Willd.  Datura innoxia Miller
Solanum indicum L.  Tribulus terrestris L.
Common weeds present are:

Achyranthus aspera L.  
Corchorus olitorius L.  
Sida rhombifolia L.  
Alternanthera sessilis L.  
Phyllanthus niruri L.  

and others.

6. Aquatic and semiaquatic habitats:

During monsoon, heavy rains result into streams and sluggish brooks and stagnant ponds being formed. In ponds and tanks or in artificial lakes aquatic stoloniferous species occur. Floating and free floating species show dominance in this period. Common among them are Typha angustata; Nelumbo nucifera; Hydrilla verticillata (L.f.) Royle; Valisneria spiralis L.; Potamogeton nodosus Poir; Lemna gibba L.

7. Ephemerals:

Species like Chlorophytum tuberosum (Roxb.) Baker; Curculago orchoides Gaertn.; Iphigenia indica (L.) A. Gray; Scilla hyacinthina (Roth.) Macbride; Urginia indica L.; Hypoxis aurea Lour. and others come up after first showers and complete their life cycle within a short period.

8. Sacred groves:

Sacred groves support the climax vegetation and give idea of original forest of the area. The groves are virtual
treasure-troves for naturalists as they support many plant species of rare occurrence. They are important reservoirs of biological diversity. A pure stand of Pongamia pinnata (L.) Pierre is preserved in Baneshwar grove, an economically important species. Porana malabarica; Begonia concanensis DC.; Campanula alphansonii Wall.; Capparis moonii Wight; Creteva magna (Lour.) DC.; Entada purusaetha DC.; Exacum bicolor Roxb.; Heracleum pinda Dalz & Gibs. are few examples of rare and endemic plants mostly seen only in particular Sacred groves.

The above floristic works gave guidelines for the present pollen studies. Wild species in the flora occurring in Pune district are about 1,400 in numbers. From these, selected representative common wild species and some rare endangered plants are considered for this present work.
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<thead>
<tr>
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<td></td>
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<td>1960</td>
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<tr>
<td>1966</td>
<td>Janardanan, Hemadri</td>
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Map-1 Location of Pune district in Maharashtra State