

**Study of floral diversity at Bhavale a barren place in Thane district adopted by an NGO for plantation.**

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**Abstract**

Biodiversity study was conducted to collect the baseline data from Bhavale where part of the terrain has become barren due to soil erosion and denudation. On one side is a small hillock and the other side is the plateau. It is a rocky terrain a part of which is used for quarrying.

In the present study observations were made to record the occurrence and diversity of the flora in the region as it was found to be unique for that particular area. Survey was conducted in summer and in monsoon season. In summer the plants that were noted were *Hyptis suaveolens*, *Lepidagathis*, dried fruits of *Dioscorea*, *Cryptostegia*, grasses, etc. After the first showers of rain the ground flora became visible in the barren region. There were extensive patches of Purple colored *Exacum*, pink colored *Neonotis*, Blue colored *Commelina*, Yellow colored *Smithia* and so on.

Plantation is carried out in the region by an NGO Hariyali. This Non Governmental Organisation working in Thane has adopted this area for plantation. It is working for the past three years. Indigenous trees are selected and planted. First proper pits are dug out with the help of locals and the NSS students from colleges. Larger trees were planted. Proper care is taken of these trees by frequent watering and pruning. The place being barren mainly develops grass that dries up in the summer months leading to forest fire, endangering the plantation. Care is taken to protect these trees from fire by digging trenches around it. This will lead in the conservation of forest, which will further develop into a climax forest.

**Keywords.** Diversity of flora, barren land, quarrying

**Introduction**

The word "biodiversity" is a contracted version of "biological diversity". John Llyod 2009 defines biodiversity as: "the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems."

Thus, biodiversity includes genetic variation within species, the variety of species in an area, and the variety of habitat types within a landscape. Perhaps inevitably, such an all-encompassing definition, together with the strong emotive power of the concept, has led to somewhat cavalier use of the term biodiversity, in extreme cases to refer to life or biology itself. But biodiversity properly refers to the variety of living organisms.

Biological diversity is of fundamental importance to the functioning of all natural and human-engineered ecosystems, and by extension to the ecosystem services that nature provides free of charge to human society. Living organisms play central roles in the cycles of major elements (carbon, nitrogen, and so on) and water in the environment, and diversity specifically is important in that these cycles require numerous interacting species in which trees play a major role.

General interest in biodiversity has grown rapidly in recent decades, in parallel with the growing concern about nature conservation, largely as a consequence of accelerating rates of natural habitat loss, habitat fragmentation and degradation, and resulting extinctions of species. The IUCN Red List estimates that 12-52% of species within well-studied higher taxa such as vertebrates and vascular plants are threatened with extinction. Based on data on recorded extinctions of known species over the past century, scientists estimate that current rates of species extinction are about 100 times higher than long-term average rates based on fossil data. Other plausible estimates suggest that present extinction rates now may have reached 1000 to 10,000 times the average over past geologic time. These estimates are the basis of the consensus that the Earth is in the midst of the sixth mass extinction event in its history; the present extinction event is termed the Holocene Mass Extinction.

The study of floral diversity of an area is important. Especially in a barren place. Though the study area is a part of western ghats which is known to be one of the hotspots of diversity of species, was getting wasted due to the negligence and apathy of the local people. This would lead to a great loss of vegetation and thus we would lose the oxygen providing lungs of the society.

#### **Materials and Methods:**

The area of study The place Bhavale lies in Bhivandi Taluka Off National Highway 03 between Bhivandi and Kalyan as shown in the map. It lies at about 8kms from Pise dam a water reservoir. The area covers land of about 10 hectares and out of that 25 acres land is given to the NGO Hariyali from Thane for plantation and conservation of water by the forest department.

Survey was conducted in summer and monsoon to record the floral diversity in the region. Identification of the specimens was done on referring various floras.

#### **Discussion:**

Plant diversity inventories in tropical forests have mostly been concentrated on tree species than other life forms, because tree species diversity is an important aspect of forest ecosystem

diversity and also fundamental to total forest diversity Mani, (2006). They provide resources and habitat structure for almost all other species.

Rapid depletion of biodiversity due to excessive deforestation is a major global environmental concern. World over there have been a number of attempts to prevent this irreparable damage through strict protection against all human disturbances but often in vain. The Western Ghats of India because of their geographical location, stable geological history, equal climate, heavy rainfall and good soil conditions support a variety of tropical forest ecosystems (Sevlaraj, 2005)

Rainfall is an important meteorological parameter, which influences the type of vegetation in a region. The relationship between rainfall and vegetation is well established Chandrasekar (2006).

Biodiversity of an area is related to a variety of factors such as topography, climate soil and natural / human disturbance. In this paper an attempt is made to highlight the influence of biotic and abiotic stresses on the plant species, regeneration potential and the patterns of secondary succession in the area. Thus the forests are threatened from local people, government conflicts as well as ever mounting commercial pressures Kothari *et al.*, (1996).

The climate in this region is warm moist with equable three distinct seasons that are summer (February to May), monsoon ( June to September) and winter (October to January). In the present study survey was conducted in two seasons, during the summer when temperature was higher and there was scarcity of water and in the monsoon season when the humidity was high and the temperature was comparatively low. Base line data was obtained of the floral diversity of the area. In the study area, earlier to the plantation a part was dug up for quarrying, which was later abandoned by the intervention of forest department. Also, as the place was denuded of vegetation the streams of water running down the hillock would run down towards the creek.

The trees listed in summer were 29 belonging to 18 different families (Table-1). However before the plantation started the number of trees on this barren land was very less like *Bombax salmalia* (silk cotton tree), *Ficus rumphii* (ashita), and *Tectona grandis* (Sag). Tree flora was established only after the plantation. About twenty thousand trees were planted in the area of 25 acres. The survival rate was good, about 65% -70% that could survive adverse, harsh conditions. These planted trees also had to overcome a mishap like the forest fire. The shrubs recorded (Table-2) in the area were twenty belonging to thirteen families, while the herbs (Table-3), were three belonging to two families while the climbers (Table-4) were seven belonging to five families. Thus the total plants recorded in this area in summer season were fifty nine.

In monsoon herbs (Table-5), recorded were twenty three belonging to seventeen families, shrubs (Table-6) one, climbers (Table-7) six belonging to four families and grasses (Table-8) eight belonging to three families.

Table 1: List of trees in the study area

serial no	Scientific name	Vernacular name	Family
1	<i>Adenantha pavonia</i>	Ratan Gunj	Mimosae
2	<i>Acacia arabica</i>	Babhul	Mimosae
3	<i>Annona squamosa</i>	Sita phal	Annonaceae
4	<i>Azadirachta indica</i>	Neem	Meliaceae
5	<i>Bauhinia tomentosa</i>	Apta	Caesalpinae
6	<i>Bombax salmalia</i>	Kate Savar	Bombacaceae
7	<i>Butea monosperma</i>	Palas	Fabaceae
8	<i>Cassia fistula</i>	Bahava	Caesalpinae
9	<i>Dalbergia lotifolia</i>	Shisam	Fabaceae
10	<i>Delonix regia</i>	Gulmohur	Caesalpinae
11	<i>Ficus religiosa</i>	Pimpal	Urticaceae
12	<i>Ficus rumphii</i>	Ashta	Urticaceae
13	<i>Gmelina arborea</i>	Shivan	Verbenaceae
14	<i>Khaya senegalensis</i>		Euphorbiaceae
15	<i>Kigelia pinnata</i>	Sausage tree	Bignoniaceae
16	<i>Macaranga peltata</i>	Chandva	Euphorbiaceae
17	<i>Madhuca indica</i>	Moha	Sapotaceae
18	<i>Melia azaderach</i>	Bakam Neem	Meliaceae
19	<i>Peltoforum ferruginum</i>	Peet mohur	Caesalpinae
20	<i>Pongamia pinnata</i>	Karanj	Fabaceae
21	<i>Phyllanthus emblica</i>	Amia	Euphorbiaceae
22	<i>Phoenix sylvestris</i>	Shindi	Palmae
23	<i>Pithecolobium dulce</i>	Vilayati chinch	Mimosae
24	<i>Syzigium jambolana</i>	Jambhul	Myrtaceae
25	<i>Tamarindus indica</i>	Chinch	Caesalpinae
26	<i>Tectona grandis</i>	Sag	Verbenaceae
27	<i>Thevetia peruviana</i>	Pivli Kanher	Apocyanaceae
28	<i>Trewia nudiflora</i>	Petari	Euphorbiaceae
29	<i>Vitex negundo</i>	Nirgudi	Verbenaceae

Table 2 List of shrubs in summer

	SHRUBS		
1	<i>Abelmoschus tetraphyllus</i>	Ran bhendi	Malvaceae
2	<i>Achyranthes aspera</i>	Aghada	Amaranthaceae
3	<i>Adhatoda zeylanica</i>	Adulsa	Acanthaceae
4	<i>Alternanthera sessilis</i>		Amaranthaceae
5	<i>Azanza lampas</i>		Malvaceae
6	<i>Blumea camphora</i>		Asteraceae
7	<i>Calotropis gigantea</i>	Rui	Asclepiadaceae
8	<i>Calycotris flaribunda</i>	Ukshi	Combretaceae
9	<i>Carissa carandus</i>	Karvanda	Apocyanaceae
10	<i>Flacourtia montana</i>		Flacourtiaceae
11	<i>Helecteris isora</i>	Murud Sheng	Sterculiaceae
12	<i>Holarrhena antidycentrica</i>	Saphed Kuda	Apocyanaceae
13	<i>Hyptis suaveolens</i>	American mint	Acanthaceae
14	<i>Lepidaghtis bandraensis</i>	Bhui gend	Acanthaceae
15	<i>Leea macrophylla</i>		Leeaceae
16	<i>Malachra capitata</i>	Van Bhendi	Malvaceae
17	<i>Mimosa pudica</i>	Lajalu	Mimosae
18	<i>Tephrosia pupurea</i>		Fabaceae
19	<i>Triumfeta rhomboidea</i>		Tiliaceae
20	<i>Urena lobata</i>		Malvaceae

Table 3 List of herbs in summer

	HERBS		
1	<i>Cleome chelidoni</i>		Capparidaceae
2	<i>Cleome viscosa</i>		Capparidaceae
3	<i>Eupatorium</i>		Asteraceae

Table 4 List of climbers in summer

	CLIMBERS		
1	<i>Caesalpinia bonducella</i>	Sagar gota	Caesalpinae
2	<i>Cryptostegia gigantea</i>		Asclepiadaceae
3	<i>Cucumis melo</i>		Cucurbitaceae
4	<i>Dioscorea bulbifera</i> (flowering)	Karanda	Dioscoreaceae
5	<i>Hemidesmus indica</i>	Anant mula	Asclepiadaceae
6	<i>Mucuna pruriens</i>	Khaj kuili	Fabaceae
7	<i>Vigna vexillata</i>	Abai	Fabaceae

TABLE 5 : List of herbs in monsoon

	Monsoon flora		
	HERBS		
1	<i>Ammania baccifera</i>		Lythraceae
2	<i>Achyranthes aspera</i>	Aghada	Amaranthaceae
3	<i>Amaranthus viridis</i>	Math	Amaranthaceae
4	<i>Canscora diffusa</i>		Gentianaceae
5	<i>Cassia tora</i>	Takla	Caesalpinae
6	<i>Celasia argentea</i>	Kurdu	Amaranthaceae
7	<i>Cleome chelidonii</i>		Capparidaceae
8	<i>Cleome viscosa</i>		Capparidaceae
9	<i>Commelina benghalensis</i>		Commelinaceae
10	<i>Corchorus capsularis</i>		Tiliaceae
11	<i>Gloriosa superba</i>	Kal jawi	Liliaceae
12	<i>Exacum pumillum</i>		Gentianaceae
13	<i>Euphorbia hirta</i>		Euphorbiaceae
14	<i>Impatiens balsaminae</i>	Terda	Balsaminae
15	<i>Martynia annua</i>	Vinchvi	Pedaliaceae
16	<i>Murdannia wightii</i>		Commelinaceae
17	<i>Neanotis lancifolia</i>		Rubiaceae
18	<i>Pogostemon spp.</i>		Acanthaceae
19	<i>Ramphicarpa longifolia</i>	Tutari	Scrophulariaceae
20	<i>Smithia bigemina</i>		Fabaceae
21	<i>Sesamum orientale</i>	Ran Til	Pedaliaceae
22	<i>Spermacoce pusilla</i>		Rubiaceae
23	<i>Trichodesma indica</i>		Boraginaceae

Table 6: List of shrubs.

	SHRUBS		
1	<i>Indigofera tinctoria</i>	Neel	Fabaceae

Table 7 List of Climbers in monsoon

	CLIMBERS		
1	<i>Canavalia lineata</i>	Abai	Fabaceae
2	<i>Cissampelos pareira</i>		Menispermaceae
3	<i>Ipomoea pes tigris</i>		Convolvulaceae
4	<i>Mucuna pruriens</i>	Khaj Kulli	Fabaceae
5	<i>Trichosanthes cucumerina</i>	Jangli Padwal	Cucurbitaceae
6	<i>Vigna capensis</i>		Fabaceae

Table 8: List of grasses in monsoon

	GRASSES		
1	<i>Chloris tenella</i>		Graminae
2	<i>Cyperus spp</i>		Cyperaceae
3	<i>Cyperus spp.</i>		Cyperaceae
4	<i>Dimera gracilis</i>		Graminae
5	<i>Eragrostis pilosa</i>		Graminae
6	<i>Eragrostis pumilla</i>		Graminae
7	<i>Eriocaulon stellulatum</i>		Eriocaulaceae
8	<i>Eriocaulon tuberiferum</i>		Eriocaulaceae
	<i>Diplisnenus spp.</i>		Graminae

#### Results:

The plants that were observed in the survey belonged to different families. Survey conducted in the summer showed that the vegetation was sparse. However there was a change in the flora after plantation. This will now definitely help to conserve the soil and also hold water. The trees were dominant (29) followed by the shrubs (20) while the herbs were very few only three. Some of the climbers like *Dioscorea bulbifera* and *Canavalia lineata* though dried up were observed in the fruiting stage.

In monsoon after the first showers the entire barren rocky terrain was strewn with all the wild flowers converting it into plateau of flowers. With huge patches of pink starry *Neanotis lancifolia*, followed by purple coloured *Exacum pumillum* with the root parasite *Ramphicarpa longiflora* that starts opening

only after 5pm in the evening. In monsoon the total number of plants recorded other than the trees were 38. It is necessary to conserve this area and see that flourishes in a climax forest.

Conservation of flora will lead to establishment of fauna as a number of butterflies and other insects were seen inhabiting the area which would not be possible on a barren land. In the study area it was observed that by the end of rainy season butterflies start appearing and almost under every leaf eggs were laid, (Pejaver2001)

A central question in explaining these patterns of diversity is determining the relative importance of long-term evolutionary processes -- the balance between origin and extinction of species -- and local ecological processes of species interactions.

The general similarity among diversity patterns of different taxa with latitude and region suggests that prehistorically these patterns have been controlled primarily by factors operating over large spatial and temporal scales. Ultimately, the number of species in a region is set by a balance between origin through speciation, loss through extinction, and migration of species among regions, all of which operate over long (geologic) time scales.

Conversely, on local spatial scales and over ecological time scales on the order of a few generations of organisms, a wealth of evidence shows that diversity often varies systematically with habitat area, habitat heterogeneity, disturbance, and availability of energy (i.e., productivity) and other resources, notably water in terrestrial ecosystems.

#### **Conclusion:**

The diversity of trees is fundamental to total rain forest biodiversity, because trees provide resources and habitat structure for almost all the forest species Cannon et al.,(1998). As human activities keep escalating with ever increasing population, ecosystems near human settlement become fragile. Hence documenting tree diversity in disturbed forests sites and therefore emphasizing the need for site conservation form the nucleus of this investigation.. The need for conservation arises from the multiple benefits offered by the biodiversity. Hence proper and stringent conservation measures would rescue species loss. Thus preservation of this forest is crucial not only for maintain the biodiversity but also for meeting the basic needs of the human population in the planes.

For the most recent 10,000 years man has been the greatest factor affecting biodiversity, with adverse impacts occurring at an accelerating pace since approximately the Industrial Revolution. Human intervention in ecosystem function have been expressed through habitat destruction, habitat fragmentation, overexploitation, and pollution. In some locations such as Easter Island and Hawaii the majority of macroscopic species that

The number of undescribed species is undoubtedly much higher. Particularly in inaccessible environments, and for inconspicuous groups of organisms. Therefore, collecting expeditions routinely help discover many undescribed species. This can be achieved by involving the local people, students from the nearby schools and volunteers from other NGOs and senior citizens.



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