

Implications of Characteristic Environmental Parameters of Melghat Forest, Dist. Amravati

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Abstract

Melghat forest in Amravati district offers a unique ecological niche for the diversified life forms. The present paper reports the analysis of specific environmental features pertaining to temperature, humidity, rainfall, etc that favors the growth and development of rich vegetation. Also, the soil conditions greatly influenced the biotic components in the Melghat forest.

Key Words: *Dry deciduous forest, Melghat, Environmental features, Edaphic Factor, Soil Analysis.*

Introduction

A tropical forest is a very diverse and complex resource. The diversity arises from very large number of plant and animal populations comprising it, from the geographical variations in composition of species (both plants and animals) resulting from difference in climatic and soil conditions, as well as divergence in physiology and morphology of various species. (Lal, 1988). In these forests, neither water nor temperature is a limiting factor. The tropical rain forests are the most productive of all. They provide 139.4×10^3 Kcal energy per year on the global basis. (Leith, 1972).

Melghat forest is one of the characteristic natural habitats of tropical dry deciduous forest in Amravati district, maintaining the biodiversity. Melghat forest is endowed with distinctive climatic conditions conducive for the growth and development of some of the temperate plants. It is especially noteworthy that plants like, *Pinus*, *Araucaria*, *Agathis*, *Cupressus* are found to be luxuriantly growing in this region. The characteristic environmental features in Melghat forest are responsible for the luxuriant growth of vegetation. It also provides an ecological niche for number of ethno medicinal plants. The area is more significant from the view of socio - cultural aspect, as it is inhabited by tribals. Melghat tract is entirely different from the rest of the district from climatological, agronomical and floristic point of view. It consists of metamorphic rocks along the northern border of district.

Melghat is located in Dharni and Chikhaldara Tahsils of Amravati district in the Southern hill ranges of Satpura. The Melghat Sanctuary includes intended Gugamal National park of 361 sq. kms. The area of Melghat Tiger Reserve forms a corridor between forest areas of Madhya Pradesh and Maharashtra ensuring continuity of forests in the satpuras. The area is catchment of five rivers namely Khandu, Khapra, Sipna, Gadga and Dolar, all of which are tributaries of river Tapi.

In Melghat, the work on floristic composition initiated by Mirashi and Salpekar (1975) and was continued further by Dhore (1986). Very recently Bhogaonkar and Devarkar (1999) conducted the morphotaxonomic studies and also reported new plant taxa viz. *Ceropegia*. Thus, overall perusal reveals that studies in Melghat area mostly concentrated on floristic aspect.



Map of Melghat Forest, District - Amravati, Maharashtra, India

Methodology

To carry out the study of abiotic environmental features of Melghat forest ecosystem, we have adopted simple methods. The abiotic components can be safely classified into – climatic, edaphic and topographic factors.

In order to study the environment and specific features, frequent visits were made to the forest area. At times, the camping was done to understand the non-living factors of environment. During the visits, the variations in the climatic parameters were noted. Also the traverses were made to understand overall constitution of vegetation, to study interdependencies between biotic and abiotic factors.

The weather parameters involving temperature, rainfall, humidity, etc were noted through kind courtesy of the Metrological Department of Forest Office. For this, regular visits were made to the forest and with the cooperation of forest official's readings were noted.

Edaphic factor plays an important role in the growth and development of vegetation. For this study, soil samples from different locations in the study area were collected. It was followed by detailed analysis with respect to the amount of carbonates, nitrates, chlorides, sulphates, phosphates, etc.

Observation

The abiotic environment of an ecosystem is controlled by climatic conditions. The climate determines the availability of water and degree of heat. Thus, it influences the development of soil, the nature of vegetation and the type of biological community. Functionally, it also enhances nutrient cycling, photosynthesis & decomposition of ground vegetation. Hence, the major structural and functional aspects of an ecosystem relate directly and indirectly to climate. Within the Melghat forest, temperature, humidity, light and rainfall show a distinct gradient, and these controls the growth and development of vegetation community.

Light

In atmosphere, humidity, dust, cloud, fog normally interfere with the light after reaching the ground surface. The intensity and duration of light changes from time to time, forms two distinct groups viz. Heliophytes and Sciophytes.

Sciophytes, which are the low light loving group of plants includes *Adiantum*, *Cheilanthes* (silver fern), *Selaginella*, few bryophytic members and species of lichens; grow abundantly in the valleys of mountains

The upper tree layer, with the fully exposed emergent trees and their associated epiphytes and animal life, exists in the euphotic layer of the forest. The euphotic layer is the most productive part of the forest, originating much of its biomass and its diversity of animal life. (Richards, 1983).

Temperature

The conspicuous features of the tropical climate are high and uniform temperatures through out the year (Mukherjee, 1996). Temperature determines hotness of a place and it varies considerably with the altitude. In Melghat forest ecosystem, there is a marked difference in day and night temperatures in summer. Maximum temperature for hot season could be up to 43°C and minimum 8°C. The higher hills, plateau and valleys become very cool during winter, when the temperature frequency falls below freezing point in December - January.

Semadoh, Jarida, Dhargadh, Raipur, and Harisal were chosen as the centers for observations. Observations indicate that, Jarida is hottest place among the places of observations. It indicates minimum temperature of 8°C in January while maximum in month of May showing 43°C. On the other hand, Semadoh is coolest place showing minimum 9°C and maximum 39°C in month of January and June respectively. Hence, due to variations in temperatures, Melghat area shows biodiversity in organisms as thermopriodicity is directly related with floristics.

Rainfall

Based on the amount of mean annual rainfall, the forest can be subdivided into wet, moist, and dry types. Where the rainfall is less than 1500 mm, the moist forms are replaced by dry ones. Rainy season start from June and remains till September and sometimes in October to November. The average rainfall is usually higher on the main ridge of Galvilgarh, which amounts to 1784 mm at Chikhaldara. Some of the valleys perhaps receive rains up to 2500 mm in a year. Thus, there is a wide variation in rainfall from place to place even within a short distance with change in altitude and topography. Among the centers studied, Semadoh receives the highest rain fall and it is followed by Dhargadh, Jarida, Harisal and the Raipur. The rain fall of the hilly region run away quickly and it is a useless form of water. The remaining water is absorbed by the plants and thus has a direct role on the development of vegetation.

Humidity

Low temperature, low wind velocity, low light, increases humidity. High humidity brings cooling effect and decrease temperature. At Semadoh and Dhargadh, the humidity is found to be highest in the month of June - July while the readings of humidity are minimum in the month of January - February. On the other hand, in summer months, humidity decreases due to high temperature, high wind velocity & intense light.

Edaphic Factors

Soils are the resultant of the interactions of several factors: climate, organisms, parent material and topology, all acting through time. (Jenny, 1980). It is the medium in which roots grow, anchor the plants and from where the plants obtain water and nutrients. A soil usually contains at least some clay and its clay content strongly influences its management and productivity (Davies *et al.*, 1972).

Among the soil samples analyzed, soil of Semadoh is rich in carbonates, nitrates, and phosphates but deficient in bases while Kolkhas rest house soil samples is rich in bases (Ca, K, Mg, Na, etc.) and deficient in other inorganic contents.

Topography

Melghat is a typical representative of the Central Indian Highlands, which is a part of biographical zone 6E - Deccan Peninsula - Central highlands (Rodger and Panwar, 1988). Topographical factors bring about variations in climate of Melghat and influence vegetation. Height of mountains in Gavilgarh and Chikhaldara region; direction of mountain ranges and steepness of slope affects the developmental pattern of vegetation.

Effect of different altitudes can be better seen on high mountains. With an increase in altitude above mean sea level (From Paratwada), there are changes in the values of temperature, pressure, wind velocity, humidity and intensity of solar radiation. Due to these topographic changes, there is much biodiversity in Melghat valleys indicating presence of ferns, lichens, bryophytes and few members of orchids.

Discussion

The species diversity in an ecosystem is greatly influenced by the climatic variations, soil characteristics and altitudinal features. Although Melghat forest has been categorized as a dry deciduous forest, its typical climatic conditions favor the growth and development of some of the representatives of temperate forests. It exhibits 5 –6 storeyed vertical stratification of the vegetation. The topographical features and light intensity allows the growth of distinct sciophytic life forms particularly diverse species of Filicales. The higher plateaus above 1000 m height are much cooler, where as Semadoh region is the coolest place. The rainfall and humidity ranging between 60 – 70% favors the growth of epiphytic forms like *Vanda* and *Aerides*. The ground vegetation also sprouts well in the month of August – September. In this period, the herbaceous vegetation grows well with its full vigor and diversified forms like *Chlorophytum*, *Curculigo*, *Dioscorea*, *Gloriosa*, etc. and the number of ethno medicinal plants viz. *Andrographis paniculata*, *Embelia rabes*, *Nerillea aragoana*, *Ceropegia*, etc.

The analysis of soil reveals the picture about the presence of organic and inorganic contents at the various locations. The soil sample from Semadoh indicates more of the inorganic substances, which results in the diversity of lower and higher forms. On the other hand, the samples from Kolkhas shows the poor quantities of inorganic substances; showing less profound vegetation as compared to other regions in the Melghat ecosystem.

Implication of characteristic environment

The altitudinal variations also affect the vegetational scenario in the forest. Indirectly, wind velocity influences the geographical distribution of tropical forests through the associated movement of moist and dry air masses, which broadly determines climate and seasonal changes. Departures from the usual patterns may however occur at regular intervals and bring unusually dry conditions even into the most equable and prehumid of equatorial climates. (Longman and Jenik, 1987).

At the foothill, the forest is thick and dense in the Semadoh – Kolkhas belt as compared to other regions. It is in this region, that Tiger and Leopards are well protected along with Deer, Bison, Sloth bear, etc. The area shows the dominant growth of teak population, followed by *Butea monosperma*. Among the monocots, specifically bamboo species like *Dendrocalamus strictus* is well represented in the forest.

Thus, the environmental conditions in the Melghat forest provides an ecological niche for the rich and diversified vegetation along with wild fauna. Also, it serves as a conservation place for many threatened and rare species of plant taxa.

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Soil Testing Chart

S. No.	Test For	Procedure	Result
1.	Carbonates	Soil sample + Conc. HCL	Effervescence
2.	Nitrates	Prepare Soil: Water (1:5) suspension. Add 0.2 % diphenyl amine prepared in Conc. H_2SO_4 . Soil suspension + few drops of diphenyl amine	Blue Colouration
3.	Base Deficiency (Ca, Mg, K, Na etc.)	Soil sample + Solution of Ammonium thiocyanate + few drops of H_2O_2	Red Colouration
4.	Chlorides	20 ml of water extract + 10 ml of N/10 H_2SO_4 + $AgNO_3$ solution	White Ppt
5.	Sulphates	20 ml of water extract + 2.5 ml of Conc. HCL & boil + $BaCl_2$ solution	White Ppt.
6.	Phosphates	10 ml of water extract + few drops of conc. HNO_3 + NH_4NO_3 Solution	Yellow colouration

Soil Analysis observation

Soil Sample	Carbonates	Nitrates	Base Deficiency	Chlorides	Sulphates	Phosphates
Ghatang River	++	+	+++	++	++++	+++
Ghatang Campus	+++	++	++	++++	++	+
Kolkhas	+	+++	+	++++	+	++
Semadoh	++++	++++	++++	++	+++	++++

Implication of characteristic environment

