



Phytosociological study of plant species on berms of Vihar lake in Mumbai region

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Abstract

A comprehensive phytosociological investigation of carpet plants and flowering plants growing on berms of Vihar Lake (19° 8' 38.4" N, 72° 54' 36" E) was carried out. Vihar Lake is located near Vihar village on the Mithi River within the boundaries of the Sanjay Gandhi National Park, in North Mumbai. When built in 1860 (construction initiated in 1856), it was considered as the largest lake in Mumbai. It is located between Tulsi Lake and Powai Lake. It partly meets the drinking water needs of the Mumbai region. The objective of this investigation is to observe and record the plant species of carpet plants and flowering species found on the berms of Vihar Lake. The phytosociological research study was conducted using the quadrat method. The dominant species was found to be *Cynodon dactylon* followed by *Sagina procumbens*.

Keywords: Biodiversity, lakes of Mumbai, plant communities, quantitative analysis, terrace bordering

Introduction

Phytosociology is the study of the plant community structure or the study of aspects of communal relations of plant and this study is important for understanding the functioning of community as it implies knowledge of structure and composition of the component species (Singh & Singh, 2010) [6]. Phytosociological studies have been reported from different corners of the globe from different ecosystems. Vihar Lake is the largest lake in Mumbai and contributes to the city's drinking water needs. Being a comparatively lesser polluted water body, it contributes to the fishery and forging needs of the tribal's living around the water body. Vihar is situated in the centre of hills, which work as a catchment point for the area. The lake was artificially constructed in 1856 to fulfil the drinking water needs of the local people in Mumbai. After around two centuries of construction, the lake has become a settled ecosystem for various flora and fauna. The objective of this study was to identify the vegetation and species richness in a selected area of Vihar Lake amid Sanjay Gandhi National Park, a mature forest well known for its high species diversity of flora and its thriving ecosystem in the centre of the bustling city of Mumbai.

Materials and Methods

The present study was carried out in June of 2023 to observe and record a variety of plant species in the monsoon season. The quadrat method was used as a means to serve the purpose for analytical character. 10 quadrats were studied of size 1.0m² (1.0m × 1.0m) where all the plants were sampled and identified and their ecological indices that is frequency percentage, density and abundance were noted. The numerical data gives information on the existing species dominant in this community. The data was compiled and analyzed for qualitative and quantitative study using the following formulae (Hanson and Churchill, 1961) [1]:

$$\text{Frequency percentage} = \frac{\text{Total number of quadrats in which the species occur}}{\text{Total number of quadrats studies}} \times 100$$

$$\text{Density} = \frac{\text{Total number of individual species}}{\text{Total number of quadrat studied}}$$

$$\text{Abundance} = \frac{\text{Total number of individual species}}{\text{Total number of quadrat in which species occur}}$$

Results and Discussion

These results shed light onto the phytosociological aspects of the berms of Vihar Lake; the analysis gives us a view of the rich floor-dwelling flora in the above-mentioned area. In the study area, a total of 7 plant species of the family Asteraceae, Caryophyllaceae, Rubiaceae, Poaceae, Cleomaceae, and Boraginaceae were observed (Table-1), where *Cynodon dactylon* L. was found to be the dominant (454) species, followed by *Sagina procumbens* L. (453). *Polycarpon prostratum* also known as prostrate manyseed was found to be 220 in number. *Heliotropium ovalifolium* was found to be lowest that is 22 in number (Table-2). *Senecio vulgaris*, *Dentella repens* and *Cleome viscosa* were also observed and were found to be 111, 80 and 33, respectively. Although the frequency percentage of *Cynodon dactylon*, *Polycarpon prostratum* and *Sagina procumbens* were found to be equal that is 70%, but the density and abundance of *Cynodon dactylon* was highest that is 45.4 and 64.8, respectively as compared to *Sagina procumbens* and *Polycarpon prostratum* that is 45.3, 64.7 and 22, 31.4, respectively and was found to be significantly different at 5% level of significance. Lowest density and abundance was recorded in *Heliotropium ovalifolium* that is 2.2 and 4.4, respectively. According to Knox, 2017^[4], the data of all the six sites of Mumbai district showed that the plant community is more towards heterogeneity. When values of frequency classes B, C and D are comparatively higher than their values in normal frequency diagram, the vegetation is said to be heterogenous (Higher values of class

E indicate homogeneity of vegetation). Density gives the numerical strength of a species in a community. Abundance, on the other hand, gives the number of individuals of a species in a habitat. Quantitative analysis was also performed by Kiran *et. al.*^[2] in which phytosociological studies of medicinal plants were recorded and analyzed during rainy season from July to October 2017 in Bundelkhand region of Jhansi district and a total of 47

medicinal plants were observed. Oudhia (1999)^[5] conducted a phytosociological survey in wastelands during rainy season and recorded about 27 weed species associated with *Parthenium hysterophorus*, an obnoxious weed. A total of 12 plant species were recorded in monsoon season from all the different sites of Mumbai region. Out of these, 5 plants were found growing abundantly in monsoon season (Knox, 2021)^[3].

Table 1: List of plant species observed on the berms of Vihar Lake

S. No.	Plant species	Common names	Family
1.	<i>Senecio vulgaris</i> L.	Common groundsel	Asteraceae
2.	<i>Sagina procumbens</i> L.	Birdeye pearlwort	Caryophyllaceae
3.	<i>Dentella repens</i> L.	Creeping dentella	Rubiaceae
4.	<i>Polycarpon prostratum</i> (Forssk.)	Prostrate manyseed	Caryophyllaceae
5.	<i>Cynodon dactylon</i> L.	Bermuda grass	Poaceae
6.	<i>Cleome viscosa</i> L.	Asian spider flower	Cleomaceae
7.	<i>Heliotropium ovalifolium</i> L.	Grey leaf heliotrope	Boraginaceae

Table 2: Phytosociological analysis of plant species observed on the berms of Vihar Lake

S. No.	Plant species	Total no. of a species	Total no. of quadrats in which species occur	Total no. of quadrats studied	Frequency %	Density	Abundance
1.	<i>Senecio vulgaris</i> L.	111	6	10	60	11.1	18.5
2.	<i>Sagina procumbens</i> L.	453	7	10	70	45.3	64.7
3.	<i>Dentella repens</i> L.	80	5	10	50	8	16
4.	<i>Polycarpon prostratum</i> (Forsk.)	220	7	10	70	22	31.4
5.	<i>Cynodon dactylon</i> L.	454	7	10	70	45.4	64.8
6.	<i>Cleome viscosa</i> L.	33	6	10	60	3.3	5.5
7.	<i>Heliotropium ovalifolium</i> L.	22	5	10	50	2.2	4.4

Conclusion

The present study deals with the phytosociological study of the selected area of Vihar lake and it was observed that the flora is rich in diversity during monsoon season which not only binds the soil from flowing into the lake but also is the dwelling place for most of the insects.

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