



Short Communication

Phytosociological characters and biodiversity of sacred grove a preliminary study

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Abstract

The study was carried out to analyze both phytosociologically and quantitatively, the trees and shrubs of sacred grove 'Siddhkho' in Gwalior district of state Madhya Pradesh. Eight quadrats of each 20m × 20m for trees and 5m × 5m for shrubs were laid down in the total area of 7.5 ha. A total of 12 species of both trees and shrubs were found in which *Anogeissus latifolia* was dominated with frequency of 100%, density (34.875), relative density (85.32), relative frequency (29.62), abundance (34.875), relative dominance (20.61) and IVI (135.54). The quantitative measurements were carried out by Simpson index of diversity, Menhinick's Richness and Shannon wiever index. The values were 0.73 for simpsons diversity index, 0.66 for Menhinick's richness and 1.59 for shanon wiever index.

Keywords: Phytosociological characters, Quadrat, Quantitative analysis, Sacred Grove.

Introduction

Sacred groves may be defined as "Forest patches of rich biodiversity which are conserved on the basis of religious beliefs" These are considered to be source of Biodiversity and thus can conserve a number of species. Their existence dates back to ancient times and their presence have been estimated as early as 1800's¹. These Sacred Groves are reported to provide all the ecosystem Services like Provisioning, Supporting, Regulation, and Cultural. These Groves also improve soil fertility and are recorded to be good carbon sinks. The studies on sacred Groves in India attained momentum with the pioneering work in Western ghats^{2,3}. Sacred groves has been estimated upto more than one 100,000⁴. Due to rigorous generation of trees sacred groves have high diversity of plants than formal reserves⁴ these groves have high tree diversity and are dominated by the same⁵⁻⁷. Gwalior division is well known in biodiversity as it consists of forest cover containing rich flora and fauna. Almost 15 Sacred forest regions are found in the district. Among them some are preserved and some are disturbed. Biodiversity on measurement determine the stability of a community of species. The present study was undertaken during 2012-13 to understand various phytosociological and other related parameters of Siddhkho sacred grove.

Materials and methods

Study site: The study was conducted from 2012 to 2013 at Siddhkho region in Gwalior District of State Madhya Pradesh, i.e., 26°04'25.6" North latitudes and 78°18'03.3" East longitudes covers an area of 7.5 ha. The average altitude of Gwalior is about 197 meters above msl. The soil type of this area is deep

loamy, alluvium, shallow to sandy and loamy grey brown. The climate is hot and dry with three distinct seasons viz. summer, monsoon and winter. Summer is intense and lasts from March to mid July. The monsoon starts from mid-July and lasts till September end. Winter starts from October and lasts till mid of February. Maximum temperature ranges from 40° - 48°C during April to June and minimum temperature ranges from 5° - 0°C. The average rainfall is 80mm.

Data collection: The total Area (7.5 ha.) of sacred forest region was divided into 8 Quadrats of 20 × 20 m for trees, 5 × 5m for shrubs and 1 × 1 m for herb. The data was collected during monsoon season by including trees as having GBH (Girth Breast height) ≥ 30 cm and for shrubs having GBH ≤ 10 cm. The data was subjected to statistical analysis.

Data Analysis: The following phytosociological parameters were undertaken for the study. Density, Relative Density, Frequency, Relative Frequency, Abundance, Relative Dominance, IVI (Importance Value Index). IVI is the sum total of Relative Density, Relative Dominance and Relative Frequency for a species⁸. The IVI was calculated for trees and shrubs.

Quantitative Assessment: Diversity indices provide important information about rarity and commonness of species in a community. The data were analysed for Simpson's Index⁹, Species Richness¹⁰ and Shannon Wiever index¹¹.

Simpson index of Diversity: Simpson index is used to estimate the degree of dominance and mostly used to determine dominance between different populations. The Simpson's value of D varies from 0 - 1. If value tends towards 0 Diversity is infinite and if value is 1 diversity is less.

$$D = \frac{\sum n_i(n_i - 1)}{N(N - 1)}$$

Where: n_i = total number of each individual species, N = Total number of all the species.

Menhinick's Richness: Species richness gives an area of diversity in the community. The species richness increases with an increase in area for study.

$$D = \frac{S}{\sqrt{N}}$$

Where: S = number of different species presented in sample, N = Total number of individuals in the sample.

Shannon Wiever index:

$$H = -\sum (p_i) (\ln p_i)$$

Where: P_i = proportion of total sample belonging to i species.

Results and discussion

The density (34.875) for *Anogeissus latifolia* was highest (Table-1). *Anogeissus latifolia* was found to be the dominating species with frequency of 100% followed by *Zizyphus xylopyra* with 37.5%. *Anogeissus latifolia* has Abundance (34.875), Relative Density (85.32) followed by *Butea monosperma* for which Abundance (8.5) and Relative density (5.2). The Relative Frequency (29.62) was also highest in *Anogeissus latifolia* followed by *Zizyphus xylopyra* (11.11). The Relative Dominance was found highest in *Grewia subinaequalis* (20.3) followed by *Anogeissus latifolia* (15.6). IVI (Importance Value Index) of *Anogeissus latifolia* was found to be (130.54) followed by *Grewia subinaequalis* (24.3). Similar findings were reported¹². Since the work was carried out for only trees and

shrubs, similar work has been carried out¹³. Phytosociological characters of Sacred Grove in Puducherry has also been in according with the current work¹⁴. Hence, the sacred grove is covered mainly by *Anogeissus latifolia* with 279 individuals found in eight quadrats. The Quantitative assessment was estimated in which Simpson diversity index was 0.73, Menhinick's richness 0.66 and Shannon Weiner (1.59) (Table-2). Species diversity is used in understanding the composition, change and development of plant communities which have importance in understanding the stability of structure and function of ecosystems. The Simpson index (0.73) indicates the dominance of the species in the study area was less as per the value. Menhinick's species richness was found 0.66. The Shannon diversity index (H) was found low when compared to the same may be due to the small area taken for the study¹³. As the Shannon diversity index is commonly used to characterize species diversity in a community. Shannon's index accounts for both abundance and evenness of the species present. Ethno botanical importance of the sacred grove also observed and was found that various disease are cured by the plants grown in the grove. The tree species which are used by the locals, associated with the grove are *Anogeissus latifolia* used for skin disease, healing of wounds, fever etc¹⁵. *Butea monosperma* used as Antihelminthic, Night blindness, snake bites etc¹⁶. Similarly other plants are used for treating various ailments. Due to increasing anthropogenic activities the sacred grove may be disturbed as the villagers connected to the grove are frequently entering the grove and taking their animals for grazing, taking fuel wood from the ecosystem which may harm the region. So there is an urgent need to address the problems of sacred grove in order to conserve.

Table-1: Phytosociological parameter of Sacred Grove of Siddh kho

Species	Density	Frequency	Abundance	R D	R F	R Do	IVI
<i>Anageissus Latifolia</i>	34.875	100	34.875	85.32	29.62	15.6	130.54
<i>Bute monospererma</i>	2.125	25	8.5	5.20	7.40	10.1	22.7
<i>Bauhinia racemosa</i>	0.125	12.5	1	0.30	3.70	7.0	11
<i>Wrightia Tinctoria</i>	0.50	25	2	1.22	7.40	13.9	22.52
<i>Haloptelea Integrifolia</i>	0.125	12.5	1	0.30	3.70	17.2	21.2
<i>Acacia Catechu</i>	0.375	25	1.5	0.91	7.40	5.5	13.81
<i>Grewia subinaequalis</i>	0.125	12.5	1	0.30	3.70	20.3	24.3
<i>Zizyphus xylopyra</i>	0.5	37.5	1.33	1.22	11.11	4.2	16.52
<i>Bauhinia variegata</i>	0.375	25	1.5	0.91	7.40	5.5	13.81
<i>Tephrosia Purpurea</i>	0.625	25	2.5	1.52	7.40	0.09	9.01
<i>Flacourtia Indica</i>	0.75	25	3	1.83	7.40	0.01	9.33
<i>Lantana camara</i>	0.375	12.5	3	0.91	3.70	0.04	4.65

R D= Relative Density, R F= Relative Frequency, R Do Relative Dominance, IVI= Important Value Index

Table-2: Showing Quantitative analysis of Sacred Grove - Siddhkhoh

S.No.	Diversity Indices	Values
1	Simpson Diversity Index	0.73
2	Menhinick's richness	0.66
3	Shanon Weiner Index	1.59

Conclusion

The study site i.e., Sacred Grove is a conserved region of Biodiversity found in the Hills of Gwalior region with *Anogeissus latifolia* as the dominating specie. The Deity of the Sacred Grove is not allowing anybody to harm the community. The Sacred region is source of important plants like *Anogeissus latifolia*, *Butea monosperma* etc. which are used by the locals in solving various problems regarding health, family, relation etc.

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