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Diversity and Phytosociological Analysis of Tree Species in Sacred Groves of Vijaypur Block, Samba (J&K)

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Abstract: ***The sacred groves are the representatives of climax vegetation and exhibit the diversity of species such as trees, climbers, epiphytes and other shade loving herbs. Well-preserved sacred groves are storehouses of valuable medicinal and other plants having high economic value and serve as a refuge to threatened species. Every sacred grove carries its own legends, lore, and myths which form the integral part of the sacred grove. The present study was conducted, to study the sacred groves from ecological and floristic point of view in Vijaypur Block of Samba district, J&K. For this the tree diversity in some prominent sacred groves of Vijaypur Block was studied by random sampling using Quadrat method. In all, 30 sampled plots each of 10 m × 10 m size were laid in the sacred groves. Altogether, 28 tree species were enumerated from the sacred groves. Based on the calculations of frequency, density and abundance, IVI of each species was calculated. The basal area of the trees varied between highest of 712.33m^2/ha for Ficus religiosa followed by 472.16m^2/ha for Eucalyptus citridora and a lowest of 3.16m^2/ha for Morus alba. The overall tree diversity in sacred groves calculated by Shannon Weiner index was found to be 2.62. Some important trees in the groves are Mangifera indica, Syzygium cumini, Eucalyptus, Ficus religiosa etc.***

Keywords: Sacred grove, epiphytes, threatened, IVI, Shannon Weiner index etc.

1. Introduction

Sacred Groves of India are forest fragments of varying sizes, which are communally protected, and which usually have a significant religious connotation for the protecting community. Hunting and logging are usually strictly prohibited within these patches (Gadgil and Vartak 1975) . Sacred groves did not enjoy protection via federal legislation in India. Some NGOs work with local villagers to protect such groves. Traditionally, and in some cases even today, members of the community take turns to protect the grove (Sudha *et. al.*1998).The Dubla Island sacred grove in Sundarbans mangrove forest in Bangladesh harbours rich vegetation and are a place of worship for low caste Hindus, who visit it once in a year for prayer (Islam et al. 1998). Joshi and Gadgil (1991) reported that sacred grove might serve important refugia for threatened and rare species. Besides, they preserve genetic diversity of even the common trees (Nair et al., 1997).Byers et al. (2001) show that sacred forests have persisted longer than non-sacred forests in Zimbabwe. Biodiversity keeps the ecological processes in a balanced state, which is necessary for human survival. Therefore, the biodiversity-rich sacred groves are of immense ecological significance. They also play an important role in the conservation of flora and fauna. Keeping in view the role of the sacred groves as treasure of repositories of variety of tree species, the present study is conducted with objectives to find out the tree diversity and to carry out inventory of trees in the study area.

2. Litrary Survey

Sacred groves are the good source of a variety of medicinal plants, fruits, fodder, fuelwood, spices, etc. The study of interrelationship between the human beings and plants and animals in their surrounding environment (i.e. ethnobiology) is very revealing. In India, 13,720 sacred groves have been identified in various parts of India. The sacred groves are the representative of climax vegetation and exhibit the diversity of species such as trees, climbers, epiphytes and other shade loving herbs (Bhandary and Chandrasekhar 2003). Sacred groves are distributed across the globe and diverse cultures recognize them in different ways encoding various rules for their protection the institution of sacred groves is very ancient and widespread in most parts of India and in spite of increase in human population, sacred groves have survived under a variety of ecological situations (Ramakrishnan *et al*., 1998).

3. Previous Work

Recently Negi (2010) documented 168 sacred natural sites including 75 sacred forests, 74 sacred groves, 10 water bodies and 9 pastures in nine districts in Uttarakhand. Chandrakant *et al.* (2006) conducted a study in the sacred groves of Parinche valley, Pune district of Maharastra to understand the status and importance of common cultural aspects and religious values in conservation. Historically, attitudes and behaviour towards the environment and sustainable use of resources have been greatly affected and determined by nature worship and spiritual values (Khumbongmayum et al. 2004).

4. Study Area

The state has been divided into three divisions i.e., Jammu, Kashmir and Ladakh. There are 22 districts in the state which include 8 recently formed districts. Jammu division has 10 districts in all and Samba is one of these districts. Samba, the headquarter of Samba district is situated in range of Shivalik hills alongside the National Highway 1-A/ on the bank of river Basantar at a distance of 40 km. from Jammu

city. Samba district is adjacent to the International Border with Pakistan. About two third of the area of the tehsil Samba is *Kandi* and rain fed. The southern area downside of the national highway is irrigated through Ravi Tawi Irrigation Canal Network which contributes towards cultivation of major cereals crops and vegetables cultivation. The climate of the district is sub-tropical being hot and dry in summer and cold in winter. The temperature ranges between 6^0C in winter and 45^0C in summer.

5. Methodology

A total 30 sample plots of 10m x 10m were laid randomly in sacred groves in the study area. The information regarding CBH (circumference at breast height), approximate height, and species of the trees in each plot was noted for carrying out of phyto-sociological analysis. The quantitative analysis of frequency, density and abundance was done by using the standard expressions. The A/F ratio was used to interpret the distribution pattern of the species. This ratio has indicates regular (<0.025), random (0.025-0.05) and contagious (>0.05) distribution pattern (Whitford, 1949).The importance value index (IVI) was determined as the sum of relative frequency, relative density and relative dominance. In calculating the importance value index, the percentage value of relative frequency, relative density, and relative dominance are summed together and this value is designated as importance value index or IVI of species (Curtis, 1959) which determines vegetation status and importance of component species with in a stratum stand.

Shannon-wiener index – it is used to calculate the species diversity in the community and is represented by H (Shannon and Wiener, 1963).

$H = - \sum Pi \ln Pi$

Where $Pi = n_1/N$

n_1 is the number of individuals of the species

N is the total number of individuals of all species.

Table 1: List of tree species encountered in Sacred Groves in Vijaypur Block

Name of species	*Family*	*Common name*	*Uses*
Ficus religiosa Linn.	Moraceae	Peepal	Religious, medicinal.
Melia azadirachta L.	Meliaceae	Drenk	Fodder, medicinal, fuel wood.
Mangifera indica L.	Anacardiaceae	Mango	Fruit, timber, religious, medicinal.
Tectona grandis L.	Lamiaceae	Teak	Furniture, carving, boat building.
Morus alba Linn.	Moraceae	Mulberry	Fruit, basket.
Syzygium cumini (L.) Skeels	Myrtaceae	Jamun	Fruit, fodder.
Eucalyptus citridora Linn.	Myrtaceae	Safeda	Timber, fuelwood.
Salix acmophylla BOISS.	Salicaceae	Beant	Timber, fuelwood
Anthocephalus cadamba(Roxb.)	Rubiaceae	Kadamba	Religious, medicinal, timber, fodder
Acacia nilotica	Mimosaceae	Kikar	Agricultural tool,
Ficus bengalensis L.	Moraceae	Bargad	Religious
Leucaena leucocephala(Lam.) de Wit	Fabaceae	Lassoni	Forage, fodder
Zizyphus maurtiana. Lam.	Rhamnaceae	Ber	Fruit , fodder.
Toona ciliata M Roemer	Meliaceae	Toonu	Timber, furniture, musical instruments
Aegel marmelos (L.)	Rutaceae	Bael	Religious, Fruit
Dalbergia sissoo Roxb.	Fabaceae	Tali	Timber, fuelwood, shade.
Acacia modesta	Mimimoseae	Flahi	Protection of teeth, fuel
Crateva nurvala	Cappridaceae	Barna	Antibiotic(bark)
Diospyros Cordifolia	Ebenaceae	Rajain	Medicinal, ornamental ,fodder
Bombax ceiba Linn.	Malvaceae	Simbal	Timber
Psidium guajava L.	Myrtaceae	Guava	Fruit, fodder
Albizzia lebeck	Fabaceae	Sreen	Fodder, fuelwood
Alistonia scholaris	Apocynaceae	Satpatra	Medicinal, pencils
Emblica officinalis	Euphorbiaceae	Amla	Fruit, medicinal
Cordia dichotoma	Borginaceae	Lasuda	Medicinal, fodder
Butea monosperma (Lam.)Taub.	Fabaceae	Plash	Leaves as dinner plates
Murraya koenigii	Rutaceae	Curry patta	Fruits ,leaves

Table 2: Phyto-sociological Parameters for Trees in the selected sacred Groves in Vijaypur Block

Name of species	*Density (tree/ha)*	*Frequency*	*A/F*	*Relative Density*	*Relative Frequency*	*Relative Dominance*	*IVI*
Ficus religiosa	6.66	3.33	0.60	0.77	1.08	0.39	2.24
Melia azadirachta	26.6	10	0.26	3.08	3.23	1.69	7.98
Mangifera indica	80	36.67	0.05	9.23	11.83	10.57	31.63
Tectona grandis	6.66	3.33	0.60	0.77	1.08	0.27	2.11
Morus alba	3.33	3.33	0.30	0.38	1.08	1.10	1.55
Syzygium cumini	100	26.67	0.14	11.54	8.60	11.48	31.62
Eucalyptus	190	43.33	0.10	21.92	13.98	14.76	50.66
Salix acmophylla	50	6.67	1.12	5.77	2.15	1.05	8.96
Ficus religiosa	63.33	40	0.04	7.31	12.90	22.27	42.48
Anthocephalus	10	6.67	0.22	1.15	2.15	0.76	4.06

cadamba							
Acacia nilotica	50	16.67	0.18	5.77	5.38	6.21	17.35
Ficus bengalensis	13.33	10	0.13	1.54	3..23	11.85	16.62
Leucaena lucocephala	20	6.67	0.45	2.31	2.15	1.13	5.58
Zizyphus maurtiana	10	6.67	0.22	1.15	2.15	0.41	3.71
Toona ciliata	10	3.33	0.18	1.15	1.08	0.53	2.75
Aegel marmelos	16.66	3.33	1.50	1.92	1.08	0.63	3.62
Dalbergia sissoo	70	26.67	0.09	8.08	8.60	4.82	21.49
Acacia modesta	40	10	0.40	4.62	3.23	1.68	9.52
Crateva nurvala	20	6.67	0.45	2.31	2.15	0.71	5.16
Diospyros Cordifolia	26.66	3.33	2.40	3.08	1.08	1.58	5.73
Bombax ceiba	3.33	3.33	0.30	0.38	1.08	0.25	1.71
Psidium guajava	3.33	3.33	0.30	0.38	1.08	0.15	1.61
Albizzia lebeck	20	13.33	0.11	0.38	4.30	3.82	10.43
Alistonia scholaris	3.33	3.33	0.30	2.31	1.08	0.15	1.61
Emblica officinalis	16.66	6.67	0.37	0.38	2.15	2.44	6.51
Cordia dichotoma	3.33	3.33	0.30	1.92	1.08	0.16	1.62
Butea monosperma	3.33	3.33	0.30	0.38	1.08	0.12	1.58
Murraya koenigii	6.67	3.33	0.6	0.38	1.08	0.30	2.15
TOTAL	873.33	313.33		100	100	100	300
Shannon Weiner index	2.66						

6. Result and Discussion

A total of 15 sacred grooves were studied in the study area. 28 tree species belonging to 17 families were found in the sacred groove studied. The basal area of the trees varied between highest of 712.33m^2/ha for *Ficus religiosa* followed by 472.16m^2/ha for *Eucalyptus citridora* and a lowest of 3.16m^2/ha for *Morus alba*. *Eucalyptus citridora* was the most dense tree species with density value of 190 tree per hectare followed by *Syzygium cumini* and *Mangifera indica* having density of 100 and 80 tree per hectare respectively.*Morus alba ,Bombax ceiba, Psidium guajava,Cordia dichotoma, Butea monosperma* were the least dense species with density value of 3.33tree/ha each. *Eucalyptus citridora* was also observed as the most frequent species followed by *Ficus religiosa* with values of 43.33 percent and 40 respectively. The results pertaining to quantitative analysis of tree species in each village are presented in the table 2.

It is found that *Eucalyptus* has maximum IVI (50.66) followed by *Ficus religiosa* (42.48) and *Mangifera indica* (31.63). In a similar study conducted by Priya and Sharma (2013) in sacred grooves of Jammu district of J&K, maximum IVI was found to in case of *Ficus religiosa* (47.7).Moraceae and Fabaceae was most dominant family represented by 4 tree species each followed by Myrtaceae and Mimoseae with 3 tree species each. In a similar study conducted by Sharma and Devi (2014) in sacred grooves of Block Bhalwal of Jammu district (J&K) also found Fabaceae as dominant family represented by 10 tree species followed by Moraceae with 6 species. Sambandan and Dhatchanamoorthy (2012) conducted the same study in sacred grooves located in Karaikal distirct and found 59 plant species of flowering plants which spread in 55 genera and 30 families. The highest density was found in case of *Eucalyptus* with (190 tree/ha) followed by *Syzygium cumini* (100 tree/ha) and *Mangifera indica* (80 tree/ha).The most frequently occurring species was found to be *Eucalyptus* (43.33) followed by *Ficus religiosa*(40). The value of Shannon Weiner index of trees in sacred groove was found to be 2.62.

7. Conclusion

The study revealed that, main driving force behind the disturbance and degradation of the trees occurs due to human activities. The increasing human interference has changed the structural and functional pattern of the landscape and has influenced the biodiversity significantly (Sinha and Sharma, 2006).There is disappearance of the traditional belief systems, which were fundamental to the concept of sacred groves. Thus the degraded sacred groove can be restored only by raising awareness among the rural people regarding the importance of sacred grooves and its conservation. Also the local people are encouraged to grow indigenous tree species plantation. There is an urgent need for recognizing these traditionally valued natural systems at various levels and planning for their better management, ultimately aiming to conserve biodiversity. In this context, traditional values that help in conservation should be properly recognized and acknowledged.

8. Future Scope

Sacred groves have become biodiversity hotspots, as various species seek refuge in the areas due to progressive habitat destruction, and hunting. Sacred groves often contain plant and animal species that have become extinct in neighboring areas. They therefore harbor great genetic diversity. Besides this, sacred groves in urban landscapes act as "lungs" to the city as well, providing much needed vegetation cover .On the basis of the above study, various strategy should be followed for conserving and protecting sacred groves like inventorisation of sacred grove, collection of vital information regarding the sacred grove and consent and participation of local communities particularly the village chiefs, community elders and priests.

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