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Research Article

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Singhabahini Sacred Grove A 1000 Years Old Sacred Grove Represents Nature Made Nursery of Forest Plants for Future Study

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ABSTRACT

Diversity Index of tree species in Singhabahini Sacred grove was found as 0.55 which is very interesting for future studies in ecology as well as for conservational biology in the present day scenario. The site differs from Khirkul in such a way that; Khirkil sacred grove with tree species diversity value was 0.86. The dominance indices found were 0.34 and 0.06 for Singhabahini and Khirkul groves respectively. Evenness indices were 0.70 and 0.48 respectively for Singabahini and Khirkul sacred groves. Richness indices of tree species in two sites were 2.02 and 4.45 for Singhabahini and Khirkul respectively. Both the sites were 33.33 percent similar in case of tree species composition. Among them, Singhabini was older stand than Khirkul which boosts so many medicinal plants with ecological significance.

Key words: *Singhabahini Sacred grove, Khirkul Sacred grove, nature made nursery, ecological significance.*

INTRODUCTION

Sacred groves are sites of village or forest fringe composition with enormous number of plants of various kinds which having religious importance, nay ecological significance. Sacred groves are the sites which boost different old aged trees that have the capability to produce good quality mature seeds for next generation offspring as seed nursery. In India, the pioneer research workers on sacred groves are Gadgil *et al.*[15] and Vartak *et al.*[27] who have done so many works in different parts of India with significant importance. In Paschim Medinipur in West Bengal, different works have been made by Bhakat[4], Bhakat and Pandit[5], and Bhakat[6]. The same theme was same but ecological status of different plants in three districts of West Bengal (Purulia, Bankura and Midnapore) have been done by Das[10,11] through UGC-sponsored project, from Botany Department of Jhargram Raj College, Govt. of West Bengal. The other work which is related to conservation in ecology from lateritic region was made by Das[10] in his Ph. D thesis. The recently published documents have also been consulted which was made by the authors from time to time are broadcast conservation and same status regarding the importance and helath of the ecosystem[12,13,14,16]. All have made their works for the conservation of species and to conserve the nations through sustainable development of resource which aims a plea for ethical concern and with the conformity of aspects including pattern, structure of resource management. As a whole not globally but spatially need to study the allocated sites and their concerned floral and faunal elements for the indigenous management for proper verification of scientific means. Therefore, the present study is required which aims the status of all species and their traits in connection with the management in the same habitat. By and large all are basically local need based and after that coincide with others nationally or globally. As per this record the present studies have been taken and study in the lateritic forests of South West Bengal which having ethnicity and their modern base line of integrity.

During the visit of Godapiyasal forest range of East Midnapore forest Division under Paschim Medinipur District, West Bengal an interesting site came to my knowledge which represents nearly about 1000 yrs old sacred grove as diverse conservatory.

The locality of this site is popularly called Harinamari of Anandapore Beat under no. 7 Barateghari Gram Panchyet of Keshpur Block. This site having natural forest with coppice *sal* dominated vegetation. Total area of this sacred grove is about 200 m^2 and age of this grove is about to be 1000 yrs old. Festivals associated with this sacred grove are payla Magha and Kali Puja following Bengali month (Ref. by Prist: Ranjit Maity). Types of people involved here are tribals *i.e* Santals and others including general caste. Out of 95 families involved only 14 families are mahishya (data collected in the year 2007-2010). Period of deities specified for such grove restricted only in the English month January (Bengali month Magha). Articles dedicated are red and white clothes, earthen horses, elephants, tattoos, vermilion, incense sticks, beatle leaf, wooden and bamboos thali (spread bowl), coloured flowers and sweets. They offer blood of hen and goat to the goddess during the maghi (festival commences in the month of Bengali time magha mas) festival. A Committee has been formed for managing such grove in which committee members are Ratan Chandra Hembram, Sadhan Murmu, Dhirendranath Maity, Sitaram Hansda, Fakir Hansda, Sanatan Tudu and Srimanta Hembram. According to them, 'our sacred grove is a grove of old-aged practice and it's phyto-diversity is rich which flooded nearly about 25 species of medicinal plants of ecological importance". Name of such medicinal plant species are given below. These are-*Shorea robusta* (*Sal*), *Andrographis paniculata* (Kalmegh), *Azadirachta indica* (Nim), *Alangium salvifolium* (Aish), *Asparagus racemosus* (Satamuli), *Capparis zeylanica* (Kallinka), *Clerodendrum viscosum* (Ghetu), *Diospyros sylvatica* (Donka), *Ficus benghalensis* (Bot), *Lantana camara* (Saibani), *Mangifera indica* (Aam), *Phoenix acaualis* (Bhui Khejur), *Schleichera oleosa* (Kusum), *Jasminum sambac* (Jui), *Syzyzium cumini* (*Jam*), *Canthium didynum* (Kanthi), *Streblus asper* (Sahara), *Zizyphus oenoplea* (Siyakul), *Vanguiria spinosa* (Maynakanta), *Gardenia gummifera* (Lohajang), *Acacia moniliformis* (Sonajhuri), *Ixora coccinia* (Jangli Ranjan), *Aristolochia india* (Isarmul), *Flacourtia ramontchi* (kanta boich), *Vitis pedata* (jara anggur).

Areas Under Study

Study area was Godapiyasal forest range of East Midnapore forest Division under Paschim Medinipur District in West Bengal, India. It is under the community development block Keshpur. Two sacred groves in and around forest have been taken. So, forests, jungle, agricultural land and degraded stand have been taken for study. The locality of this site is popularly called Harinamari of Anandapore Beat, under number seven "Barateghari Gram Panchyet" of Keshpur community Development Block. This site having natural forest with coppice *sal* (*Sorea robusta*) dominated vegetation.

Objectives of the Study

The study includes the following objectives -

1. To identify the habitats for local flora and fauna in different eco-climatic conditions in Paschim Medinipur district of West Bengal.
2. To identify the floral and faunal elements, which are wild in the microhabitat?
3. Study of ecological status of wild flora and fauna *i.e* relatively frequency, density and abundance with IVI of species.
4. Study of seasonal variations of plant and animal species in fragile eco-regions as well as their interactions in the specific area of the same zone.
5. Study of different indigenous measures of conservation of plant species.
6. Suggestions forwarding scientific management of species in the Forest District with special reference to sustainable management.

MATERIALS AND METHODS

SELECTION OF SITES

Sites were selected in two different regions of each sacred grove and therefore for two study sites four such sites were selected randomly in and around sacred groves concerned forests in lateritic southwest West Bengal. Topographically the sites belong to different types i.e. in cultivated land nearer to the forest and another in degraded land. For such studies in total 5 plots in each site (10 m X 10 m plots for trees

and 5m X 5m plots for shrubs) were selected randomly for regular monitoring of status of different wild floral elements including some faunal status with special reference to their interactions in the tribal area.

PERIODICITY OF FIELD STUDY

Studies were conducted in three different seasons in a year for three consecutive years (2007-2008, 2008-2009 and 2009-2010). In this particular region three seasons namely monsoon (June-September), winter (October-January) and summer (February-May) were well perceived. So, study will be made three times in a year as per the standard of the ecology of plants. To know the seasonal impact on different ecological parameters data were collected during these seasons *i.e.* thrice in a year but in the year 2010, due to short span of monsoon, it was taken four times because post monsoon was well perceived.

ECOLOGICAL STUDIES

Vegetation in a community is a dynamic biological system consisting of a number of plant and animal species. Vegetation at a particular site is the result of interaction of various climatic and biotic (faunal also) as well as edaphic (soil) factors. During the course of succession, many tree species compete with each other to establish their hold on the vacant niches. Consequently, some tree species occupy the top position and become dominant in the community and others are either contented with their lower phytosociological status or eliminated from the system. So, as a whole there are some factors that govern the complete process, through which flora and fauna of wild species sit together and also possess their special interactions through co-existence. So, for the study of constrains and dynamics parallel data were collected from nearby forest as check list of species directly and indirectly with the help of local people.

SYNTHETIC CHARACTERS

The vegetation survey and faunal survey will be made in the sites selected by laying quadrats as random. Vegetation data of the above mentioned two sites situated in two sacred groves situated under Godapiyasal forest Range. In open tract the vegetation study was made by belt transect on three exposures *i.e.* margin (nearer to road), center and deeper part the forest, according to the principles of "landscape" approach as followed by Whittaker[28]. The size of the quadrats were prepared and fixed by method of "species area curve"[21].

The numbers of quadrats required were determined by plotting the number of species against the number of quadrats. The quadrats analyses were made following Dombois and Ellenberg, 1974. Quadrats of 1m x 1m, 5m x 5m and 10m x 10 m for herbs, shrubs and trees were laid out at random for study of vegetation of all kinds. Five specific quadrats at each study site for each type or aspects of the selected localities were marked by paint (red color paint) through the help of pole where the poles were natural kind. Peripheral areas were demarcated by white coloured paint by tracing double circle through the girth at breast height (GBH) of trees. In each quadrat, the following characters were taken for calculation of result:

I. Abundance of each species (for the calculation of density).
II. Basal cover of species taken by measuring girth of a tree (> 10 cm girth) at breast height *i.e.* at 1.37 meter ($4^{/}6^{//}$) is individually measured for all the species.
III. Data on Non Timber Forest Produce species following Economic Botany Data Collection standard[8].

Similarly, for shrubs 10 quadrats of 25 square meters each and for herbs 10 quadrats of 1 square meter each were made. Plant species encountered in each quadrat was listed out and identified on the basis of floristic studies of regional vegetation made by Prain[23] (revised Edn. 1963, Flora of West Bengal made by BSI in a series), Mabberley[19] and the names will be cross- checked with the help of Bennet[7]. In each quadrat the following special character was recorded-

1. In case of herbs, above ground biomass was estimated by destructive method for calculation of abundance (dominance) of a species.

Frequency density and abundance values will be calculated for each species. The importance value index (IVI), an integrated measure of relative frequency, relative density and relative dominance will be derived following Curtis[9].

DIVERSITY INDEX

Diversity index (H) of each sample stand was calculated as per Shannon and Wiener[20].

(H) = $-\sum$ [(ni / N). Ln (ni / N)] , Where 'ni' is the IVI of individual species and N is the total IVI of all the species.

DOMINANCE CONCENTRATION

Concentration of Dominance (Cd) of each stand was calculated following the formula given below by Simpson (1949).

Cd = $\sum$ $(ni / N)^2$, where 'ni' is the IVI of individual species and 'N' is the total IVI of all the species.

EVENNESS INDEX

Evenness Index (e) will be calculated according to Pielou[22].

$$(e) = H / \log S$$

Where, $\overline{H}$ = Shannon index and S = Number of species.

SPECIES RICHNESS INDEX

Species Richness index (d) will be calculated according to Margalef [18].

$$(d)=S-1 / \log N.$$

Where, S= Number of species, N = Importance Value and d= Species richness.

SIMILARITY INDEX

To avoid individual variation the degree of similarity is expressed mathematically on the basis of any quantitative character (Number of species in the present case). The indices of similarity of community coefficient (IS) between any two sample sites or communities will be made by the formula of Sorensen (1948) as described by Muller-Dombois and Ellenberg[17].

$$IS = (2C/A+B) X 100$$

Where, A= Number of species in one stand / Community. B= Number of species in another stand / Community and C= Number of species common to both the communities.

Similarly, other literature studied for the identification and for the study of medicinal plants for lateritic area books published time to from BSI, CGO complex, Govt. Of India and Forest Directorate, Govt. of West Bengal in different series[1,2,3]. For limitation of study only the shrubby and tree species have been taken for consideration for publication though the list is long for herbs is in my custody. To keep it in a limited space herbs and a major shrubs have been discarded which need another space for publication in another issue.

RESULTS AND DISCUSSION

1. Status of tree species in Singabahini sacred grove:

Singabahini sacred grove is nearer to Khirkul sacred grove of East Midnapore forest Division which is mainly forest dominated. This site is filled with coppice sal (*Shorea robusta*) along with other tree species like *Alstonia scholaris, Canthium didynum, Diospyros sylvatica, Madhuca indica* and *Streblus asper*. The Importance Value Index (IVI) of such heterogeneous forest type of sacred grove is ranging from 8.27 to 117.51. Here highest IVI of tree species was observed in case of *Shorea robusta* (117.51) followed by *Alstonia scholaris* (74.72). The lowest IVI of tree species was observed in case of *Diospyros sylvatica* (8.27). Diversity Index of tree species in such site is 0.55 (Table 1). The Dominance Index is 0.34.

2. Status of tree species in Khirkul sacred grove:

Khirkul sacred grove is situated inside the village and bounded by forests in a side and agricultural land in the other. The site is filled with kusum (*Schleichera oleosa*) along with other tree species like *Strychnos nux-vomica*, *Garuga pinnata*, *Diospyros sylvatica*, *Achras japota* and *Streblus asper*. The Importance Value Index (IVI) of such plantation type of sacred grove is ranging from 9.96 to 51.95. Here highest IVI of tree species was observed in case of *Achras japota* (51.95) followed by *Shorea robusta* (50.53).

The lowest IVI of tree species was observed in case of *Strychnos nux-vomica* (9.96). Diversity Index of tree species in such site is 0.86 (Table 2). The Dominance Index is 0.06

Table 1. Ecological Status of Plants of Singhabahini sacred grove of Paschim Medinipur District, W.B.

Name	GBH	No.	Fre.	Rf	Denity	R. Den	Basal Area	Rdom	IVI	IVI	ni/N	Logni/N	ni/N X Logni/N
Alstonia scholaris (Chatim)	230	1	10	1.234	7.142	6.25	4210.44	67.24	74.72	74.72	0.27	0.56	0.15
Canthium didynum (Kanthi),	42	1	10	1.234	7.142	6.25	140.44	2.24	9.72	9.72	0.035	1.44	0.05
Diospyros sylvatica (Donka),	25	1	10	1.234	7.142	6.25	49.76	0.79	8.27	8.27	0.03	1.51	0.04
Madhuca indica	25	1	20	2.469	7.142	6.25	49.76	0.79	20.78	9.5	0.076	1.118	0.084
Madhuca indica	45	1	20	2.469	7.142	6.25	161.22	2.57		11.28			
Shorea robusta (*Sal*),	70	1	100	12.345	7.142	6.25	390.12	1.55	139.94	10.26	0.513	0.289	0.148
Shorea robusta (*Sal*),	35	1	100	12.345	7.142	6.25	97.53	1.55		20.14			
Shorea robusta (*Sal*),	45	1	100	12.345	7.142	6.25	161.22	2.57		21.16			
Shorea robusta (*Sal*),	50	1	100	12.345	7.142	6.25	199.04	3.17		21.76			
Shorea robusta (*Sal*),	55	1	100	12.345	7.142	6.25	240.84	3.84		22.43			
Shorea robusta (*Sal*),	55	1	100	12.345	7.142	6.25	240.84	3.84		22.43			
Shorea robusta (*Sal*),	50	1	100	12.345	7.142	6.25	199.04	3.17		21.76			
Streblus asper (Sahara),	30	1	20	2.469	7.142	6.25	71.65	1.14	19.35	9.85	0.07	1.149	0.08
Streblus asper (Sahara),	25	1	20	2.469	7.142	6.25	49.76	0.79		9.5			
		14	810	93.822	114.272	100	6261.66	95.25	272.78	272.78			**0.552**
								Diversity Index =0.552					

Table 2. Ecological Status of Plants of Khirkul sacred grove of Paschim Medinipur District, W.B.

Name	GBH	No.	Fre.	R.f.	Den	R.Den	Basal Area	Rdom	IVI	ni/N	Logni/N	ni/N X Logni/N
Tamarindus indica (Tentul)	230	1	10	4.16	5.55	5.55	41791	13.29	23	0.08	1.09	0.08
Strychnos nux-vomica (Kuchila)	100	1	10	4.16	5.55	5.55	790	0.25	9.96	0.03	1.45	0.04
Achras japota (Sapoda)	410	1	10	4.16	5.55	5.55	132799	42.24	51.95	0.08	0.73	0.05
Streblus asper	40	1	50	20.83	5.55	5.55	9559	3.04	29.42	0.10	0.98	0.09
Streblus asper	70	1										
Schleichera oleosa (Kusum)	225	1	10	4.16	5.55	5.55	3999	1.27	10.98	0.03	1.41	0.04
Aegle marmelos	130	1	20	8.32	5.55	5.55	13351	4.24	18.11	0.06	1.19	0.07
Diospyros sylvatica	12	1	20	8.32	5.55	5.55	575.91	0.18	14.05	0.04	1.30	0.05
Diospyros sylvatica	15	1										
Shorea robusta	110	1	30	12.48	5.55	5.55	45504	14.47	32.5	0.11	0.94	0.10
Shorea robusta	130	1	30	12.48	5.55	5.55			18.03	0.06	1.19	0.07
Garuga piñata	85	1	10	4.16	5.55	5.55	21507.75	6.84	16.55	0.05	1.23	0.06
Garuga piñata	80	1										
Alangium lamarkii	15	1	10	4.16	5.55	5.55	177.75	0.05	9.76	0.03	1.46	0.04
Millusa velutina	25	1	10	4.16	5.55	5.55	3337.75	1.06	16.22	0.05	1.24	0.06
Millusa velutina	40	1			5.55	5.55						
Anogeissus latifolia	225	1	10	4.16	5.55	5.55	39993.75	12.72	22.43	0.07	1.10	0.07
Hymenodyction excelsum	35	1	10	4.16	5.55	5.55	967.75	0.30	10.01	0.03	1.44	0.04
		18	240	99.87	83.25	83.25	314353.7	99.95	283.07			**0.86**

Diversity Index= 0.86

PHOTOGRAPHS (Figure 1-2)

Figures 1-2: Author himself and forest guard (with uniform) at Singhabahini Sacred grove during field study, in Godapiyasal Range of Paschim Medinipur district of West Bengal State, India.

CONCLUSION

As per the study of Phtodiversity of such grove, it is interesting to note that Singhabahaini sacred grove is fall under the East Midnapore forest Division of Paschim Medinipur District, which is mainly forest dominated. This site is filled with coppice sal (*Shorea robusta*) along with other tree species like chattim (*Alstonia scholaris*), kanthi (*Canthium didynum*), donka (*Diospyros sylvatica*), mahul (*Madhuca indica*) and seora (*Streblus asper*). The Importance Value Index (IVI) of trees in such heterogeneous forest type of sacred grove is ranging from 8.27 to 117.51. Here highest IVI of tree species was observed in case of *Shorea robusta* (117.51) followed by *Alstonia scholaris* (74.72). The lowest IVI of tree species of this same site was observed in case of *Diospyros sylvatica* (8.27). Diversity Index of tree species in such site is 0.55 which is very interesting for future studies from ecology as well as for conservational biology in present day scenario. The site differs from Khirkul is that; Khirkil having tree species diversity is 0.86, where as the dominance index is 0.06. Both the sites having 33.33 % similarity of tree species. Richness indices of tree species in two sites are 2.02 and 4.45 for Singhabahini and Khirkul respectively. Evenness indices are 0.70 and 0.48 for Singhabahini and Khirkul sacred groves respectively.

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