INTERNATIONAL JOURNAL OF SCIENCE AND NATURE

www.scienceandnature.org

VEGETATION ECOLOGY OF SACRED GROVES MANAGED BY TRIBALS & NON-TRIBALS OF PASCHIM MEDINIPUR

Samir Kumar Dandapat & Tapan Kumar Mishra
Department of Environmental Science, Ballygunge Science College, University of Calcutta 35, Ballygunge Circular Road, Ballygunge, Kolkata – 19, West Bengal, India
*Corresponding Author e-mail: mishratapan@hotmail.com

ABSTRACT
A comprehensive ecological study of 57 sacred groves scattered over the district of Paschim Medinipur was done. A list furnishing their geographical position, approx. area, elevation and locations has been prepared. The study reveals that due to more popularity of deities of the groves, under the first group, managed by the general communities, tree vegetation is far better than the second group (managed by the tribals). All these groves experience anthropogenic disturbances and problem of land encroachment. But without better protection of these groves it is hardly expected that there will be climax formations by natural dynamics. Recovery of the climax vegetation over time could be possible if larger areas were earmarked for their growth and a network of sacred groves had been created. Since these groves are preserved mainly on religious grounds and have never been destroyed by clear felling, they represent the characteristic vegetation of each area. In 80.4% of groves managed by the non-tribals, forest species are dominant whereas in the second group of groves only 72.7% are dominated by forest species. Dominant forest species include *Alangium salviifolium*, *Shorea robusta* and those of non-forest species include *Ficus benghalensis Ficus religiosa* etc. Both the species of *Ficus* are considered to be key-stone species. Given the importance of sacred groves in the conservation of biodiversity and ecosystem, there is a need to take care of such sites, and attempts should be made to maintain the sanctity of these sacred groves.

KEY WORDS: Sacred groves, vegetation, quadrat, Importance Value Index (IVI), Dominance Index, Diversity Index, Species Richness Index (Menhinick's Index), GPS, Tribals, Non-Tribals.

INTRODUCTION

Nature -worship in some form or other has been traced to be a distant and hazy past, when early man had to live in the forest in the midst of both the bounties and furies of nature. The human civilization has grown through the ages and by phases and through various necessary changes but nature –worship has stayed on. The early men had an instinctive belief that the gigantic trees, thick and shady groves were the abodes of some deities or spirits of their ancestors. So they had started protecting and worshipping patches of forests on the outskirts of the mother forests. These forest segments have traditionally come to be known as 'Sacred Groves'. Sacred groves may, therefore, be described as segments of the landscape, containing trees and other forms of life and geographical features that are delimited and protected by human societies because it is believed that to keep them in a relatively undisturbed state is an expression of important relationship with the divine or nature (Hughes and Chandran, 1998). But due to the advent of modern civilization in these remote areas, life and culture of the aboriginals are gradually changing to the urban pattern. Consequently many of the beliefs, folklores are being ignored and are likely to be forgotten in the near future. Inconsiderate and self-centered urban folk have already started exploiting these sacred forests. Therefore, these groves provide plenty of scope for ethno-botanical studies i.e. the study of man-plant relationship in all aspects of human life. During the present study in Paschim Medinipur it has been observed that the local religious custom, however, protects part of the forests, where a deity resides and is worshipped. In this context, it becomes necessary to document the abode as sacred grove. The article impregnates and enlightens as to how a religious custom restores and preserves an area as sacred grove and brings people of different opinion and status on one platform.

Study area

The study area is a part of the plateau tract of West Bengal covering the south west part of the state represented by the district of Paschim Medinipur. It is bounded by Bankura district and Purulia district in the north, Mayurbhanj district and Balasore district of Orissa in the south, Hoogly district and Purba Medinipur district in the east and Singhbhum district of Jharkhand and Purulia district of West Bengal in the west. The district lies between 21º 47/ N - 23º N latitude and 86º 40/ E - 87º 52/ E. The areas attain an altitude of 50m -350m. The district is mostly tribal dominated. As per census report, 2011, out of the total population (59, 43, 300), 32.9% are tribes (SC-18.07% and ST- 14.85%). In 2006 the Ministry of Panchayati Raj tagged Paschim Medinipur as one of the country's 250 most backward districts (out of a total of 640). The major tribal communities of the district are Santhal, Bhumij, Munda, Lodha, Kora and Mahali. Among them, Lodha only belong to the primitive tribal group (PTG). Among the tribal groups Santhals constitute the highest share of 55.93% of total tribal population. Lodhas are only 3.85% while the Mahalis are 1.57% of the tribal population of the district (Table- 1).

TABLE 1: Major Tribal Communities in Paschim Medinipur district

Tribe	Population	Sex Ratio	Percentage to total ST Population	Percentage of Literates
Santhal	431907	973	55.93	27.57
Bhumij	86197	932	11.16	31.34
Munda	47079	961	6.10	24.08
Lodha	29747	1034	3.85	26.60
Kora	22351	984	2.86	27.75
Mahali	12117	942	1.57	25.10

Source: District Human Development Report- 2011, Paschim Medinipur

METHODOLOGY

1. Documentation of sacred groves

Documentation of sacred groves was done in two phases.

i) The 1st phase was to record the socio religious practices associated with the sacred grove.

ii) The 2nd was the study of vegetation ecology which had to be completed in more than a single day.

All these studies were done with the help of the priest of the sacred grove and co-operation of the aged and knowledgeable persons.

2. Assessment of age and area of each sacred grove

In most of the sacred groves help was sought from the priests of the sacred groves concerned and from the elderly people. Priesthood is an inheritance through generations. A priest inherits it; he also carries down the history of the grove. Therefore, from the account furnished by him approximation about the age of the grove becomes reliable. This is tallied with the information gathered from the elderly people who must have had it from their forefathers. This makes the approximation more reliable and acceptable.

As to determination of the area of the maximum number of groves, related records of the concerned land reforms office were consulted. In case of groves which belonged to private property, the owner concerned was approached for the relevant record and the authenticity of the area of the grove was confirmed. In a few cases, other than the above two, the existing area of the grove was determined by the simplest method of measurement.

3. Vegetation analysis

In course of investigation for a period of six years from 2006 to 2011, the sacred groves of this study area was thoroughly explored. Several attempts were made for collection of plant specimens in different seasons of a year. During field survey 3 to 5 samples for each species were taken and they were attached with numbered tags (e.g., S 1, S 2 etc). For shrubs and trees, twigs of suitable sizes (> 6 inches) with flowers and/or fruits and leaves were collected. After collection, the specimens were processed, preserved and mounted on herbarium sheets following the standard and modern herbarium techniques (Jain & Rao, 1977). The herbarium sheets have been identified by matching with the correctly annotated materials which are available at the Central National Herbarium (BSI, Kolkata) and for the currently accepted scientific name of each species, their spellings and author citations websites of IPNI (The International Plant Names Index) and http://www.theplantlist.org (Collaboration between the Royal Botanic Gardens, Kew and Missouri Botanical Garden) have been consulted. Then IVI, Dominance Index and Diversity Index were calculated in the tree, shrub and herb levels.

3.1. QUADRAT study

At the outset a species area curve was prepared in a few sacred groves to find out the minimum size of the quadrat required for the study of three layers (considered as separate communities) such as tree, shrub and herb. It was inferred that for tree layer the minimum size of the quadrat required for study was 500 sq. mtrs (50mtrs × 10mtrs.) for trees, (5mtrs × 5mtrs) 25 sq. mtrs for shrubs and (1mtr × 1mtr) 1sqmtrs for herbs. In each of the sample sites a quadrat of 500sqmtrs (50mtrs × 10mtrs) was laid in the north-south direction to study the tree community for the parameters like Importance Value Index (IVI) according to the formula given by Curtis and McIntosh (1950), Dominance Index following the formula of Simpson (1949), Diversity Index according to the formula given by Shanon and Weaver (1963) etc. In each of the tree quadrats four shrub quadrats were laid on alternate sides and similarly five herb quadrats were laid for study of herb layer. In case a quadrat of 50m × 10m could not be laid for constraint of space 20m × 25m were laid. Each site was given a code and geographical coordinates were taken by GPS handset reading. For GPS reading GARMIN-12 handset was used and all the readings are stored in the GPS memory.

3.2. Species richness index (Menhinick's Index)

It was calculated only in the tree level of each sacred grove of the study area. Species richness is a measure of the number of species found in a sample. Since the larger the sample, the more species we would expect to find, the number of species is divided by the square root of the number of individuals in the sample. This particular measurement of species richness is known as D, the Menhinick's index (Menhinick, 1964).

RESULTS

Ramanujam (2000) reported that, almost all the villages of India have patches of natural vegetation in the form of sacred groves, which were established and protected by our ancestors in the name of gods and traditions. As Paschim Medinipur is mostly tribal dominated, most of the villages also have sacred groves. But most of them are small i.e. with an area < 0.5 ha consisting of only 2-3 sacred trees and a few shrub and herb species. But much bigger sacred groves can be spotted in the obscure tribal villages in the vicinity of forests. The area of the groves in such locations is 1-2 hectares even. In the district of Paschim Medinipur 57 sacred groves have been studied thoroughly, furnishing their geographical positions, approximate areas, elevations, locations, history and management group and vegetation ecology, though the actual number of sacred groves in this district is much more than the studied number. Paschim Medinipur district

is composed of only 4 sub-divisions, viz- Midnapur sadar, Kharagpur, Ghatal and Jhargram. Total recorded forest area of this district is 174762 hectares (District Annual Plan, 2010-2011, Paschim Medinipur, W. B.). Out of this maximum forest area (80,743.034 hectares) is in Jhargram sub-division. This sub-division is also tribal-dominated; tribal people constitute about 30.02% of the total population (Bureau of Applied Economics & Statistics, Govt. of W.B. 2004). So most of the sacred groves studied are in Jhargram Sub-division. During this study it was found that there are 41 sacred groves in Jharagram sub-division; in Midnapur Sadar there are 11, in Kharagpur the number is only 5 (Table- 2). Most of the sacred groves are very small, less than a hectare. Only 3 are >1 hectare in area and 2 are >2 hectares in area.

TABLE 2: List of studied Sacred Groves of Paschim Medinipur district

Sl. No	Name of the Groves	Approx. Area (in ha)	Geographical Positions	Tree Density	Tree type	Tree species Richness Index	Tree Dominance Index	Tree Diversity Index
Managed by the General Communities								
1	Bhairabthan, Silda	0.134	N 22˚ 37’52.1" E 86˚ 50’2.4"	800/ ha	Forest	2.67	0.155	0.892
2	Kal Bhairabdanga, Silda	0.033	N 22˚ 36’20.4" E 86˚49’6.6"	400/ ha	Forest	1.81	0.257	0.596
3	Jhulanthan, Silda	0.669	N 22º 36' 54" E 86º 50' 1.6"	750/ ha	Forest	2.04	0.312	0.588
4	Abode of Mangala Ma, Malabati	0.134	N 22º 35' 44.7" E 86º 52' 12.1"	750/ ha	Forest	2.02	0.346	0.631
5	Abode of Ghentaburi	0.134	N 22˚ 12’28.1" E 86˚ 49’13.6"	700/ ha	Forest	1.75	0.167	0.834
6	Abode of Jwalaburi	0.067	N 22˚ 11’45" E 86˚ 48’55.5"	800/ ha	Non-Forest	1.77	0.294	0.599
7	Abode of Duarsunidevi	0.401	N 22˚ 10’02" E 86˚ 48’44"	733/ ha	Forest	2.30	0.128	0.987
8	Abode of Basanta Kumaridevi	0.034	N 22˚ 9’01" E 86˚ 48’42"	800/ ha	Forest	2.12	0.236	0.707
9	Abode of Khanaburi	0.41	N 22˚ 10’37" E 86˚ 48’44"	800/ ha	Non-Forest	2.01	0.168	0.863
10	Abode of Kalmuhi	0.201	N 22˚ 10’57.2" E 86˚ 48’37.5"	1150/ ha	Forest	1.88	0.249	0.747
11	Abode of Sindurgouraburi	0.067	N 22˚ 10’57" E 86˚ 43’25"	850/ ha	Forest	1.94	0.198	0.795
12	Abode of Bayaburi	0.607	N 22˚ 10’41.5" E 86˚ 48’21.4"	867/ ha	Forest	1.77	0.186	0.810
13	Bhutkahalia Tulshithan	0.134	N 22º 14' 0.1" E 86º 53' 3.2"	700/ ha	Non-Forest	2.67	0.140	0.919
14	Askola Manasathan	0.134	N 22˚ 13’44" E 86˚ 52’19.6"	350/ ha	Non-Forest	1.90	0.303	0.647
15	Abode of Ma Kali, Kharbandhi	0.016	N 22˚ 16’19.1" E 87˚ 1’46.3"	600/ ha	Forest	1.63	0.309	0.551
16	Kenduathan, Balipal	2.023	N 22˚ 15’1.6" E 87˚ 1’54.5"	633.3/ha	Forest	3.21	0.092	1.078
17	Basulithan, Nunia	0.268	N 22º 30' 0.3" E 86º 50' 45.4"	1000/ ha	Forest	1.49	0.204	0.774
18	Kanakdurga Sacred Grove, Chilkigarh	24.28	N 22º 27' 11.7" E 86º 53' 2"	950/ ha	Forest	1.87	0.189	0.892
19	Abode of Satbahuni-Duari, Alampur	0.268	N 22º 28' 30" E 86º 55' 31.41"	550/ ha	Forest	1.81	0.199	0.765
20	Bara Ghang Garamthan	0.067	N 22º 25' 56.9" E 86º 53' 14"	900/ ha	Forest	2.40	0.231	0.691
21	Dakshinsole Garamthan	0.201	N 22˚ 26’12.7" E 86˚ 54’17.9"	866/ ha	Forest	1.77	0.535	0.465
22	Abode of Shiva & Shitala, Kendua	0.268	N 22˚ 26’34.6" E 86˚ 54’59.3"	600/ ha	Non-Forest	2.02	0.306	0.660
23	Abode of Chakrasinidevi, Sanbalia	1.07	N 22º 27' 29.5" E 86º 54' 41.7"	950/ ha	Forest	2.23	0.267	0.811
24	Sanbalia Garamthan	0.067	N 22º 20' 36" E 87º 09' 10"	900/ ha	Forest	1.65	0.744	0.258
25	Narayanpur Garamthan	0.028	N 22º 27' 26.3" E 87º 5' 58.9"	400/ ha	Forest	0.89	0.567	0.271
26	Tapoban Sacred Grove	0.268	N 22˚ 7’3.9" E 87˚ 2’23.2"	750/ ha.	Non-Forest	1.53	0.314	0.656
27	Darkhuli Gram Chandi	0.04	N 22˚ 6’4.8" E 87˚ 2’55.2"	600/ ha	Forest	2.31	0.356	0.543

28	Rameswar Sacred Grove	5.53	N 22º 8' 45" E 87º 3' 23.2"	750/ ha	Non-Forest	2.04	0.189	0.920
29	Ruknimara Garamthan	0.041	N 22˚ 6’ 35.5" E 87˚ 3’ 56.1"	600/ ha.	Forest	2.65	0.168	0.777
30	Kaluasnar Sacred Grove	0.809	N 22º 2' 56" E 87º 8' 49.2"	800/ ha	Forest	2.65	0.157	0.971
31	Abode of Satbauni, Banpura	0.134	N 22˚ 12’ 26.04" E 87˚ 04’ 33.40"	750/ ha.	Non-Forest	1.46	0.254	0.713
32	Abode of Duarsiniburi, Bhramargar, Rohini	0.12	N 22˚ 10’ 03.80" E 87˚ 05’ 26.85"	600/ ha	Forest	2.31	0.190	0.799
33	Abode of Bhuidharaniburi, Ragra	0.1	N 22˚ 11’ 20.85" E 87˚ 2’ 3.90"	750/ ha	Forest	1.39	0.355	0.550
34	Abode of Hariaburi, Hariatara	0.401	N 22º 17' 52.2" E 87º 13' 28.4"	733/ ha	Forest	2.35	0.182	0.868
35	Duarkhole Kali Mandir, Jantia	0.535	N 22º 19' 21.24" E 87º 12' 07.91"	633/ha	Forest	4.27	0.092	1.110
36	Radhanagar Garamthan	0.034	N 22º 20' 48.51" E 87º 11' 19.66"	450/ ha	Forest	1.18	0.424	0.506
37	Kantasola Sitalathan	0.02	N 22º 20' 43.5" E 87º 12' 28.2"	400/ ha.	Forest	1.50	0.379	0.445
38	Pachadobra Garamthan	0.028	N 22º 51' 46.7" E 87º 12' 51.4"	800/ ha	Forest	1.41	0.188	0.750
39	Abode of Kudrasinidevi	0.134	N 22º 51' 46.4" E 87º 12' 51.38"	600/ ha	Forest	1.07	0.347	0.536
40	Abode of Hulhulasinidevi	0.134	N 22º 51' 47.1" E 87º 12' 51.8"	800/ ha	Forest	2.25	0.176	0.793
41	Abode of Baba Narasingha Bir	0.405	N 22˚ 43’ 1.4" E 87˚ 14’ 0.5"	650/ ha	Forest	3.05	0.124	0.978
42	Abode of Baba Bharsingha Maro	0.02	N 22˚ 42’ 7.3" E 87˚ 16’ 34"	300/ ha	Non-Forest	1.15	0.619	0.247
43	Bhelaitala Sacred Grove	0.02	N 22˚ 42’ 6.9" E 87˚ 16’ 12.2"	700/ ha	Forest	0.80	0.796	0.185
44	Abode of Dhansoladevi	0.134	N 22˚ 43’ 33" E 87˚ 17’ 12.2"	900/ ha	Forest	1.73	0.264	0.685
45	Abode of Sitabalaburi, Kankabati	1.62	N 22º 24' 16" E 87º 15' 3"	950/ ha	Forest	2.83	0.22	0.782
46	Abode of Hatidharaburi, Enayetpur	0.134	N 22˚ 25’ 54.2" E 87˚ 12’ 14.9"	850/ ha	Forest	2.16	0.675	0.330
Managed by the Tribal Communities								
1	Kalapathar Jaher Ao	0.067	N 22º 37' 4.1" E 86º 52' 6.9"	550/ ha	Forest	0.58	0.721	0.197
2	Bhaluk khulia Jaherthan	0.067	N 22º 14' 25.9" E 86º 56' 38.8"	450/ ha	Forest	2.21	0.432	0.459
3	Ramchandrapur Jaherthan	0.405	N 22˚ 14’ 45.5" E 87˚ 3’ 2.9"	500/ ha	Forest	1.55	0.524	0.456
4	Satpati Jaherthan	0.034	N 22º 24' 1.3" E 86º 50' 15.2"	1000/ ha	Forest	1.04	0.568	0.371
5	Chilkigarh Jaherthan	0.067	N 22º 26' 45.8" E 86º 52' 25.6"	750/ ha	Forest	1.54	0.615	0.351
6	Guptamani Sacred Grove	0.201	N 22º 20' 35" E 87º 09' 15"	650/ ha	Non-Forest	1.96	0.251	0.756
7	Tiakati Jaherthan	0.095	N 22º 25' 9.6" E 87º 2' 25.8"	700/ ha	Forest	2.84	0.117	1.007
8	Joy Chandi Sacred Grove, Pitalkanti	0.134	N 22º 16' 39" E 87º 9' 41.6"	333/ ha	Non-Forest	2.53	0.165	0.829
9	Baro Kanyadiha Jaher Ao	0.067	N 22º 19.25' 8" E 87º 10.11' 3"	850/ ha	Forest	0.73	0.537	0.312
10	North Tasar arah Jaherthan	0.268	N 22˚ 30’ 02" E 87˚ 22’ 47.8"	550/ ha	Forest	0.43	0.761	0.282
11	Abode of Sitamoni buri, Dharampur	0.201	N 22˚ 29’ 08.9" E 87˚ 22’ 31.6"	600/ ha	Non-Forest	1.63	0.294	0.563

Out of the total 57 groves, 46 groves are managed by the general community; 9 groves by the Santals and the rest (2 groves), by the Lodhas. During this study it was revealed that though 80.7% groves are being presently preserved by the general community, in most cases the work of preservation activity was initiated by a particular tribal community. Due to growing popularity of the deities, the work of preservation has been voluntarily undertaken by the general community. Out of the rest 15.8% groves are being preserved by the Santals and 3.5% by the Lodhas. Therefore, presently 80.7% groves are being preserved by the general communities and 19.3% groves by the tribal communities (Figure- 1). In the first group (managed by the non-tribals), new aged (< 100yrs) groves are minimum, only 6.5%. 52.2% groves are middle aged (>100yrs but < 200yrs) and 41.3% groves are of >200yrs

old. In the second group (managed by the tribals), 9% groves are new aged (<100yrs), 72.7% groves are of 100-200yrs age and 18.2% groves are above 200yrs (Figure-2).

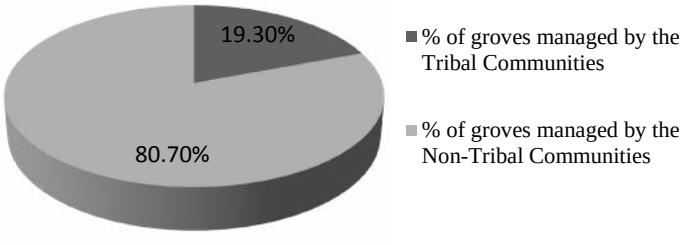

FIGURE 1: Distribution of Sacred Groves among different communities

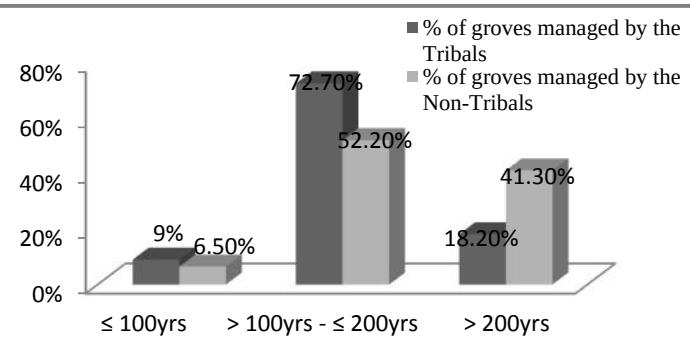

FIGURE 2: Distribution of Groves (in %) in different age group

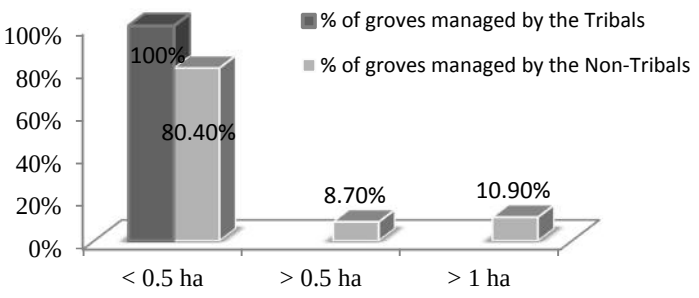

FIGURE- 3: Distribution of groves in different area (approx.) group

In the second group, all the groves are very small having the approximate area < 0.5 ha. In the first group, 10.9% groves are comparatively large, having > 1 ha area, 8.7% are of > 0.5 ha and the rest (80.4%) are of < 0.5 ha area (Figure- 3). Many sacred groves have been found encompassing about 10-30 tree species. Again it has been found that in some sacred groves the vegetation of a few particular species is very dense. It shows that in the first group (managed by the non-tribals) the preservation of trees is better than that of the second group (managed by the tribals). High popularity of the groves of the first group is the main cause of this better preservation. The presence of a large number of trees of low GBH is also the cause of the high density of some groves. In the first group 86.9% groves have the tree density > 500/ha, whereas in the second group it is 81.8%, where the tree density is > 500/ha (Table- 2). In most groves (80.4%) of the first group (managed by the non-tribals), forest species are dominant. Here non-forest species are dominant in only the rest 19.6% groves. In the second group of groves 72.7% are dominated by forest species and 27.3% by non-forest species. Therefore, dominancy of forest species is also greater in the first group (Figure- 4). Among the forest species *Alangium salviifolium* is mostly dominant. It is dominant in 21.7% groves of the first group, followed by *Shorea robusta* and *Streblus asper*, which are dominant in 15.2% and 10.9% groves respectively. But in the second group, maximum groves (36.4%) are dominated by *Shorea robusta.* Maximum groves of the Tribal community canopy cover are low. 72.7% groves of this community

have only 40% or < 40% canopy cover, 18.2% groves have > 40% - 60% canopy cover and only 9.1% groves show > 80% canopy cover. Whereas maximum (43.5%) groves of Non-Tribal communities show > 40% - 60% canopy cover. 34.8% groves have low (40% or < 40%) canopy cover, 15.2% have > 60%-80% canopy cover and 6.5% have > 80% canopy cover (Figure- 5).

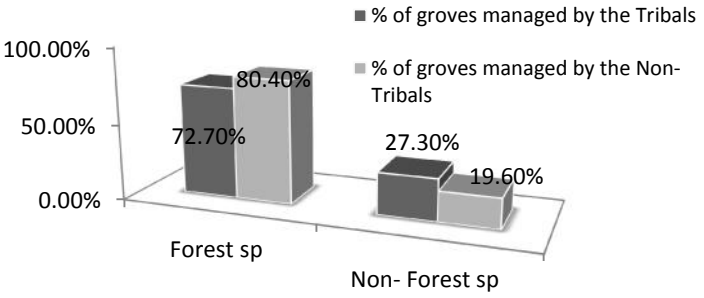

FIGURE 4: Dominance of Forest & Non-Forest sp in different groves

In the first group, species richness index is > 4 in 2.2% groves, > 3 in 4.3% groves, > 2 in 41.3% groves, > 1 in 47.8% groves and < 1 in 4.3% groves. In the second group, > 2 in 27.3% groves, > 1 in 45.5% groves and < 1 in 27.3% groves (Figure- 6). Dominance index is ranging from 0.092- 0.796 in the first group (managed by the non-tribals) whereas in the second group (managed by the tribals) this is 0.117- 0.761 (Table- 2).

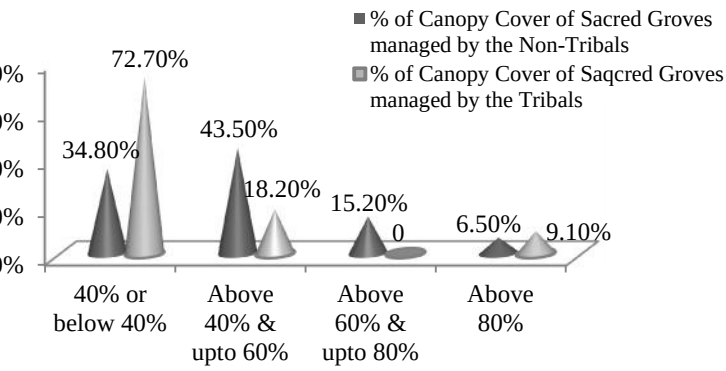

FIGURE 5: Canopy cover of sacred groves managed by tribals and Non- tribals

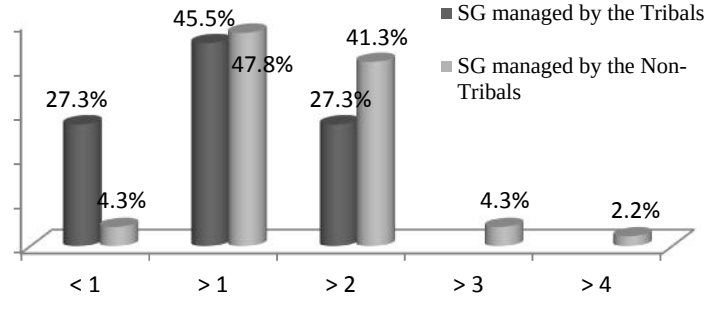

FIGURE 6: Species richness Index of the groves managed by the tribals and non-tribals

In the first group of groves Dominance Index is < 0.1 in 4.3% groves only and > 0.5 in 13% groves only. In other (82.6%) groves of this group tree Dominance Index ranges from 0.1 -0.5. In the second group, there is no grove where tree Dominance Index is < 0.1. In 54.5% groves tree Dominance Index is > 0.5 and in the rest 45.5% groves it

ranges from 0.1- 0.5. On the other hand, Diversity Index in the first group ranges from 0.185 - 1.11 and in the second group it ranges from 0.197 - 1.007 (Table- 2). In the first group species diversity is much greater than in the second group, because in the first group maximum groves (84.8%) are having tree Diversity Index > 0.5, whereas in the second group only 36.4% groves have tree Diversity Index > 0.5. Dominance Indices are higher in the second group of groves than the first group of groves. In case of Diversity Indices this condition is just opposite of the Dominance Index. The relationship between the dominance and diversity indices (in the tree level) of the studied groves shows that despite in some cases in maximum groves Diversity Index and Dominance Index is inversely similar (Figure- 7a & 7b).

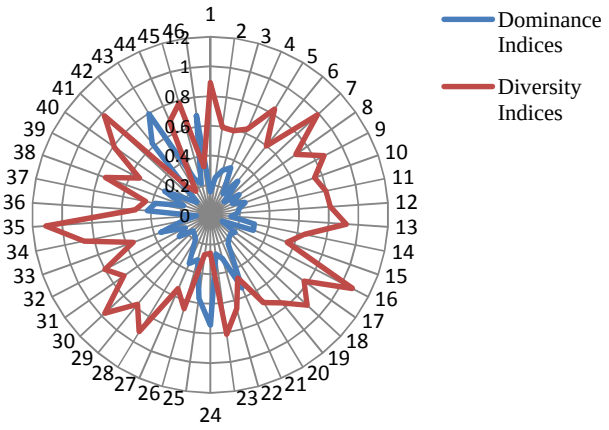

FIGURE 7a: Relationship between Dominance Index & Diversity Index in the tree level of the Sacred Groves managed by the Non-Tribals

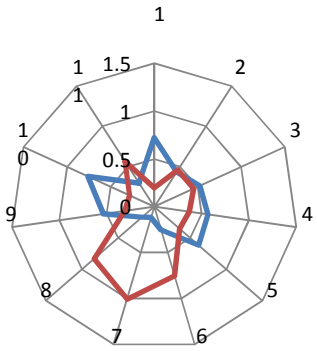

FIGURE 7B: Relationship between Dominance Index & Diversity Index in the tree level of the Sacred Groves managed by the Tribals

TABLE 3: Average Dominance & Diversity Indices in the Tree, Shrub and Herb level in the two groups of groves

	Average Dominance Index in the Tree Level	Average Diversity Index in the Tree Level	Average Dominance Index in the Shrub Level	Average Diversity Index in the Shrub Level	Average Dominance Index in the Herb Level	Average Diversity Index in the Herb Level
First Group (Managed by the Non- Tribals)	0.29	0.693	0.199	0.775	0.094	1.098
Second Group (Managed by the Tribals)	0.453	0.508	0.223	0.71	0.097	1.078

DISCUSSION

This study reveals that, 80.7% groves are being preserved by the general communities. It was initiated by a particular tribal community, but due to growing popularity of the deities, the work of preservation has been voluntarily undertaken by the general community. This finding supports the opinion of Amrithalingam (2000), who commented that not only tribal people, but rural people also preserved the sacred groves by traditional customs, rituals, ceremonies and folk-beliefs. Ray (1912) reported that the Santals who lived in new settlements, served as agricultural labourers. Around each new settlement they created a new sacred grove. The Mundari-speaking tribes who settled in the region in the Nineteenth Century all established their *Jaherthans* in their respective villages. Among the Santals, the sacred groves serve as an important criterion to ascertain village membership and geographical boundaries (Troisi, 1978). Findings of two small but very popular sacred groves (Guptamani Sacred Grove & Pitalkanti Joy Chandi Sacred Grove) managed by the Lodhas, support the opinion of Bhowmik (1963), who commented that the Lodhas migrated in the nineteenth century from the central Indian forests to settle down in west Medinipur and created their own sacred groves. In maximum sacred groves (77.4%), forest species are dominant in the tree level. So, this study reveals that sacred groves are really the miniatures of their original forest types, thus supporting the earlier views of Deb & Malhotra (1997, 2001). While working on Bankura, West Medinipur, Puruliya and Darjeeling, Deb & Malhotra (1997, 2001) commented that fragments of earlier forest vegetation are likely to survive as sacred groves in the forest villages. Amrithlingam (1998) also commented that sacred groves are the last remnants of the forests that once thrived in these areas. Dominance and Diversity Indices shows that in the second group of groves (managed by the

Tribals) dominance of one or two species is better than the first group (managed by the non-tribals). High dominance of forest type species in some groves is the cause of this type of Dominance Index. Among the forest species *Shorea robusta* and *Alangium salviifolium* are dominant in the tree level in both of the groups of groves, therefore supporting the views of Basu (2009). He reported that in the sacred groves of Bankura district, dominant tree species are *Shorea robusta*, *Butea monosperma*, *Madhuca longifolia* var *latifolia*, *Alangium salviifolium*, *Streblus asper*, *Diospyros melanoxylon* and *Holoptelea integrifolia*. Patnaik and Pandey (1998) also commented that sacred groves (*Sarna*) of Madhya Pradesh are characterized by the vegetation with a cluster of Sal (*Shorea robusta*) trees.

CONCLUSION

A comprehensive list of 57 sacred groves scattered over the district of Paschim Medinipur, furnishing their geographical position, approx. area, elevation and locations has been prepared. All this is expected to serve as bench-mark for further studies. Due to more popularity of deities of the groves, under the first group, managed by the general community, tree vegetation is far better than the second group (managed by the tribals). But without some extension of the area of these groves, they cannot be expected to return to climax formations by natural dynamics. Recovery of the climax vegetation over time could be possible if larger areas were earmarked for their growth and a network of sacred groves had been created. Since these groves are preserved mainly on religious grounds and have never been destroyed by clear felling, they represent the characteristic vegetation of each area. With the passage of time changing values, growth of population, participation of non-tribal people in the sacred grove-related activities have definitely brought about changes almost in all fields of human activity, and the sacred groves are not an exception. There has been perceptible decline in the sacred groves. The temples within the grove are still enjoying the place of worship but the forest surrounding it is becoming relatively unimportant. It is perceived that the sacred groves are not only important for religious values, which contribute significantly in maintaining the village eco-system and surrounding biodiversity (Gadgil *et al.* 1993), but they are also culturally rich and living place of deities and spirits, which has larger significance. Sacred groves are sites of traditional conservation practices of both tribals and non-tribals. These pockets of biodiversity need to be conserved properly with institutional support of the state. A study done by Konar (2010) around Ayodhya Hills of Purulia District of West Bengal conclude that there is need to awaken the appropriate authorities from the culture of connivance or silence for creating mass-awareness among the citizens of the non-tribal mainstream society so as to restore the sustainability of the diverse tribal communities. “Tribal culture” coupled with “cultural tribalism” may create tribal unsustainability. This paper therefore emphasized on the study of the effort of non-tribal communities in conserving these ecological sensitive zones.

REFERENCES

Amrithlingam, M. (1998) Sacred Groves of Tamilnadu – A Survey, C.P.R. Environmental Education Centre, Chennai.

Amrithlingam, M. (2000) Folklore of Sacred Groves’. *Indian Folklife*, Vol. 1 (3): 8-9, October.

Basu, R. (2009) Biodiversity and Ethnobotany of Sacred Groves in Bankura District, West Bengal. *The Indian Forester*, Vol.135 (6): 765-778.

Bhowmik, P. K. (1963) The Lodhas of West Bengal. *Punthi Pustak*. Calcutta.

Census of India (2011) Office of the Registrar General & Census Commissioner, Govt. of India.

Curtis, J. T. and Mc Intosh, R. P. (1950) The interrelations of certain Analytic and Synthetic Phyto sociological Characters. *Ecology*, Vol. 31: 434- 455.

Deb, Debal & Malhotra, K. C. (1997) Interface between biodiversity and tribal cultural heritage’. *J. Hum. Ecol*. Vol. 8: 157- 163.

Deb Debal and Malhotra, K. C. (2001) Conservation Ethos in Local Traditions: The West Bengal Heritage’. *Society and Natural Resources*, Vol. 14: 711-724, Philadelphia.

District Annual Plan (2010-2011) District Planning Committee, Paschim Medinipur, West Bengal.

District Human Development Report: Paschim Medinipur. 2011. Development & Planning Department, Government of West Bengal.

Gadgil, M., Berkesand, F. & Folke, C.(1993) Indigenous Knowledge for Biodiversity Conservation, *A Journal of the Human Environment*, Vol. 22, pp. 151-156.

Huges, J. D. & Chandran, M. D. S. (1998) Sacred Groves around the Earth: an overview.’ (eds.) *Conserving the Sacred for Biodiversity Management* by P.S. Ramakrisnan, K.G. Saxena and U. M. Chandrashekara, Oxford IBH Publishing Co. New Delhi, India.

Jain, S. K. & Rao, R. R. (1977) A Handbook of Field and Herbarium Methods. Today & Tomorrow’s Printers and Publishers, New Delhi.

Konar, K. K. (2010) Tribal Communities and Their Age-Old Sacred Groves: A Fair Fieldwork in the Purulia District of West Bengal, India, Stud Tribes Tribals, 8(1): 1-12.

Menhinick, Edward F. (1964) A Comparison of Some Species-Individuals Diversity Indices Applied to Samples of Field Insects. Ecology; Vol. 45, No. 4. pp. 859-861.

Patnaik, S. & Pandey, A. (1998) A study of indigenous community based forest management system: Sarna (sacred grove).’ P.S. Ramakrisnan, K.G. Saxena and U. M. Chandrashekara (eds.), *Conserving the Sacred for*

Biodiversity Management. Oxford and IBH Publishing Co. Pvt. Ltd., pp. 315-321.

Ramanujam, M. P. (2000) Conservation of Environment and Human Rights: Sacred Groves in Cultural Connections to Bio-diversity.' *The PRP Journal of Human Rights*, pp. 34-38, January – March.

Ray, Sarat Chandra (1912) *The Mundas and their Country*. Kuntaline Press. Calcutta.

Shanon, C.E. and Weaver, W. (1963) The Mathematical Theory of Communication. Univ. of Ilinois Press, Urbana, pp.117.

Simpson, E. H. (1949) Measurement of Diversity, *Nature*, pp. 688.

Troisi, J. (1978) *Tribal Religion*: *Religion and Practice among the Santals*". Manohar Publishers. New Delhi.