Study on Purnapani Forest Vegetation At Lalgarh of Jhargram District

Dr. Debabrata Das
Ecology Laboratory, Dept of Botany
Govt. General Degree College, Lalgarh-721516, Binpur-I, Jhargram, West Bengal, India

Abstract- *The present paper reflects vegetation of Purnapani forest area of Jhargram which is sal dominated. The girth of the tree species ranged between 10cm to 41cm though during count only the physiognomic characters were considered. The present study showed a large number of medicinal plants under herbs, shrubs and trees. The ground cover was heterogeneous as per the 5 quadrats studied in field. The ground vegetation was minimal and some sites have discontinuous patch of green cover. It broadcasts dominant sal with other predominant species like kumbhi (Carya arborea), bahera (Terminalia bellerica), karam (Adina cordifolia), kurchi (Holarrhena pubescens) and kelikadam (Mitragyna parviflora). During monsoon, ground grown vegetation cover showed mosses, ferns and fern allies. Genera like Riccia, Ophioglosssum, Botrychium, Lygodium, Selaginella and Adiantum were found here and there. Good pollinators like bees, honey bees, hornets, butterflies of various kinds, moths, birds and other insect larvae were found during investigation. Here, stock number for herbs, shrubs and trees were recorded per 100m^2 were 1100, 130 and 39 respectively. Cut marks for shrubs and tree species were recorded as number 64 and 03 respectively. Here, management is moderately high but not up to mark that need control grazing which could develop forest cover to make it complete in all respect.*

Keywords- Vegetation-Purnapani, Lodha Community, Bio-resources and Management.

I. INTRODUCTION

Entire tract of Chotanagpur plateau exhibits a good growth of dry vegetation that reflects deciduous forest species dominated by *sal* (*Shora robusta*) which is a coppice natural forest element protects almost all ground cover in the entire tract of the landscape. Its presence and absence reflects the community and their economic background as because people use the non-Timber Forest Products of *sal* (Fig. 1). The present situation reflects a pattern of resource that are available in a local forest area in Purnapani of Jhargram District which is forest based because people use *sal* tooth brush, *sal* leaf, green leaf, flosses, mushrooms, fruits, vegetables, small herbs, fuel woods, tooth brush (sal sticks),

lac, tasar etc. round the year. In this monsoon period they use green vegetables and mushrooms (Fig. 13) for their daily use even transported to local hat (weekly market) to generate income. Therefore use basis resource mobilization and their management is a prime goal of this research which could be non biased basis to know about the role of forest and role of people to manage the forest in near future. Not only that we can predict the fate of the forest in the forthcoming year in compare to the past and present scenario of the forest in our area as it is a source of biological resource and open land used for common use without hampering the original flora and fauna of her own kind. *Sal* is important plant as a fodder plant for the quadrupeds of villagers.

Sal vegetation is available in entire tract of Jhargram district of West Bengal. It is important because it is a dominant species which covers most of the landscape by its basal area and heavy canopy cover. Not only that in the Binpur-I CDB, the forest vegetation manifests a landscape which is an associate corridor of Jhitka-Lalgarh forest under Jhargram Forest Division (Formerly Medinipur Forest Division). This is an open corridor for Dalma Elephant of Jharkhnand, but most of the paces it is found as residential kind due to its group less condition. The site is also famous because of recorded 'The Royal Bengal Tiger', reported first time in the year 2018. The forest is a forest filled with coppice sal (*Shorea robusta*) along with many valuable medicinal plants, timber yielding crops, mushrooms, diverse liverworts, and mosses, ferns and fern allies. The forest includes a variety of birds, butterflies, insects, reptiles, millipedes, centipedes, molluscs, amphibians, round the year. The forest comprised of a large number of ready insects, aphids, hoppers, mushrooms, microfungi, many ferns, mosses and woody lianas. The so called forest have been studied ecologically which reflects highest diversity index of shrubs (1.15) followed by herbs (1.14) and lowest diversity index of trees (0.15). Research revealed the site reflects high evenness index and species richness index of plants (Das and Goswami, 2018). Here, highest evenness index was observed in case of herbs (1.16) followed by shrubs (0.08) while lowest was observed in case of tree species (0.16). Similarly, species richness of shrubs showed highest value (7.69) and lowest value of richness found in case of tree species (2.84). In case of studied

medicinal plants, status of abstract community was *Shorea-Spatholobus-Cyperus* during monsoon. Here, all the plants observed were medicinal which have significant ecological role to develop better plant community. Remembering the theme in mind the present author made the article which could be a readymade idea for planners and foresters to make the forest plant more congenial to manage it better in a sustainable way. Students of environmental studies and scholars from Botany and zoology may get facility better to study in the site in near future. Hope that the present scenario would reflect in the article for beginners study in managing the ecosystem better to sustain the Lodha community of the said area.

II. AREA UNDER STUDY

Study area is a forest under Khas-Jungle of Lalgarh forest which is 7 km away from Government General Degree College, Lalgarh, Jhargram, West Bengal. It is a coppice sal (Fig. 1) dominated dry deciduous forest with huge medicinal plants though water resource nearby is problematic. It is a forest under Lalgarh Forest Range, Binpur-I CDB of Lalgarh, West Bengal. The site is famous as because it is surrounded by agricultural land and one side bounded by a dry shallow canal. The site is dominated by tribal people like Lodha in a Lodha village. The nearer forest aside the Jungle is Jhitka-Lalgarh forest. It is divided by two patches, one is dense and another is denser which is filled with *Shorea, Madhuca, Terminalia, Adina, Mitragyn, Anogeissus, Odina, Zanthoxylum, Flacourtia* etc. The village path is run between two patches started from School ground of Purnapani (Map 1). It lies between $22°38′58′′$ N and $87°5′4′′$ E. Temperature ranged between 30.3 and 32.03 at 9:30 and 10:30hrs (a.m.) respectively. Weather was mostly cloudy at the morning but after 11:00a.m. it was clear.

Map 1. Purnapani area (Source: www. 2018)

III. MATERIALS AND METHODS

A field study includes some aspects of study i.e. standardization of instruments, standardization of methodology associated with specific type of study have been made earlier in the workshop held at Lalgarh Govt. College on and from 26th July to 28th July. The study field and grid

standardization was fixed by using statistical sampling. Random sampling was considered and plots were chosen and study was done with the fix up of seasons as per the guideline made earlier. Quadrats were drawn and study was done using 10×10 m², 5×5 m² and 1×1 m² for the study of trees, shrubs and herbs respectively. A local map has been drawn with the help of local people using participatory rural appraisal (PRA) technique. Study conducted to know the characters of vegetation, soil, flora, fauna, soil microbes, etc. to know the condition of ecosystem on a trial basis. Standard indices were prepared using different indices available in ecology work book. We consider study of frequency, density, abundance and importance value index (IVI) of species. These are required to qualify the goals and quantify the vegetation in terms of standard data. Importance Value Index was used to know the status of individual plants. It is totality of frequency, density and abundance of species i.e. a total value will be calculated on 300 only. Therefore, frequency, density and abundance values shall be calculated on 100 each basis. To make an IVI sum of RF+RD+RA (R stands for relative) was used, for diversity study use IVI vale as 'ni' and sum of 'ni' as 'N' has been taken for consideration. Shannon and Wiener (1963) index was prepared from the standard formula available in ecology book. Similarly for dominance of concentration, Simpson's formula (1949) was used. To study the evenness of species, Pielou (1966) was used along with species richness by Margalef (1958). Similar in manner, indices of similarity in any community or simply community coefficient (IS) between any two sample sites were taken though now it has its no predictive value because of a single study area. Community study, the formula of Sorensen (1948) as described by Muller-Dombois and Ellenberg (1974) has been taken in to account. All the references are mentioned in the workbook (2018) published by Workshop Committee of Lalgarh Govt. College, Lalgarh (26-28th July, 2018).

To study all, the individual formula is presented below: Diversity Index (H)= $-\sum[(ni/N) \times \log(ni/N)]$,

Where, 'ni' is the value of IVI of individual species and 'N' is the total IVI of all the species. Dominance of Concentration (Cd)=$(ni/N)^2$, Where 'ni' is the IVI of individual species and 'N' is the total IVI of all the species. Evenness Index (e)= Diversity Index/log S, Here, Diversity Index is Shannon Index and 'S'is the number of species. Species Richness Index (d)= S-1/log N, Where, S= Number of species and 'N' is the total Importance value and 'd' is species richness., Abstract Community study is a completeness of vegetation study. It is a degree of occurrence of a species in an ecosystem, in an abstract community, along the series of stand may be adjusted by species presence in sample plots of similar nature and size. The judgement for grouping of discrete plant

communities in to an abstract community may vary. However, based on common management status the classification of community has been done. This is indeed true to a natural forest where the elements are heterogeneous in comparison to the community in degraded land or plantation stand. Several formulae used today to assess the diversity of species. But in general, Simpson's diversity index was popular. Zoologist and botanist use Shannon Index (1948) to determine the diversity of species. The formula is: $H = - \sum_{i=1}^{r} ni/N * logni/N$, Where, 'N' is total number of 'ni' and ' ni' is the proportion of characters belonging to the ith type of letter in the string of interest. In ecology, ni is often the proportion of individuals belonging to the ith species in the dataset of interest. Then the Shannon entropy (degree of surprise) quantifies the uncertainty in predicting the species identity of an individual that is taken at random from the dataset. Although the equation is here written with natural logarithms, the base of the logarithm used when calculating the Shannon entropy can be chosen freely. Shannon himself discussed logarithm base 2, 10, and e and these have since become the most popular bases in application that use the Shannon entropy. Each log base corresponds to a different measurement unit, which have been called binary digits (bits), decimal digits (decits), and natural digits (nats) for the base 2, 10 and e respectively. Comparing Shannon entropy values that were originally calculated with different log base requires converting them to the same log base: change from the base 'a' to base 'b' is obtained with multiplication by log$_b$a. Evenness of Species: It takes natural logarithms of species richness 'ln(S)'. In this example, ln(3) equals 1.009. We can calculate the proportion of each species 'p(i)' by dividing the number of that species by the total number of all species. Methodology used for the research article mentioned in references[1-23].

IV. RESULT AND DISCUSSION

Present study revealed species composition and structure of abstract community in Purnapani forest of Lalgarh, Jhargram. Here, herbaceous species encountered in quadrat was 16 while shrubs and tree species were 20 and 8 respectively. In this study it is revealed that mean number of plants per 100m^2 area was 100, 130 and 38.8 respectively at Purnapani forest. Here, mean cut marks observed for shrubs and trees were 64 and 3 respectively that indicates biotic interference of the forest (Table 4, Fig. 5). Here highest IVI value of herbaceous plant was observed in case of *Cyperus rotundus* (43.78, Fig. 4) followed by *Curculigo orchioides* (38.75). Lowest IVI of species was recorded in case of *Crotalaria nana*, *Desmodium triflorum, Andrographis paniculata* and *Butea superba* (8.2). Highest IVI value of shrubby species was observed in *Spatholobus roxburghii*

(49.4) followed by *Holarrhena pubescens* (35.75, Fig. 3) which is a medicinal plant (Table 2). Lowest IVI was noticed in case of *Thespesia lampas*, *Syzygium cumuni*, *Flemingia chapper, Glochidion lanceolarium, Odina wodier* and *Flacourtia indica* (4.7). Tree species showed lesser degree of variations, i.e. dominant species *Shorea robusta* (Fig. 1, 2) showed highest IVI value (186.7) followed by *Adina cordifolia* (35.34). Lowest IVI of tree species was found in case of *Gardenia latifolia, Terminalia bellerica, Mitragyna parviflora* and *Careya arborea* (9.18) in the same forest which is heterogenous about species distribution (Table 3).

V. CONCLUSION

As the site is grazed by quadrupeds so setting of seedlings should be damaged, therefore limited browsing and grazing is highly recommended. Fuel wood collection and forest fire should be checked. Monsoon to post monsoon special attention should be paid to regenerate seedlings at a high degree and high stopped to cover the degraded site, if not monitoring should be made on a priority basis. Unwanted felling, lopping and climber cutting, should be banned so that spontaneous growth of natural members may get flowering and fruiting in due time. Leaf and mushroom collection should be made on the basis of local management. During heavy rains do not allow or do not get permission to the forest even stop grazing. Unscientific monitoring, litter collection, collection of mushroom, vegetables, leaf fuel, wood may enhance the productivity loss. Study should be made repeatedly to monitor the vegetation as well as growing stock at regular interval basis. Continuous study in monsoon, winter summer must be made in addition to the soil study including micro-flora study to make a conclusion for betterment of the ecosystem in near future.

VI. ACKNOWLEDGEMENTS

and butterflies in field. Sri A. C. Jana who accompanied us is well acknowledged. Last but not least thanks to the villagers who actively participated in survey even help during Participatory Rural Appraisal Map preparation.

VII. TABLES (1-4)

Table 1 Ecological status of herbaceous plants in Purnapani forest of Lalgarh, Jhargram, West Bengal, India

Sl. No.	Name of Herbs	Frequency	Density	Abundance	IVI
1.	*Andrographis paniculata*	3.4	3.1	1.7	8.2
2.	*Bonnaya brachiata*	3.4	6.2	3.4	13
3.	*Botrychium daucifolium*	3.4	12.4	6.96	22.76
4.	*Butea superb*	3.4	3.1	1.7	8.2
5.	*Commelina oblique*	3.4	6.2	3.4	13
6.	*Crotalaria nana*	3.4	3.1	1.7	8.2
7.	*Curculigo orchioides*	13.6	7.75	17.4	38.75
8.	*Cyperus rotundus*	13.6	9.3	20.88	43.78
9.	*Desmodium triflorum*	3.4	3.1	1.7	8.2
10.	*Dicliptera bupleuroides*	6.8	3.1	3.48	13.38
11.	*Digitaria sanguinalis*	10.2	4.9	8.7	23.8
12.	*Dioscorea bulbifera*	6.8	4.65	5.2	16.65
13.	*Hemidesmus indicus*	3.4	6.2	3.48	13.08
14.	*Ichnocarpus frutescens*	3.4	15.5	8.7	27.6
15.	*Lygodium japonicum*	6.8	4.65	5.2	16.65
16.	*Murdania nudiflora*	6.8	4.65	5.2	16.65
	SUM	95.2	97.9	98.8	291.9

Note: Diversity Index of herbs is 1.14 and dominance index is 0.08 at Purnapani forest (Das & Goswami, 2018)

Table 2 Ecological status of Shrubby plants at Purnapani forest, Jhargram

Sl. No.	Name of Shrubs	RF	RD	RA	IVI
1.	*Ampelocissus latifolia*	7.8	4.95	6	18.75
2.	*Dioscorea bulbifera*	5.2	4.5	3.6	13.3
3.	*Thespesia lampas*	2.6	1.5	0.6	4.7
4.	*Spatholobus roxburghii*	10.4	15	24	49.4
5.	*Holarrhena pubescens*	10.4	9.75	15.6	35.75
6.	*Smilax perfoliata*	5.2	0.75	0.6	6.55
7.	*Croton oblongifolia*	10.4	9.3	15	34.7
8.	*Smilax zeylanica*	5.2	2.25	1.8	9.25
9.	*Lygodium japonicum*	5.2	5.25	4.2	14.65
10.	*Syzygium cumuni*	2.6	1.5	0.6	4.7
11.	*Flemingia chapper*	2.6	1.5	0.6	4.7
12.	*Glochidion lanceolarium*	2.6	1.5	0.6	4.7
13.	*Gardenia arborea*	5.2	3	2.4	10.6
14.	*Meyna spinosa*	5.2	15	12	32.2
15.	*Flacourtia indica*	2.6	1.5	0.6	4.7
16.	*Odina wodier*	2.6	1.5	0.6	4.7
17.	*Cissus adnata*	2.6	10.5	4.2	17.3
18.	*Atylosia indica*	2.6	3	2.4	8
19.	*Ichnocarpus frutescens*	2.6	2.25	1.8	6.65
20.	*Antidesma diandrum*	2.6	1.5	0.6	4.7
	SUM	96.2	96	97.8	290

Note: Diversity Index is 1.15 and dominance index is 0.08 for shrubs at Purnapani forest (Das and Goswami, 2018)

Table 3 Ecological Status of tree species at Purnapani forest, Jhargram.

Sl. No.	Name of tree species	RF	RD	RA	IVI
	Col 1	Col 2	Col 3	Col 4	Col 5
	Shorea robusta	35	88.8	62.9	186.7
	Gardenia latifolia	7	0.48	1.7	9.18
	Terminalia bellerica	7	0.48	1.7	9.18
	Mitragyna parviflora	7	0.48	1.7	9.18
	Careya arborea	7	0.48	1.7	9.18
	Semecarpus anacardium	14	0.48	3.4	17.88
	Adina cordifolia	7	6.24	22.1	35.34
	Syzygium cumini	14	0.96	1.7	16.66
	SUM	98	98.4	96.9	293.3

Note: Diversity Index of tree species is 0.15 and dominance index is 0.41 at Purnapani (Das and Goswami, 2018).

Table 4 Plants in 100m² area in Purnapani of Lalgarh, Jhargram, West Bengal, India

Sl. No.	Type of plants	Mean number of pole/bole/tree/stem/plant per 100m²	Cut mark number /100m²	Range of stem number /100m² (Lowest to Highest in monsoon)
1.	Herbs	1100	0-0	300-1800
2.	Shrubs	130	64	52-120
3.	Trees	38.8	3	32-45

Note: N.A-Not applicable

VIII. FIGURES (1-13)

Fig. 1 Sal (*Shorea robusta*) dominated coppice dry deciduous forest at Purnapani, Lalgarh, Jhargram, W.B., India

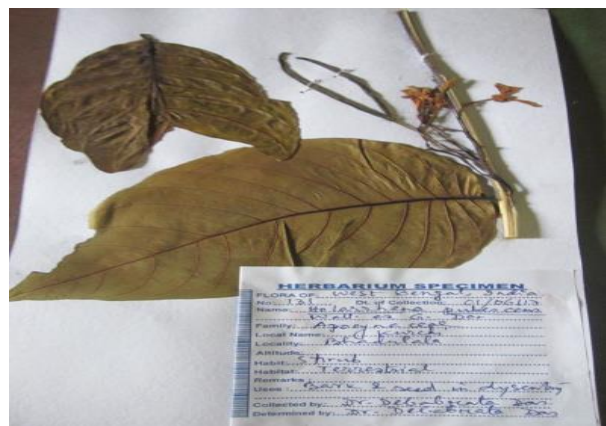Fig. 2 **Shorea robusta** with fruits during summer at Lateritic forest of Medinipur Forest Division, W.B., India

Fig. 3 **Holarrhena pubescens** (*H. antidysenterica*) in lateritic forest may be tree or shrubs, a medicinal plant.

Fig. 4 **Cyperus rotundus** in forest floor of Medinipur forest Division, W.B.
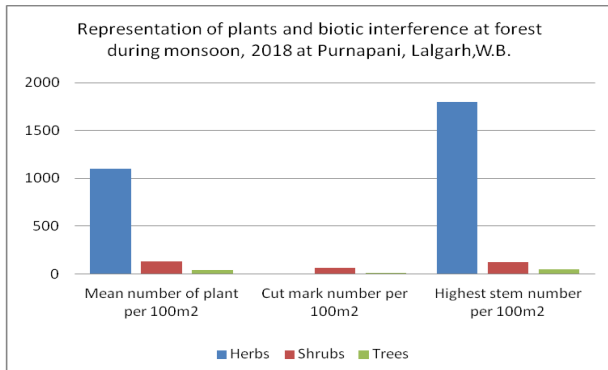

Fig. 5 Species representation and vegetation structure at Purnapani forest of Jhargram, West Bengal, India

Fig. 6 Dr. Debjani Basu (Retired Botanist, BSI) showing Collection Book for Herbarium Specimen preparation

Fig. 7 Researchers, Professors, Scientists and students are studying herbarium specimens at Ecology Laboratory, LGC.

Fig. 8 Prof. A.K. Mahapatra of IIEST, Shibpore, delivering lecture on Chromatography used in plant chemistry in a Seminar hall

Fig. 9 Dr. Manoj E. Hembrom, Botanist, BSI, Howrah-W.B. delivering lectures on Macrofungi at Seminar hall, LGC

Fig. 10. Member, Indian Bird Conservation Network (IBCN), Mumbai delivering lecture on Common birds monitoring Programme

Fig. 11 Dr. A. K. Pal, Participant of the workshop delivering lecture on Macro-fungi in a training workshop, 2018

Fig. 12 Author at the right side from the to view during research team at field of Purnapani, Jhargram.

Fig. 13 Local woman showing forest macro-fungi at Purnapani *sal* forest during study, Jhargram, W.B.

Fig. 14 Green *sal* twigs used as fooder in the village, collected from Purnapani forest, Jhargram, W.B, India

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