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ECOLOGICAL AUDIT AND PHYTOSOCIOLOGICAL ANALYSIS OF TROPICAL FOREST, JORAPUL, KALAMATI, JHARKHAND

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ABSTRACT
The physoiognomy of Jorapul, Kalamati forest has been described. The forest is under high biotic pressure and the study reflects that some of species are on the way to disappearance. The importance value index (IVI) has been calculated for each species encountered during sampling. the study is base on species-site and site-habitat relationship and data genevated are sequential assersment of information on the basis of phytosociological analysis.

INTRODUCTION

The outcome of ecological interaction among the species determine the nature of a community which is shared with many associates. A forest structure and physiognomy is not haphazard but is a complete commune in itself. The physical environment determines the pattern of succession but is community controlled (Odum, 1949). In the forest community, the presence of a species explains the presence or absence of certain other species even in its degraded condition. of the forest. This is an important aspect of community analysis and study (Weaver and Clement, 1986). The vegetational analysis provides information about the community which prepares a firm ground for managemental action.

The place of phytosociology and vegetational analysis in vegetation studies as defined by Poore (1962) is " The proper province of plant phytosociological studies should be to describe vegetation and to discover and define problems for solution by more exact methods". Elsewhere, he states "Every description is an abstraction from the available data" and "current statistical methods are inappropriate for the description of stands for classification"(Ovington and Madgwick, 1959; Ovington, 1962). Since the method of successive approximation involves the sequential assessment of information, the vegetational analysis based on data generated touching approximation has now become a reliable tool to do the ecological audit for management, the present work has been taken up to know the present plight and suggest the measurs of management.

MATERIALS AND METHODS

The study site was Jorapul forest, 25km south to Ranchi. The forest is dominated by *Shorea roubsta*. The study was conducted in spring and rainy seasons of 2004.
The quantitative characteristics of vegetation was determined by the quadrat method. These quadrats were the "recording units". The quadrats (10mx10m) were placed randomly and 10 quadrats were laid down to generate data.
The top and middle layer of the vegetations were counted under this transect. Inside this transect of 10m x 10m another quadrat of 5m x 5m was stretched by the same method for counting the shrubs. The quadrats were laid at random with the objective of covering the maximum range of vegetation. Care was taken that the two adjoining quadrats do not overlap.

Ten quadrats were recorded every time in the way described above and data were analysed for the total surveyed vegetation.

On the basis of data generated, firstly, density, frequency

Table 1 :Vegetation Structure of Jorapul forest, Kalamati (Jharkhand)

Sl. No.	Name of the species	Quadrats laid down										No.of ind. of each sp.	No. of quadrat of occur.	No. of quadrat studied	Frequency %	Frequency class	Density	Abundance	RF	RD	RA	IVI
1	2	3										4	5	6	7	8	9	10	11	12	13	14
	Upper storey																					
1	*Shorea robusta* Goertn.t.	9	14	18	19	10	17	14	9	7	3	120	10	100	100	E	12.0	12.0	0.495	0.463	0.207	1.114
2	*Adina cordifolia* Hook	-	1	-								1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
3	*Ficus benghalensis* L.							1				1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
4	*Anogeissus latifolia* Klall.	1			1							2	2	10	20	A	0.2	1.0	0.09	0.007	0.017	0.123
5	*Careya arborea* Roxb. (Kumbhi)		1									1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
	Middle storey																					
6	*Terminalia belerica* Roxb.			1				1				2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
7	*Buchnamia lanzan* Spreng.		1						1			2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
8	*Diospyros melanoxylon* Roxb.				1	1		1	1			3	3	10	30	B	0.3	1.0	0.148	0.011	0.017	0.176
9	*Terminalia chebula* Tetz.	1								1		3	3	10	30	A	0.1	1.0	0.148	0.011	0.017	0.176
10	*Magnifera indica* Linn.			1		1						1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
11	*Butea monosperma* (Lamk.)		1					1				2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
12	*Pongamia pinnata* (L.) Pierre			1	1							2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
13	*Ficus glomerata* Roxb.										1	1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
14	*Aegle marmelos* Corr.			1								1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
	Shrubs																					
15	*Emblica officinalis* Gaertn	1		1	1		1					4	4	10	40	B	0.3	1.0	0.198	0.011	0.017	0.226
16	*Croton oblongifolius* Roxb	2	2	3	2	1		1				11	6	10	6	C	1.1	1.8	0.297	0.042	0.018	0.357
17	*Holarrhena antidysenterica* Wall	1			1			1				3	3	10	30	B	0.3	1.0	0.148	0.011	0.017	0.176
18	*Clerodendron infortunatum* Linn	1		1	1							3	3	10	30	B	0.3	1.0	0.148	0.011	0.017	0.176
19	*Gardenia gummifera* Linn.						1		1			2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
20	*Thespensia lampus*	-	-	-	-	1						1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
21	*Wendlandia exserta* (Roxb.) DC.		1									1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
22	*Clausena excavata* Burm				2							2	1	10	12	A	0.2	2.0	0.049	0.007	0.034	0.284
23	*Flemingia chapper* Benth	2		2	1	3		2				10	5	10	50	E	1.1	2.0	0.247	0.042	0.034	0.323
24	*Litsaea polyantha* Juss.				1							1	1	10	10	A	0.1	1.0	0.049	0.003	0.017	0.069
25	*Casearia tomentosa* Roxb.			1	1			1	1			4	4	10	40	B	0.4	1.0	0.198	0.015	0.017	0.238
26	*Eugenia heyneana* Duthie						1		1	1	4	6	3	10	30	B	0.6	2.0	0.148	0.023	0.034	0.205
27	*Carissa carandas* L.	1			1	2						5	4	10	30	B	0.5	1.2	0.48	0.019	0.020	0.187
28	*Nyctanthes arbor - tristis* L.		1	1								2	2	10	10	A	0.2	1.3	0.049	0.007	0.022	0.078
	Herbs																					
29	*Atylsia crassa* Prain ex King	1	1			1						3	3	10	30	B	0.3	1.0	0.148	0.011	0.017	0.176
30	*Elephant us scaber* L.		1	2	1							4	3	10	30	B	0.3	1.3	0.148	0.011	0.022	0.181
31	*Phyllanthus niruri Retz*				1		1	1				3	3	10	30	B	0.3	1.0	0.148	0.011	0.017	0.176
32	*Crotalaria prostrata* Willd.		1	1		3						5	3	10	30	B	0.2	1.8	0.148	0.007	0.0310	0.186
33	*Polygonum glabrum* Willd									2	5	7	2	10	20	A	0.7	3.5	0.099	0.027	0.578	0.190
34	*Barleria priorities* Linn.					2						2	1	10	10	A	0.2	2.0	0.049	0.007	0.034	0.186
35	*Adhatoda vasica* Nees.	1		1								2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
36	*Phoenix acaulis* Roxb.		1	2	2	3	2		1			11	6	10	60	C	1.1	1.8	0.297	0.042	0.031	0.363
37	*Randia dumetorum* (Retz.) Lam.							1	1			2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
38	*Acalypha stricta* Poepp.	2	3		4		2			1		12	5	10	50	C	1.2	2.4	0.247	0.046	0.041	0.334

Table 1: Cont.....

39	*Lippia alba* (Mill.) N.E.Brown		2		2			3				7	3	10	30	B	0.7	2.3	0.148	0.027	0.39	0.214
	Climbers																					
40	*Smilax prolifera* Roxb.						1					1	1	10	10	B	0.1	1.0	0.049	0.003	0.017	0.069
41	*Asparagus racemosus* Willd.						2		1			3	2	10	20	A	0.3	1.5	0.099	0.011	0.025	0.135
42	*Celastrus paniculata* Willd.	1					1					2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
43	*Vitis repanda* W&A			1	1							2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123
44	*Dioscorea bullbifera* L.						1	1				2	2	10	20	A	0.2	1.0	0.099	0.007	0.017	0.123

and abundance of different species of vegetation were calculated and then the relative density, relative frequency and relative abundance were calculated. Following the method of Curtis (1959) the Importance Value Index(IVI) was calculated to provide some predictive value to the generated data.

The diffrent frequency class were assigned as follows:

Frequency class	**Frequency value**
A	1-20%
B	21-40%
C	41-60%
D	61-800%
E	81-100%

RESULTS AND DISCUSSION

Jorapul forest, Kalamati showed that it is in a very degraded state due to the high biotic pressure. The forest is subjected to illicit felling and grazing. Every year the forest fire is also a major problem mainly because of clearing the ground for collection of mahua *(Madhuca indica* J.F. Gmel).

A decreasing population is seen in the frequency grade C (41 – 60%), whereas the frequency grade D (61 – 80%) is completely lacking. There is no species which comes under 61 – 80% frequency in the forest. Benten and Werner's (1976) opinion is that if such a trend continues, the species is on the way to extinction. According to Knight's terminology, these types of species can be classified as an infrequent reproducer (Knight, 1975).

The dominant species is *Shoera robusta* with 100% frequency representing frequency class – E (81 – 100%). Simpson (1949) reported the indicator significance of the plant communities and species. He pointed out that the dominants in plant community provide a rough estimate of the controlling factors prevailing in the habitat. However, he also pointed that all the species in a community, provide a better basis for approximation of the causative factors for presence of species.

The occurrence of a species that is phytosociological association is site specific which in turn depends upon the habitat. Thus the three ecological categories-species, site and habitat are taken into account.

Although the erection of abstract units defined by both species and site could be legitimately regarded as the end of the strictly phytosociological operations on the data from a given area, it must be remembered that, for analytical purposes, the sites have so far been regarded as purely spatial entities with no external reference except their position on the surface of the earth. For ecological purposes, however, some knowledge of the particular habitat conditions relating to particular groups of species is required: we must therefore now return to the original concept of vegetation as a threefold system of plant/site/ habitat relationships. We must examine site / habitat relationships and use the sites to establish connection between the two. The question of what habitat features to record in a given situation must always be to some extent subjective, bases on the investigator's intuition as to the range of features most likely to be involved; within the range, however, the question of which of the recorded features show the best correlations with variations in the plant cover needs to be objectively resolved.

It has been already indicated that there are three basic approaches to the general problem. One may examine species / site relationships in the first instance and use these as the reference system for site / habitat relationships, one may make site / habitat relationships the focus of our interest and relegate species / site relationships to a subsidiary position. We have examined both systems independently and attempted to correlate the two sets of results. Although there are a priori reasons for preferring the first approach, some mention should nevertheless be made of the other two.

The final decision to be made concerns the nature of the information about each species to be collected at each site. A wide variety of measures have been proposed, ranging from a simple presence or absence system to the complex "indices of importance" used by Curtis and McIntosh (1951). For instance, measures of density, dry weight, leaf area, percentage cover, vitality and so on have all been adopted at one time or another in various phytosociological studies. Given that the prime requirement is to obtain unbiased information as efficiently as possible, the different types of measure must now be looked at in this light.

In the first place, there is little to be said on theoretical grounds in favour of composite, mixed quantitative measures. Examples of these are Curtis's " Importance Value" (a sum of non- additive numbers, i.e. relative density, relative frequency and relative abundance) and the various "cover-abundance" scales much used in continental work. The latter, in fact, are little more than more mere subjective estimations, given respectability by being displayed in a pseudo-quantitative form.

The maximum value of IVI has been obtained for *Shorea robusta* as1.114. Most of the species had IVI only as 0.123 and 0.078, reflecting their very low relative density, relative frequency and relative abundance.

The results of the study reveal that there is urgent need of decreasing biotic pressure over the forest so that the species associated with dominant tree could survive in future.

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