

## Phytosociological studies of tree vegetation of Moraghat forest range ,India

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### Abstract

In order to better understand and manage forest ecosystems, it is important to study the diversity of plants in these ecosystems. Ecological studies are the measure of biodiversity status of any vegetation. This study was carried out at Moraghat forest of Jalpaiguri District, West Bengal, to investigate the composition of trees and the status of biodiversity of these tree species. A total of 19 established tree species were recorded in the forest. The present studies were made to evaluate the Frequency, Density, Basal Area and Importance Value Index (IVI). The IVI values have helped to understand the ecological significance of the tree species in community structure.

Key words : Basal Area, Codominance, Dominance, IVI, Quadrate, Territorial Forest.

### INTRODUCTION

A forest is a large area of land inhabited by trees, shrubs, herbs, climbers and lots of other organisms. The vegetation of forest is uncultivated and it forms the wild growth. Ecologically and economically forests are very significant as forests produce a huge amount of renewable sources which are being utilized by all organisms including human. Though forest does not comprise of tree alone but in most forest ecosystems, tree species play a crucial role in the overall plant diversity. Forest ecosystems including trees undergo several natural and human disturbances and due to major differences in terms of life form and regeneration, they usually react to such disturbances in different ways<sup>[1]</sup>. It is a fact that except protected areas and reserve forests, scientific studies on biodiversity have not been conducted so much for plants, especially for a majority of taxonomic groups and ecosystem types. The situation is the same in Moraghat range of Gorumara National Park. Only preliminary information on the biodiversity patterns of plant groups are available in this forest range. Such a lack of information severely hinders the assessment of the value of existing species, their current status and threats which might facilitate their long term conservation. In present studies the frequency, Density and Basal area were determined to evaluate the status of biodiversity of tree species. Then IVI of trees were made to determine the dominant species of the forest. Dominance is an important indicator of species composition in a forest<sup>[2,3]</sup>. The dominance of a species refers to its relative importance in its habitat<sup>[4]</sup> which determines the degree of influence of the species on the ecosystem<sup>[5]</sup>.

### MATERIALS AND METHODS

#### Description of Study Site

The Moraghat forest range is a territorial forest of Jalpaiguri district and is located in close proximity to Gairkata. This range is totally recommended for plantation of commercially important timber plants. Total range area is 5511.37 hectares. The Moraghat forest range (latitude 26°47'28.04"N to 26°37'48.33"N, longitude 88°59'57.38"E to 89°00'55.65"E and 473 to 267 ft. elevation.) has four beats i.e. Totapara, Khuttimari, Gossaihat and Sonakhali (Fig1). Two rivers pass out through the forest, namely, Garati River and Nonai River.

### Methodology

For phytosociological studies of tree vegetation in Moraghat range, the quadrat methods were used. In each forest beat three quadrates laid down for trees. The size of quadrates for trees were 10 m. sq. The use of local name of each forest site was adopted from the knowledge of Forest guards. Different topography and altitudes, had different types and levels of disturbance intensity; and the dominant and character species for each of the twelve forest community sites were different. Tree species found within each sampling plot were photographed and Identified by their vernacular names (adopted from forest guards, range officer and local people) and scientific names using various books, articles and internet<sup>[7]</sup>. Basal area was calculated from the perimeter which was measured at a breast height.

### Data Analysis Techniques

In order to analyze the diversity of tree vegetation Frequency, Relative frequency, density and Relative density were calculated<sup>[8,9]</sup>. Importance Value Index was calculated by adding Relative frequency and Relative density (Table 1).

$$\text{Basal Area} = \frac{(\text{Circumference at breast height})^2}{12.56}$$

$$\text{Frequency}(\%) = \frac{\text{No. of plot in which the species is present}}{\text{Total No. of plots sampled}} \times 100$$

$$\text{Density} = \frac{\text{No. individuals of the species}}{\text{Total No. of plots sampled}}$$

$$\text{Relative Frequency}(\%) = \frac{\text{Occurance of the species}}{\text{Occurance of all the species}} \times 100$$

$$\text{Relative Density} = \frac{\text{Density of the species}}{\text{Density of all the species}}$$

$$\text{Relative Basal Area} = \frac{\text{Basal Area of the species}}{\text{Basal Area of all the species}}$$

$$\text{IVI} = \text{Relative Frequency} + \text{Relative Density} + \text{Relative Basal Area}$$

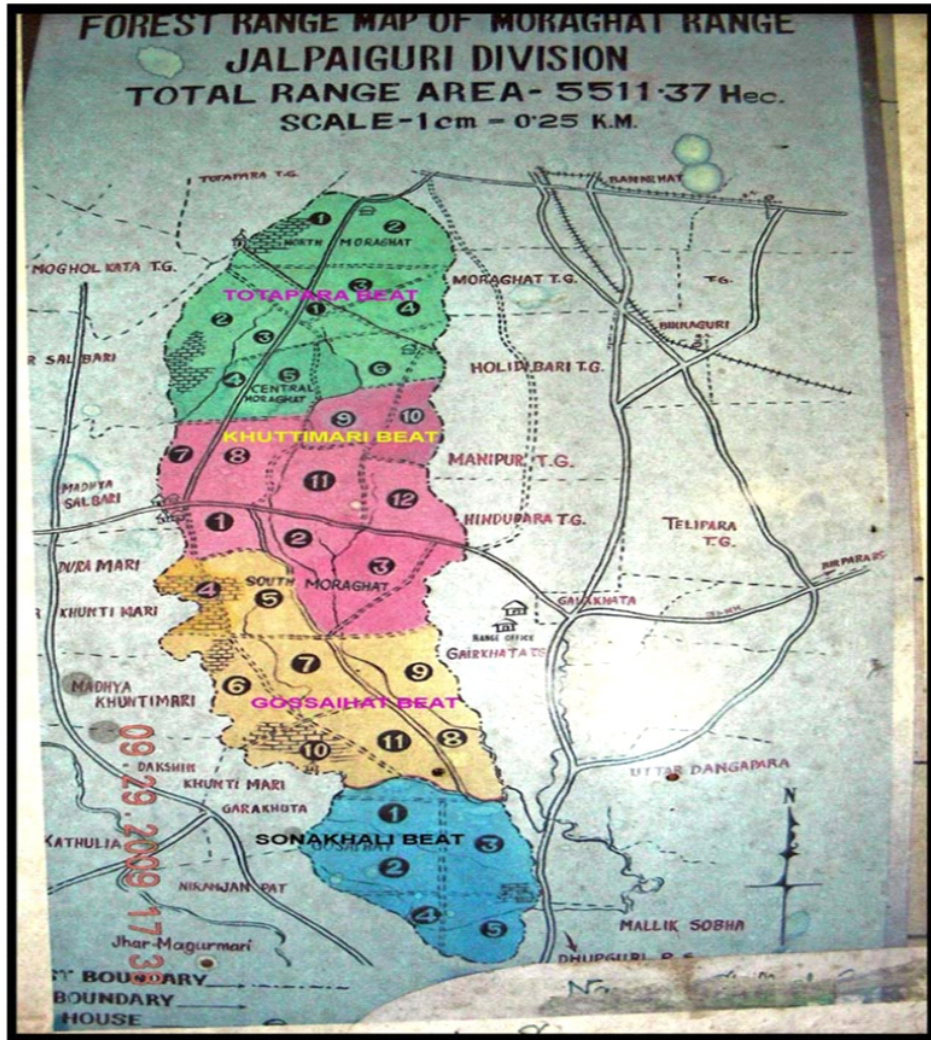


Figure 1: Forest map of Moraghat [6]

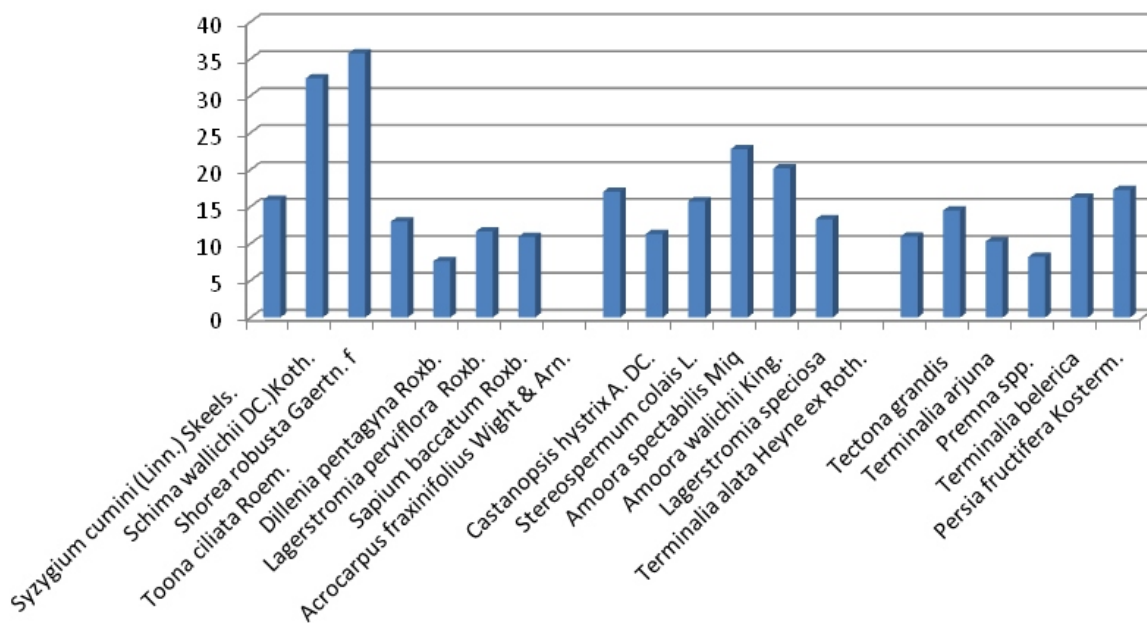


Fig. 2: Graph1: IVI status of woody plant

**Table 1 :** Value for different parameters, recorded for different tree species of Ramsai range

SL. NO	NAME OF SPECIES	D	F (%)	B.A	R.D	R.F	RBA	IVI
1	<i>Syzygium cumini</i> (Linn.) Skeels.	3.00	8.33	166.36	6.66	1.31	7.95	15.92
2	<i>Schima wallichii</i> DC.)Koth.	3.82	91.66	116.25	8.48	18.34	5.56	32.38
3	<i>Shorea robusta</i> Gaertn. f	3.36	91.66	255.02	7.46	16.15	12.19	35.75
4	<i>Toona ciliata</i> Roem.	2.50	16.66	109.52	5.50	2.18	5.23	12.96
5	<i>Dillenia pentagyna</i> Roxb.	1.50	16.66	61.73	3.33	1.31	2.95	7.59
6	<i>Lagerstromia perviflora</i> Roxb.	1.66	25.00	120.48	3.68	2.18	5.76	11.62
7	<i>Sapium baccatum</i> Roxb.	2.33	25.00	56.24	5.17	3.05	2.69	10.91
8	<i>Acrocarpus fraxinifolius</i> Wight & Arn.	3.33	25.00	109.78	7.39	4.38	5.25	17.02
9	<i>Castanopsis hystrix</i> A. DC.	1.75	33.33	91.40	3.88	3.05	4.37	11.30
10	<i>Stereospermum colais</i> L.	2.20	41.46	117.75	4.88	4.80	5.63	15.71
11	<i>Amoora spectabilis</i> Miq	3.28	58.33	116.16	7.28	10.04	5.55	22.79
12	<i>Amoora walichii</i> King.	3.20	41.66	127.20	7.10	6.98	6.08	20.16
13	<i>Lagerstromia speciosa</i> (L.) Pers.	2.00	25.00	130.47	4.44	2.62	6.24	13.30
14	<i>Terminalia alata</i> Heyne ex Roth.	2.00	16.66	99.75	4.44	1.74	4.77	10.95
15	<i>Tectona grandis</i> L.f.	2.00	41.66	118.50	4.44	4.38	5.66	14.48
16	<i>Terminalia arjuna</i> (Roxb.) Wight&Arn.	1.25	33.33	111.52	2.77	2.18	5.33	10.28
17	<i>Premna</i> spp.	1.33	25.00	73.25	2.95	1.74	3.50	8.19
18	<i>Terminalia arjuna</i> (Roxb.) Wight&Arn.	2.50	50.00	86.89	5.55	6.50	4.15	16.20
19	<i>Persia fructifera</i> Kosterm.	2.00	66.66	122.06	4.44	6.98	5.83	17.25

D =Density, F=Frequency, R.F= Relative Frequency, R.D= Relative Density, B.A= Basal Area, RBA=Relative Basal Area , IVI= Importance Value Index

## RESULT

This study provides information on the tree species of the Moraghat forest range, their distribution and the status of dominance. The study will be of great help in evolving a complete biodiversity picture of tree vegetation of Moraghat forest. The findings have illustrated that most abundant tree species of this range are *Shorea robusta* Gaertn. f. and *Schima wallichii* (DC.) Koth.. The results obtained in this study clearly show that, only few tree species have good IVI. Observation of this study indicates that *Shorea robusta* Gaertn. f. had maximum IVI of 35.75 and *Dillenia pentagyna* Roxb. had minimum IVI of 7.59. It

is interesting also to note a good IVI value of 32.38 for *Schima wallichii* (DC.) Koth. In *Shorea robusta* Gaertn. f. average basal area was recorded of 255.02. This fact indicates that *Shorea robusta* Gaertn. f. is the dominant tree of the forest.

## CONCLUSION

This Phytosociological study indicates that *Shorea robusta* Gaertn. f and *Schima wallichii* (DC.) Koth are the dominant species of this forest range. The low IVI values of others tree species may indicate that they do not improve their maturation. The densities of such species are either negatively influenced by changes in soil conditions or environmental conditions or

through the direct losses by animals and humans. This study also reveals that average basal area was not so good for other species except *Shorea robusta* Gaertn. f., most probably due to previous ignorance as these species were not so recognized as economically important plant. Another important observation is the absence of young trees of *Shorea robusta* Gaertn. f. This fact indicates that there was a continuous loss of seeds or seedlings from the forest since a long time, as the plant is economically very important. Thus the study suggested to the followers for the research of soil seed bank of the forest range. Hope that this research help to a better plan of biodiversity conservation and its socio-economic significance for Moraghat forest range and other territorial forests.

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### REFERENCES

1. Lohbeck M, Poorter L, Martinez-Ramos M, Rodriguez-Velazquez J, Van Breugel M, Bongers F. Changing Drivers of Species Dominance during Tropical Forest Succession. *Functional Ecology*, 2014; 28:1052-1058.
2. Gillium FS. The ecological significance of the herbaceous layer in forest ecosystems. *BioScience*. 2007;57: 845-858.
3. Priya D, Jean PP, Egbert GL. Changes in Rain Forest Tree Diversity, Dominance and Rarity across a Seasonality Gradient in the Western Ghats. *Indian Journal of Biogeography*, 2005;32: 493-501.
4. Chase JM, Leibold MA. Ecological Niches: Linking Classical and Contemporary Approaches. University of Chicago Press, Chicago. 2003.
5. Burak KP, Roy SW, Matthias MB, Craig M, Pauline FG. Response of Plant Species and Life Form Diversity to Variable Fire Histories and Biomass in the Jarrah Forest of South-West Australia. *Austral Ecology*, 2011;37: 330-338.
6. Patra AK, Datta T, Das V, GhoshDastidar S. Fin-fish diversity in Moraghat forest, a territorial forest of Jalpaiguri District, West Bengal, India, *International Journal of Fisheries and Aquatic Studies* 2014; 2(3): 118-124.
7. Das D, Pramanik BK, Mollay SK. A Model Classical report on vegetation dynamics in Gorumara National Park, in West Bengal, India. *Int. J. Phar. & Biomed. Res.* 2015; 2(2): 1-14.
8. Misra R. Ecology Work Book, Oxford & IBH Publishing Co. 1968.
9. Phillips EA. Methods of Vegetation Study, Henry Holt Co. Inc., London, 1959.
10. Chaubey OP, Prasad R, Mishra GP. Studies of Teak Plantation and mixed natural forest in Madhya Pradesh. *J. Trop. For.* 1988; 4: 22-35.
11. Anderson, A.J.B. Ordination methods in Ecology. *J. Ecol.* 1971; 59:713-726.