

Non-Timber Forest Product: Case Study Of Diversity In Garampani Wildlife Sanctuary, Karbi Anglong District, Assam, India

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*Abstract: Non-timber forest products play a fundamental role in maintaining the livelihood of the rural areas peoples. NTFPs also provide the well range of valuable resources to the tribal community. The present study was focused of the diversity of NTFPs of Garampani Wildlife Sanctuary in Karbi Anglong district, Assam, India. The data was collected by using random sampling method through laying quadrats along the transect of 5×5 m² (herbs & shrubs), 10×10 m² (tree) and calculated their diversity index and importance value index. 14 species of herbs/shrubs, 13 species of ferns/climber/epiphytes and 5 species of wild edible fruits were recorded. The average Shannon wiener index of diversity of different species were 1.96 (herbs/shrubs), 2.27 (ferns/climbers/epiphytic) and 1.50 (fruit edible) where ferns/climbers/epiphytic species indicated higher importance value and diversity in comparison to herbs/shrubs and wild edible fruits species. *Delima sarmentosa* L. (climber) have high importance value index (115.81) and *Solanum indicum* L. (20.25) have lowest importance value index.*

Keywords: Diversity index, IVI (Importance value index), Non-Timber Forest Products (NTFPs), Quadrat.

I. INTRODUCTION

Non-Timber Forest Products (NTFPs) refers to a broad range of resources in the forest. Non-Timber Forest Products (NTFPs) are objects of biological origin; both plant and animal derived from the forest and allied land uses for subsistence and cash income by forest dwellers. NTFPs have long been harvested for subsistence and trade (Ticktin 2004). An estimated 50 million economically marginalized forest dwellers in India harvest large quantities of NTFPs for their subsistence as well as for trade (Uma Shaanker *et al.* 2004; Hegde *et al.* 1996). An additional 200 to 300 million non-tribals also depend on NTFPs to lesser degrees (Shiva 1995). A 2010-2011 report from the Ministry of Environment and Forests, Government of India, estimated that about 100 million of people in India depend on various forest products other than timber, which in turn generates Rs 20 billion in government revenue (TERI 2004). Throughout the world, the diversity of NTFPs is important to the livelihoods of forest-

edge populations. About 4,000 to 6,000 NTFPs are used worldwide and most are harvested from wildlands (Iqbal, 1993). In India, 90% of the plants supplied to the international market are from wild stock (Mishra *et al.* 2009). NTFPs indeed play a very significant role in rural economy in terms of providing employment, income potential and life sustenance (Negi *et al.*, 2011).

The term NTFPs define as “goods biological origin other than wood derived from forests, other wooded lands and trees outside forests (FAO, 1999). The term NTFPs also encompasses that all biological materials other than timber, which are extracted from forests for human use (De Beer and MC Dermott, 1989). Non-wood forest products include all goods of biological origin, as well as services, derived from forests or any land under similar use, and exclude wood in all its forms (Chandresekharan, 1995). The NTFPs are an integral part of development and survival of people living in and around forests and depending on them. The potential economic value of NTFPs either in terms of utilization or their

market value is often underestimated or unknown (Wickens, 1994).the NTFPs are important tools for addressing poverty issues for the marginalized, forest dependent communities, by contributing to livelihoods, including food security, income, health and sustainable human development (Ahenkan and Boon, 2008). Globally, an estimated 350 million people mostly in developing countries depend on NTFPs as their primary sources of income, food, nutrition and medicine (UND, 2004; FAO, 2005). Garampani Wildlife Sanctuary is one of the oldest sanctuaries of Karbi Anglong District of Assam. The wildlife sanctuary has rich in biodiversity including rare and endanger species. The sanctuary has surrounded by Nambor Sanctuary and having different types rare orchid species. Garampani wildlife sanctuary has provided the good habitat of Non-timber Forest Products (NTFPs) along with timber plant species and no research activity has done in previously. Therefore, the objective of studies was to identify the NTFPs and estimated their diversity. Also study the importance value index (IVI) of NTFPs in Garampani Wildlife Sanctuary, Karbi Anglong district, Assam.

II. METHODS

Garampani Wild life Sanctuary one of the oldest Wildlife Sanctuaries situated in Karbi Anglong District. The unique features of these sanctuaries are that it containing “hot water spring” and “waterfalls.” It is located between 093°52’48.7” E latitude and 26°23’32.9” N longitude. The Sanctuary covers areas of 6.05 km² and the sanctuary has providing well provisioning services. The study was conducted from January to April month 2017 in Garampani Wildlife Sanctuary, Karbi Anglong district Assam. The data were collected using systematic sampling method by laying quadrat along the transect (Sharma et al.2016; Barbour et al 1999; Singh & Singh 1992). In quadrat collected the all herbaceous species, shrubs species, epiphytic species, climber species and wild edible fruit yielding species and their number were recorded. The proper identification was done by using the help of taxonomist and the available literature (Kanjilal et al., 1934-40; Hooker J.D., 1872-97). The main objective of study is that collect the species of NTFPs and analyzed the species diversity based on (Shannon and Wiener, 1963). Also calculate the importance value index (IVI) S of NTFPs based on (Sharma et al., 2016; Curtis, 1959).

III. RESULT

The species diversity of NTFPs in Garampani wildlife sanctuary obtained in 1.96 (herbs/shrubs), 2.27 (ferns/climbers/epiphytic) and 1.50 (Wild edible fruit). Ferns/climbers/epiphytic species indicated higher importance value and diversity in comparison to herbs/shrubs and wild edible fruits species. *Delima sarmentosa* L. (climber) have high importance value index (115.8179) and *Solanum indicum* L. (20.2508) have lowest importance value index, Shown in Table1 (Herbs/Shrubs), Table2 ((ferns/climbers/epiphytic)) and Table3 (Wild edible fruit).

Species name	N	R f	R d	R do	IVI	PilnPi	H'	
Herbs species								
<i>Ageratum conyzoides</i> L.	320	35.71	29.93	1.4277	67.0677	-	1.108	
<i>Spilanthes paniculata</i> DC.	295	35.71	27.59	0.4264	63.7264	0.3552		
<i>Colocasia esculenta</i> (L.) Schott	74	50	6.92	3.7919	60.7119	0.1848		
<i>Leucas aspera</i> (Willd.)	10	14.28	0.93	8.8818	24.0918	0.0435		
<i>Mimosa pudica</i> L. (Laajvanti)	17	21.42	1.59	0.1390	23.149	0.0658		
<i>Homalomena aromatic</i> (Spreng.) Schott	29	42.85	2.71	10.8381	56.3981	0.0977		
Shrubs species								
<i>Clerodendrum infortunatum</i> L.	104	42.85	9.72	4.6541	57.2241	0.2265	0.8499	
<i>Solanum xanthocarpum</i> Schrad & Wendl.	8	21.42	0.74	18.6352	40.7952	0.0363		
<i>Solanum indicum</i> L.	11	14.28	1.02	4.9508	20.2508	0.0467		
<i>Lantana camara</i> L.	61	42.85	5.70	3.3654	51.9154	0.1632		
<i>Chromolaena odorata</i> (L) King & H.E. Robins.	102	50	9.54	2.6145	61.1545	0.2241		
<i>Melastoma malabathricum</i> L.	16	21.42	1.49	1.5390	24.449	0.0626		
<i>Phlogocanthus tubifloras</i> Nees.	17	21.42	1.59	1.5390	24.549	0.0658		
<i>Ricinus communis</i> L.	5	7.14	0.46	37.1963	44.7963	0.0247		
TOTAL	1069							1.9579

n= Total number of individual species, R f= Relative frequency, R d= Relative density R do = Relative dominance, IVI= Importance value index,
*Shannon diversity index (H') = $\sum P_i \ln P_i$

Table 1: Herbs & Shrubs plant species of Garampani wildlife sanctuary

Species name	n	R f	R de	R d	IVI	PilnPi	H'
Ferns species							
<i>Amphineuron opulentum</i> (Kaulf.) Holttum	234	61.53	17.98	1.0316	80.5416	0.3109	0.8944
<i>Diplazium esculentum</i> (Retz.) Sw.	140	38.46	10.76	2.2402	29.9402	0.2424	
<i>Pronophrum nudatum</i> (Roxb.) Holttum	76	38.46	5.84	0.6632	44.9632	0.1678	
<i>Dicranopteris linearis</i> (Burm.f.) Underw.	55	15.38	4.22	2.8887	22.4887	0.1355	
<i>Pteris semipinata</i> L.	10	23.07	0.76	0.2210	24.051	0.0378	
Climber species							
<i>Mikania micrantha</i> Kunth	57	46.15	6.30	0.8990	53.349	0.1387	0.5569
<i>Delima sarmentosa</i> L.	15	30.76	4.38	80.6779	115.8179	0.0520	
<i>Lygodium flexuosum</i> (L.) Sw. (Fern spp.)	125	23.07	1.15	0.2210	24.441	0.2275	
<i>Stenochlaena palustris</i> (Burm. f.) Bedd. (Fern spp.)	57	23.07	9.60	2.2402	34.9102	0.1387	
Epiphytic species							
<i>Rhynchostylis retusa</i> (L.) Bl.	8	15.38	0.61	4.7310	20.721	0.0315	0.8188
<i>Microsorium punctatum</i> (L.) Copel. (Fern spp.)	200	30.76	15.37	2.0338	48.1638	0.2904	
<i>Drymoglossum heterophyllum</i> (L.) Trimen. (Fern spp.)	181	30.76	13.91	0.6632	45.3332	0.2769	
<i>Pyrosia lanceolata</i> (L.) Farwell (Fern spp.)	118	15.38	9.06	1.4885	25.9285	0.2200	
Total	1276					2.2701	

n= Total number of individual species, R f= Relative frequency, R d= Relative density R do= Relative dominance, IVI= Importance value index,
*Shannon diversity index (H') = $\sum P_i \ln P_i$

Table 2: Ferns, Climber & Epiphytic plant species in Garampani wildlife sanctuary

Wild edible fruit species	N	R f	R de	R d	IVI	PilnPi	H'
<i>Psidium guajava</i> L.	8	40	22.22	4.1241	66.3441	-0.3342	1.4974
<i>Mangifera sylvatica</i> L.	12	80	33.33	44.3697	157.6997	-0.3662	
<i>Dillenia indica</i> L.	2	40	5.55	38.7857	84.3357	-0.1604	
<i>Mimusops elengi</i> L.	7	40	19.44	10.0366	69.4766	-0.3183	
<i>Ziziphus mauritiana</i> Lam.	7	80	19.44	2.6836	102.1236	-0.3183	
Total	36					1.4974	

n= Total number of individual species, R f= Relative frequency, R d= Relative density R do= Relative dominance, IVI= Importance value index,
*Shannon diversity index (H') = $-\sum P_i \ln P_i$

Table 3: Wild edible fruit species in Garampani wildlife sanctuary

IV. DISCUSSION

Species diversity of NTFPs has estimated by using Shannon wiener index of diversity. The species were collected by laying 10 quadrats along the transect. Collected species was recorded and identify by using available literature. In Garampani Wildlife Sanctuary NTFPs have well distributed in wide range. In my studies NTFPs have been categories in to herbs, shrubs, epiphytes, ferns, climber and also included wild edible fruit species. The average species diversity of herbs/shrubs has estimated in 1.96, ferns/climbers/epiphytic has estimated in 2.27 and fruit edible has estimated in 1.50.

Similar worked has been done by Sharma et.al 2016, were recorded in three different sites 2.128(site 1), 2.113(site 2) and 2.488(site3) in Raid- Marwet Region, Ri-Bhoi District, Meghalaya.

In my study epiphytes and herbs species are comparatively highest in number and wild edible fruits are lowest in number but wild edible fruits are high importance value index shown in Figure: 1.

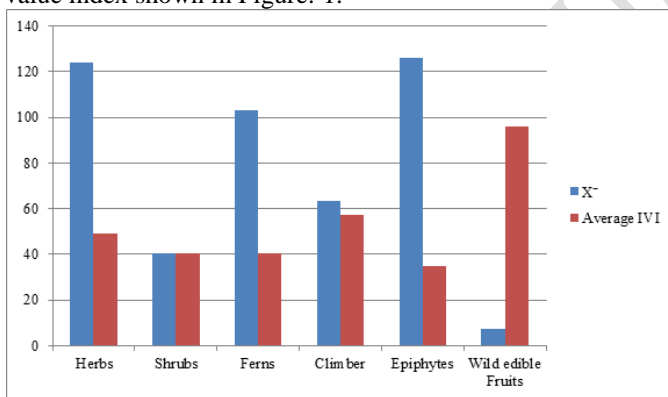


Figure1: Average number (\bar{X}) of species along average with their importance value index (IVI) in Garampani WLS

V. CONCLUSION

From the study it is evident that Garampani wildlife Sanctuary have rich in floral diversity. The Shannon-Wiener Index of Diversity (H') among the different species, were 1.9579 (Herbs/Shrubs), 2.2701 (Ferns/Epiphytes/Climber) and 1.4974 (wild edible fruit), signifying that Ferns/Epiphytes/Climber have high diversity value in comparison to (Herbs/Shrubs) and (wild edible fruit). The climber species have also high importance value, *Delima sarmentosa* L. (115.8179). Wild edible fruit have a low diversity in comparison other species.

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