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RESEARCH ARTICLE

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Potential Floristic Analysis of Peat Swamp Village Forest in Jambi Province to Supports Village Ecotourism Programme

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ABSTRACT

Pematang Rahim Village Forest is one of the social forestry schemes offered by the government. Pematang Rahim Village Forest Management Institute makes ecotourism as the basis for its management. Ecotourism in peat ecosystems in village forests creates biodiversity inside, especially plants, as the basis for planned ecotourism. The purpose of this research is to obtain data and information about the potential flora to support ecotourism-based village forest management. This study was carried out for 8 months from March to October 2021, located in the Village Forest of Pematang Rahim, East Tanjung Jabung Regency, and further analysis was conducted at the Herbarium and Laboratory of Management, Department of Forestry, Faculty of Agriculture, Jambi University. Research results in the field show that peat forests are generally managed as village forests in Pematang rahim in good condition. There are various types of trees and plants in different life forms. The study found 26 families, 58 genera, and 104 species, with a total of 2,831 individuals consisting of 855 seedlings, 880 saplings, 546 poles, and 550 trees. The diversity index showed a high value (> 3) for each growth stage from seedlings, sapling, pole to trees (3.39; 3.56; 3.65; 3.79). The existence of various peat-specific species with ecosystem conditions that are still maintained is expected to add value to ecotourism activities in the Pematang Rahim Village Forest area in the future.

Introduction

The Indonesian government, through the Ministry of Environment and Forestry, is intensifying the social forestry program as one of its efforts so that the community around the forest can take advantage of the potential of the existing forest. Village forests are a part of several types of social forestry in Indonesia. One of the village forests in the Jambi Province is located in the village of Pematang Rahim, Mendahara Hulu District, East Tanjung Jabung Regency. This village forest is located around the Sungai Buluh Peat Protection Forest (HLG/*Hutan Lindung Gambut*) and has an area of ± 1,185 ha. Village forest management rights were legally handed over on December 26, 2018, and managed through the village forest management agency (LPHD/*Lembaga Pengelola Hutan Desa*). The Village Forest Management Plan (RPHD/*Rencana Pengelolaan Hutan Desa*), starting from 2019 to 2029 (10 years), includes plans for utilization activities such as area utilization businesses, collection of non-timber forest products, utilization of environmental services, and utilization of carbon sequestration.

Pematang Rahim Village Government on October 17, 2018 has issued Village Regulation number 8 of 2018 concerning Protection and Management Peat is one way to prevent village forest management from damaging the Peat Ecosystem in Pematang Rahim Village. Village forest management is expected to restore damaged forest areas, and this effort also aims to improve the economic community by utilizing non-timber forest products. Destruction of the forest and peatland is still happening to preserve the forest, and it is necessary to manage it properly to maintain forest sustainability. The Village Forest area, Pematang Rahim,

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is currently developing ecotourism, which utilizes environmental services as a form of responsibility for sustainable forests and the environment.

Biodiversity plays an important role in ecotourism by highlighting the quality of each destination. In the peat ecosystem of Pematang Village Forest Rahim (*Hutan Desa Pematang Rahim* in bahasa/HDPR), the composition of biodiversity can provide added value to ecotourism activities. Biodiversity has a positive impact on ecotourism [1], while the loss of biodiversity will reduce the quality of ecotourism [2]. Habibullah et al. [3] confirmed that ecotourism does not survive without supporting biodiversity. Forest plants, as the main components of peat ecosystems, are interesting topics to explore. Peat ecosystems contain trees such as ramin (*Gonystyus bancanus*), several types of meranti (*Shorea* spp.), and other forest trees [4]. Undergrowth is also interesting in pitcher plants (*Nepenthes* spp.), orchids, and some palms [5,6]. The existence of plants that grow naturally, along with all types of utilization in an ecosystem, is indeed very interesting if associated with ecotourism activities [7,8].

Pematang Rahim Village Forest Management Institution makes ecotourism as the focus of management. In fact, HDPR saves a lot of plant potential that has not been explored in depth, and it is scientifically identified as a means of supporting these ecotourism activities. This study aims to determine the potential of plants found in the Pematang Rahim Village Forest and how existing plants can be utilized to support ecotourism in Pematang Rahim Village.

Materials and Methods

Location and Time

This research was carried out over eight months starting from March to October 2021 in Pematang Rahim Village Forest, and follow-up analyses were carried out in herbarium and forest management laboratories, Forestry Department, Faculty of Agriculture, Jambi University. Pematang Rahim Village, Mendahara Ulu District, East Tanjung Jabung Regency, Jambi Province is located at coordinates S.01°14'54.67" and E.103°32'20.73" (Figure 1). This village is located 1 to 5 m above the sea level. Topographically, Pematang Rahim Village is an expanse of lowlands. Administratively Pematang Rahim Village is part of the Mendahara Ulu District, East Tanjung Jabung Regency, Jambi Province. The distance from the village to the sub-district capital is ±1.5 km, can be reached by road with a time of ±15 minutes by using two-wheeled or four-wheeled vehicles. The distance to the district capital is ±53 km, which takes approximately ±1.5 h, and ±79 km from the provincial capital, which takes approximately ±2 h.

The Pematang Rahim Village area is included in the peat landscape of the East Coast of Jambi, which stretches from Sungai Buluh Peat to the Londerang Peat Protected Forest with an area of 311,264 ha. In this landscape, there are three area functions: Other Use Areas (APL/*Area Penggunaan Lahan*), Production Forests (HP/*Hutan Produksi*), and HLG. Within the Londerang HLG there is a Kandis Dendang City Village Forest while in the Buluh River Peat Protected Forest (HLG) there is a Pematang Village Forest and the Sinar Wajo Village Forest.

Materials and Tools

In this study, the tools and materials used were in the form of stationery (pens and books), Nikon D5600 cameras for documenting the data results, cuttings, plastic, label paper, pencils, newsprint, Global Positioning System (GPS) Garmin Map 64S, ropes and measuring tapes are used for field activities. The materials used in the collection of samples were tally sheets, materials with the characteristics of plant organs, and 70% alcohol as a preservative. Identification of plants in collaboration with Andalas University Herbarium (ANDA).

Data Collections Methods

Vegetation data were collected using a combination of path and plot methods. A total of 30 research plots were placed on six lines, each 100 m long, with five observation plots in each line there were 5 observation plots. Each plot measured 20 × 20 m for tree observation, and inside it were placed 10 × 10 m plots for observation of poles, 5 × 5 m plots for observing saplings, and 2 × 2 plots for observing seedlings and undergrowth (Figure 2). The total area of the observation plot was 1.2 ha. On the other side, interviews were conducted with members of forest farmer groups (KTH/*Kelompok Tani Hutan*) and village forest management institutions to determine what ecotourism activities were carried out in the HDPR. The number of respondents was 49, consisting of 3 KTHs involved in managing the HDPR.

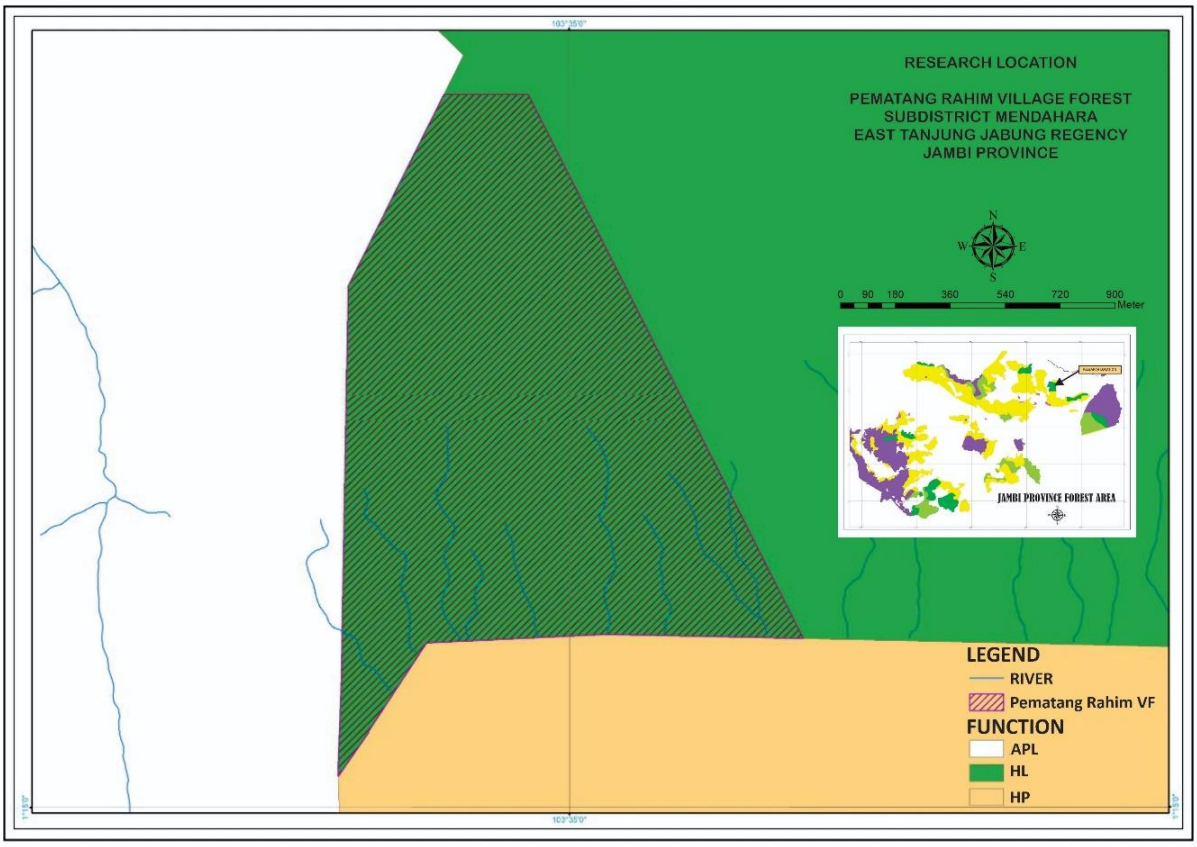

Figure 1. Research location.

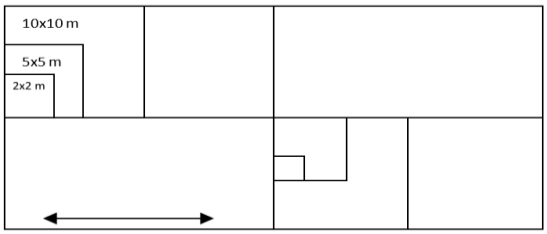

Figure 2. Illustration of observation plots.

Data Analysis Methods

Important Value Index (IVI)

IVI can be described as the ecological position of a species against other species in a community. INP is the accumulation and conclusion of density, relative density, frequency, relative frequency, dominance, and relative dominance, all of which are part of the community structure analysis by Indriyanto [9]. The formula used is as follows:

Density (K)	= (number of individuals of a species) / (total observation area)	(1)
Relative density (KR)	= (density of a species) / (total density) x 100%	(2)
Frequency (F)	= (number of species occurance in observation plots) / (total plots)	(3)
Relative frequency (FR)	= (frequency of a species) / (total frequency) x 100%	(4)
Dominance (D)	= (basal area of a species) / (total observation area)	(5)
Relative dominance (DR)	= (dominance of a species) / (total dominance) x 100 %	(6)
Important Value Index (INP)	= KR + FR (for seedlings and saplings)	(7)
Important Value Index (INP)	= KR + FR + DR (for poles and trees)	(8)

Species Richness Index, Diversity Index and Evennes Index

Species richness was measured using the Margalef Index using the following formula by Indriyanto [9]:

$$D\,Mg = (S-1)/Ln \quad (9)$$

D Mg = Margalef Index

S = Number of species observed

Ln N = Normal logarithm of total number of observed individuals

The Shannon-Wiener diversity index uses the following formula by Indriyanto [9]:

$$H' = \sum_{t=1}^{s}(pi)Ln\,pi \quad (10)$$

H' = Shannon diversity index

S = Number of species

Pi = The proportion of the number of individuals I

Ln = log natural

The range of diversity index values was H' ≤ 1 = low diversity, 1 ≤ H' ≤ 3 = moderate diversity, and H' > 3 = high diversity. The evenness index is determined by the formula [9]:

$$J = H'/Ln(S) \quad (11)$$

J = Evennes index

H' = Diversity index

S = Number of species

The evenness index criterion is as follows: if 0 < J < 0.5, the community is depressed, if 0.5 < J < 0.75, the community is unstable and if 0.75 < J, the community is stable.

Results and Discussion

Forest Inventory and Vegetation Analysis

Data were collected using observation plots, following the planned method. The results collected included 26 families, 58 genera, and 104 species, with a total of 2,831 individuals, consisting of 855 seedlings, 880 saplings, 546 poles, and 550 trees. Out of the 26 families recorded in the research plot, the Myrtaceae Family emerged with the most species (13 species) followed by Lauraceae (8 species) and Dipterocarpaceae and Anacardiaceae (7 species). The details of the data collected from the HDPR observation plot in HDPR shown in Table 1 and Figure 3.

Table 1. Numbers of families, species and individual at all growth stages in Pematang Rahim Village Forest.

No	Family	Species	Quantity per growth stages				∑
			Seedling	Sapling	Poles	Trees	
1	Anacardiaceae	*Buchanania arborescens*	14	9	15	13	51
		Campnosperma coriaceum	12	19	5	19	55
		Gluta aptera		1		1	2
		Gluta renghas	8	3		3	14
		Gluta sp.	2	1	2	10	15
		Mangifera qudrifida				1	1
		Mangifera sp 1			1		1
2	Annonaceae	*Artabotrys* sp.	3		3	2	8
		Drepananthus biovulatus	17	12	3	7	39
		Goniothalamus macrophyllus	5	5	1		11
		Xylopia malayana		3	3	9	15
3	Apocynaceae	*Alstonia angustiloba.*	13	3	1	4	21
		Alstonia angustifolia	6	5	1	1	13
		Alstonia sp.		1		1	2
		Dyera lowii	4	16	4	10	34
		Dyera sp.	1				1
4	Burseraceae	*Canarium* sp.	55	38	19	12	124

No	Family	Species	Quantity per growth stages				∑
			Seedling	Sapling	Poles	Trees	
		Santiria griffithii	43	13	8	2	66
		Santiria laevigata	1	1	2	1	5
		Santiria sp.		9		3	12
5	Celastraceae	*Lophopetalum javanicum*		2	3	2	7
6	Clusiaceae	*Calophyllum soullatri*				1	1
		Calophyllum macrocarpum	7	10	3		20
		Cratoxylon arborescens		5	4	12	21
		Calophyllum sp.			1		1
		Garcinia celebica	1				1
		Garcinia parvifolia	4	3			7
7	Dilleniaceae	*Dillenia mangiayi*	13	9	2	4	28
8	Dipterocarpaceae	*Hopea sangal*				2	2
		Shorea gibbosa			2	18	20
		Shorea hemisleyana	2	3	5	15	25
		Shorea palembanica	3	11	21	29	64
		Shorea sp1			1	1	2
		Shorea sp2				1	1
		Vatica sp.			8	1	9
9	Ebenaceae	*Diospyros mangiayi*		2	1	3	6
10	Elaeocarpaceae	*Elaeocarpus* sp.	2	4	8	2	16
		Elaeocarpus petiolatus	38	28	24	15	105
11	Euphorbiaceae	*Balakata baccata*	17	12	44	44	117
		Endospermum diadenum	1	1			2
		Macaranga griffithiana	19	31	10	11	71
		Macaranga puncticulata	111	89	11	2	213
		Pimelodendron griffithianum	12	14	12	1	39
12	Fabaceae	*Archidendron clypearia*	103	130	30	5	268
		Koompasia malaccensis		3	33	23	59
13	Fagaceae	*Lithocarpus* sp.		3	1	4	8
14	Lauraceae	*Actinodaphne angustifolia*	3				3
		Beilschimedia sp.	5	10	13	21	49
		Cryptocarya griffithiana	1	3	7	6	17
		Cinnamomum parthenoxylon	5		1	3	9
		Litsea machilifolia	15	17	36	43	111
		Litsea odorifera	7	10	17	15	49
		Litsea sp1			4		4
		Litsea sp2				1	1
15	Malvaceae	*Durio* sp.	5	3	4	11	23
		Microcos sp.	1		2		3
		Neesia altissima	6	7	1	2	16
		Sterculia sp.	12	21	10	3	46
16	Melastomataceae	*Pternandra echinata*	44	28	12	10	94
17	Moraceae	*Artocarpus elasticus*		4			4
		Artocarpus kemando		1	3	3	7
		Ficus benjamina				4	4
		Ficus hispida			1	4	5
18	Myristicaceae	*Horsfieldia irya*	39	42	39	27	147
		Horsfieldia sp.			2	1	3
		Myristica iners	7	4	6	7	24
19	Myrtaceae	*Malaleuca* sp.	3	2			5
		Syzygium chloranthum	2	1		1	4
		Syzygium grande		2	2		4
		Syzygium jambos	64	46	23	13	146
		Syzygium nervosum		12	1		13
		Syzygium rubiginosum	1	7	3	8	19
		Syzygium polyanthum	4	11	2	4	21
		Syzygium pycnanthum	4	1	1	2	8
		Syzygium sp1		1			1
		Syzygium sp3	1				1

No	Family	Species	Quantity per growth stages				∑
			Seedling	Sapling	Poles	Trees	
		Syzygium sp2		1		1	2
		Syzygium sp4	3				3
		Tristaniopsis obovata		3	2	3	8
20	Phyllanthaceae	*Antidesma leucoledon*	4		2	1	7
		Antidesma montanum	2	4			6
		Antidesma sp	4	4	2	1	11
		Aporosa subcaudata	3		4	15	22
		Galearia filifiormis		1		4	5
		Phyllantus sp	10	8			18
21	Rhizophoraceae	*Gynotroches axillaris*	3	18	2		23
		Pellacalyx cf. lobii	17	11	7	5	40
22	Rubiaceae	*Coffea sp.*	4	5			9
		Nauclea officinalis	16	14	3	2	35
		Psychotria sp1				2	2
		Urophyllum sp1		1		1	2
		Urophyllum sp2	7	3		2	12
23	Sapindaceae	*Nephelium mangiayi*	2			1	3
		Nephelium lappaceum	7	16	6	1	30
		Pometia sp.			1		1
24	Sapotaceae	*Madhuca motleyana*	3	3	6	10	22
		Palaquium quercifolium			1		1
		Palaquium leiocarpum	1		1	1	3
25	Tetrameristaceae	*Tetramerista glabra*	13	36	23	10	82
		Tetramerista sp			1	1	2
26	Theaceae	*Adinandra borneensis*				1	1
		Adinandra sp1	11	8			19
		Adinandra sp2				1	1
27	Thymelaeaceae	*Gonystylus bancanus*		11	3	3	17
Total	27	104	855	880	546	550	2,831

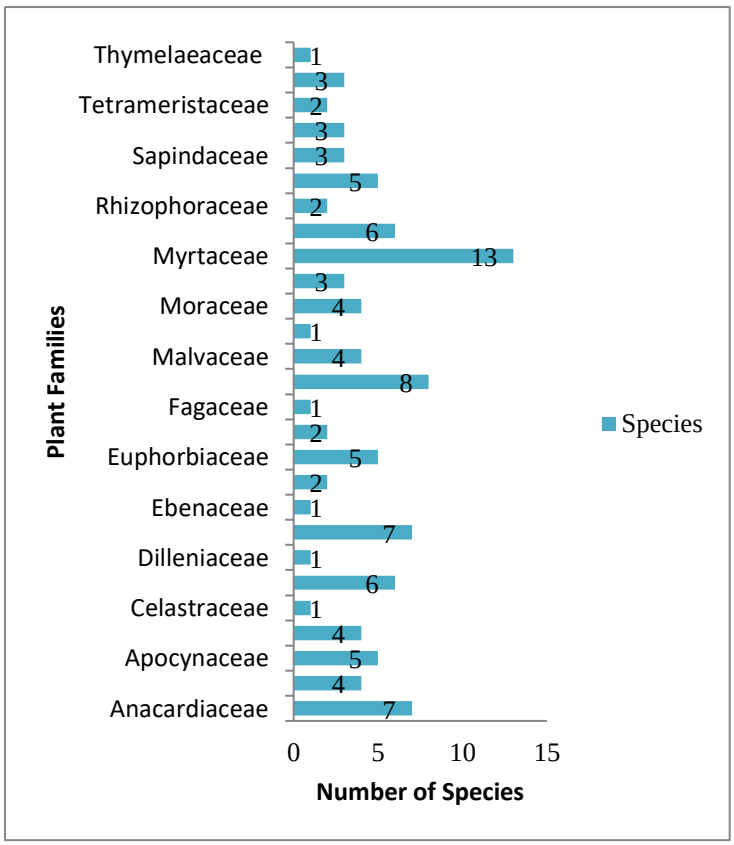

Figure 3. Comparison of the number of families and plant species in Pematang Rahim Village Forest.

The four major plant families that dominated the research location were wood producers and tree species, which are indicators of the conditions of the research location. Several species of Myrtaceae, including *Syzygium jambos*, *S. polyanthum*, and *S. rubiginosum*, appeared at all stages of growth, with 186 individuals of these three species. The family Lauraceae includes *Litsea machilifolia*, *Beilschimedia* sp., and *L. odorifera*, with 209 individuals of the three species. The Dipterocarpaceae Family was represented by *Shorea palembanica* and *S. hemisliyana*, which appeared at all stages of growth, with 89 individuals of both species. The Anacardiaceae Family is represented by *Buchanania arborescens* and *Campnosperma coriaceum*, with 106 individuals for both species. In general, these four families contained 732 individuals (25.86% of the total individuals recorded in the observation plot). Based on this study, it can be said that the dominant family in this research location is also the dominant family in other studies in adjacent landscapes or in other areas with peat swamp forest characteristics. Myrtaceae and Dipterocarpaceae families always appear in vegetation inventories carried out both in degraded (post-fire) and non-degraded ecosystems. Research [10–14] confirms this claim.

After the vegetation data were analyzed, it was observed that some species had a higher IVI than others did. For example, in *Hordsfieldia irya*. Although it was not the species with the highest INP at each growth stage, this species always appeared in the top five species with the highest IVI in each growth class. Hordsfieldia irya already noted by Garsetiasih et al. [15] as one of species with high survival rates in peatland ecosystem. Furthermore, it can be seen that the five species with the highest IVI at the seedling level were the same as those at the sapling level, although the order was different. At the pole and tree stages, four species that always appeared in the top five had the highest IVI (details shown in Table 2). Some other species are also very dominant in the number of individuals and have representatives at each stage of growth such as *Macaranga puncticulata*, *Archidendron clypearia*, *Canarium* sp., *Syzygium jambos*, *Archidendron clypearia*, *Balakata baccata*, *Litsea machilifolia*, *Elaeocarpus petiolatus* and *Shorea palembanica*. These high IVI's species is a mainstay in maintaining the continuity of vegetation regeneration and ecosystem stability. A theoretically stable ecosystem will enable it to withstand various disturbances and exhibit good resilience [16].

Table 2. Five species with the highest IVI at all growth stages in Pematang Rahim Village Forest.

Growth stages	Species	RD (%)	RF (%)	RD (%)	IVI (%)
Seedling	*Macaranga puncticulata*	12.98	4.01		16.99
	Archidendron clypearia	12.05	4.2		16.25
	Horsfieldia irya	4.56	7.12		11.68
	Canarium sp.	6.43	4.38		10.81
	Syzygium jambos	7.49	3.1		10.59
Sapling	*Archidendron clypearia*	14.77	2.92		17.69
	Macaranga puncticulata	10.11	4.06		14.17
	Syzygium jambos	5.23	3.41		8.64
	Horsfieldia irya	4.77	3.73		8.5
	Canarium sp.	4.32	3.73		8.05
Poles	*Balakata baccata*	8.06	4.27	7.89	20.22
	Horsfieldia irya	7.14	5.08	7.74	19.96
	Koompasia malaccensis	6.04	6.71	6.78	19.53
	Litsea machilifolia	6.59	4.47	6.94	18
	Elaeocarpus petiolatus	4.4	4.88	6.77	16.05
Trees	*Balakata baccata*	8	4.9	4	16.9
	Litsea machilifolia	7.82	4.31	4.52	16.65
	Shorea palembanica	5.69	5.27	4.05	15.01
	Horsfieldia irya	4.91	5.29	2.23	12.43
	Koompasia malaccensis	4.18	4.51	3.02	11.71

After processing the vegetation analysis data, the values of various indices measured at the research location were determined. The species richness index showed a high value for plant species richness at all growth stages. The same results were also shown by the Shannon-Wiener diversity and evenness indices. Figures

(Figure 4, 5, and 6) also show that the values obtained are graded sequentially starting from the lowest. It starts at the seedling level, followed by the saplings, poles, and tree levels. All measured indices show the same picture and describe the condition and structure of the plant vegetation at the study site. Based on the measured index, it can be concluded that the vegetation condition in HDPR is rich in species diversity and number of individuals, is in a good and stable condition, and will ideally be able to survive in a sustainable manner if it is managed and maintained properly and no extraordinary events occur. HDPR managers must try to maintain and continue to improve the HDPR peat forest ecosystem because it is the main selling point of ecotourism plans. Reduced biodiversity has a negative effect on ecotourism and vice versa [1,2].

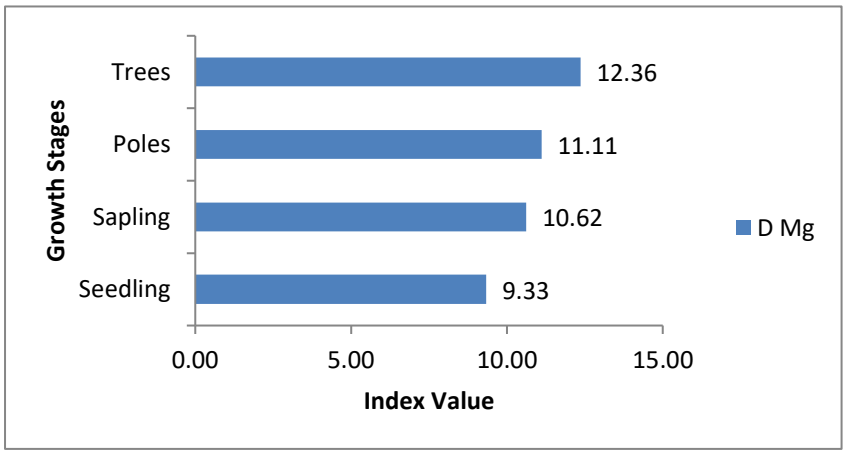

Figure 4. Margalef Species Richness Index Value.

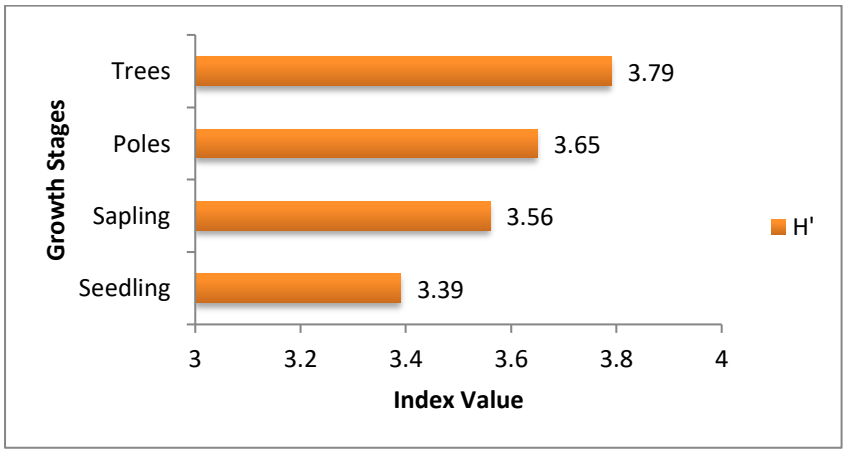

Figure 4. Shannon-Wiener Species Diversity Index Value.

Figure 5. Shannon-Wiener Evenness Index Value.

Potential of Plants as Ecotourism Attractions

Ecotourism provides an opportunity for tourists to recognize and contribute to the biodiversity and sociocultural richness of an area [17]. HDPR ecotourism management seeks to highlight the peat swamp forest ecosystem, which is still beautiful and dominated by large and shady trees or plants that can be eaten directly (edible) in the forest. In addition, several types of plants at the research location are useful as sap or rubber producers, natural dye producers, and medicinal plants. Based on the survey results of the observation plot and research location, there are several plants with distinctive values that can become ecotourism attractions. Details are shown in Table 3.

Table 3. Plants with potential for ecotourism attractions in Pematang Rahim Village Forest.

Potency	Species
Trunk and Shade	*Campnosperma coriaceum, Tetramerista glabra, Balakata baccata, Koompassia malacccensis*, *Litsea* spp., *Shorea* spp., *Ficus benjamina*
Edible	*Canarium* sp., *Archidendron clyperia, Syzygium* spp., *Artocarpus* spp., *Santiria* spp., *Durio* sp., *Antidesma* spp.,
Beehive Tree	*Koompassia malaccensis, Canarium* sp. *Shorea palembanica, Gluta renghas*
Medicinal Plant	*Campnosperma auriculatum, Goniothalamus macrophyllus, Santiria laevigata, Dillenia excels, Macaranga triloba, Litsea lancifolia, Archidendron clypearia, Sterculia cordata, Artocarpus kemando, Gynotroches axillaris, Neonauclea calycina, Madhuca motleyana, Alseodaphne insignis*
Natural Dyes	*Alstonia scholaris, Litsea* spp., *Archidendron clypearia, Intsia palembanica, Syzygium racemosum*
Rubber	*Alstonia scholaris, Dyera costulata, Artocarpus kemando, Madhuca motleyana*

Several types of trees found in the HDPR are known to have medicinal potential. *Medang Keladi* (*Actinodaphne macrophylla*) whose stem bark is used as a diabetes medicine [18] while the Medang Tai (*Litsea* sp1.) leaves are used to treat back pain [19] and in other Chinese medicines [20]. There are various types of trees that can be used as medicines in HDPR, which may be beneficial because there is a possibility that if plants with medicinal properties in the form of trees are introduced to the community, illegal logging activities or wood theft will be reduced, especially as some types of plants have medicinal properties and commercial types, such as *Shorea* sp. and *Litsea* sp. [21,22].

In addition to medicinal plants, several types of trees in HDPR can also be used to produce resin, sap, and edible fruits. *Jelutung Rawa*/jelutong (*Dyera costulata*), *Pulai*/milkwood tree (*Alstonia scholaris*) and *Balam Suntai*/butter tree (*Madhuca motleyana*) [23,24] are known to produce sap and have commercial value. Jelutong sap has relatively high commercial value, because the sap can be used as a raw material for making chewing gum, insulators and varnish mixtures. Apart from having commercial value, there is one type of tree whose sap can be used as a bird trap and a mixture of raw materials for making candles namely water cempedak/jackfruit tree (*Artocarpus kemando* Miq.) [24]. Trees from the Dipterocarpaceae Family, such as *Shorea* spp., are known to produce resins [25].

The existence of trees with edible fruits can be an ecotourism attraction because this experience is very rare, especially in the wild. In the HDPR, we also found several types of trees with fruits that could be eaten. Some of these types include *kedondong*/ambarella fruit (*Santiria oblongifolia*), *tampang*/ambarella fruit (*Santiria laevigata*), *samak dayak*/star apple (*Chrysophyllum* sp.), *balam suntai*/butter tree (*Madhuca motleyana*), *cempedak air*/jackfruit (*Artocarpus kemando*), and *terap*/breadfruit (*Artocarpus odoratissimus*) [26–28]. According to local information, the wood of olive tree (*Sterculia cordata*) can also be eaten like *cendol*, and there is a species that can be used as a cooking ingredient, namely, the fruit of *Asam Kumanjing*/mangosteen tree (*Garcinia* sp.). Cendol wood is beneficial because it contains antioxidants and antibacterial agents [29].

Previously, HDPR management built wooden gazebo and jungle tracks to become tourist attractions (Figure 7). The existence of various individuals and distinctive plant species combined with wooden gazebos and jungle tracks can be a prime attraction for tourists visiting HDPR. One of the management problems that has been previously identified is the lack of knowledge of managers and community villages regarding HDPR [30]. The knowledge of HDPR managers and the people of Pematang Rahim Village regarding the composition of HDPR must also be increased because it will be helpful in implementing sustainable ecotourism activities and providing benefits to all parties.

Figure 6. Jungle track and gazebo in Pematang Rahim Village Forest.

Conclusions

The HDPR has the potential for flora diversity that can maintain the existing peat ecosystem and become a potential ecotourism attraction for the village. This is illustrated by the high number of individuals and the richness of plant species, as well as the description of the stability of the ecosystem according to the IVI analysis, Margalef Species richness index, Shannon-Wiener diversity index, and Shannon-Wiener evenness index in all growth stages (seedling, sapling, poles, and trees). The various potential uses of these plants are clearly seen from the appearance of large stems/trunks and shady plants, plants that can be eaten directly (edible), and plants that can become beehives as ecotourism attractions.

Author Contributions

NST: Conceptualization, Methodology, Data Curation, Writing - Review & Editing, Supervision; **MU**: Writing - Review & Editing, Project Administration, Visualization; **ZS**: Writing-Original Draft, Resources, Formal Analysis, Validation.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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