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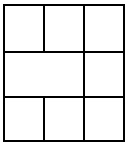

Cover images: *Begonia tjiasmantoi* Ardi & D.C.Thomas. A. Habit. B. Stipule. C. Male. D. Male inflorescence and female flower. E. Male flower. F. Female flower. G. Infructescence. H. Ovary cross-section, axile placentation and bilamellate placentae. A–H from *WI 562*. Photos: W.H. Ardi.

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TREE SPECIES DIVERSITY AND ETHNOBOTANY OF DEGRADED PEAT SWAMP FOREST IN CENTRAL KALIMANTAN

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ABSTRACT
KALIMA, T., SUHARTI, S., SUMARHANI & TRETHOWAN, L. A. 2020. Tree species diversity and ethnobotany of degraded peat swamp forest in Central Kalimantan. *Reinwardtia* 19(1): 27–54. — Most peat swamp forest has been degraded. This has resulted in decline of its biodiversity. The objective of this study was to identify the composition, diversity, and plants used by local people in Bagantung swamp forest. The study was conducted on degraded peat swamp forest area in Bagantung, Mantangai Sub-District, Kapuas District, Central Kalimantan Province. The Shannon-Wiener (H') and the Importance Value (IV) indices were used for analyzing the species diversity and the species importance across a number of forest plots. Useful tree species were identified by interviewing local villagers. There were 2,562 individual plants in 32 plots (each plot 20 m × 20 m). We identified 100 tree species and 16 non-tree species, from 74 genera, and 46 families. Myrtaceae, Sapotaceae, Ebenaceae, Dipterocarpaceae and Clusiaceae were the most dominant families. Large tree (H'=1.46) and small tree diversity was similar (H'=1.75). In both small and large tree size classes *Calophyllum nodusum* was the most dominant species. There were 16 tree species and two non-tree species used by local people for house and boat construction, furniture, handicrafts, medicine, and insect repellent.

Keywords: Bagantung forest, degraded forest, species composition, useful species.

ABSTRAK
KALIMA, T., SUHARTI, S., SUMARHANI & TRETHOWAN, L. A. 2020. Keragaman jenis pohon dan etnobotani hutan rawa gambut yang terdegradasi di Kalimantan Tengah. *Reinwardtia* 19(1): 27–54. — Hutan rawa gambut umumnya telah mengalami kerusakan. Penelitian ini bertujuan untuk mengetahui komposisi, keanekaragaman dan jenis tumbuhan yang dimanfaatkan oleh masyarakat setempat dari hutan gambut Bagantung. Penelitian dilakukan di hutan gambut terdegradasi di Blok Bagantung, Kecamatan Mantangai, Kabupaten Kapuas, Provinsi Kalimantan Tengah. Analisis keanekaragaman jenis dan nilai penting jenis dilakukan pada sejumlah plot hutan mengikuti metode Shannon-Wiener (H') dan Index Nilai Penting (INP). Jenis pohon berguna diidentifikasi dengan cara mewawancarai penduduk desa setempat. Hasil penelitian menunjukkan terdapat 2.562 individu tumbuhan dalam 32 plot (20 m × 20 m). Kami telah mengidentifikasi 100 jenis pohon dan 16 jenis non-pohon, terdiri atas 74 marga dari 46 suku. Suku yang dominan adalah Myrtaceae, Sapotaceae, Ebenaceae, Dipterocarpaceae dan Clusiaceae. Indeks keragaman pohon besar (H'=1,46) hampir sama dengan pohon kecil (H'=1,75). Pohon *Calophyllum nodusum* baik yang berukuran besar maupun kecil merupakan jenis yang paling dominan. Terdapat 16 jenis pohon dan dua jenis non-pohon yang dimanfaatkan masyarakat lokal untuk konstruksi bangunan dan perahu, mebel, kerajinan tangan, obat-obatan serta obat nyamuk.

Kata kunci: hutan Bagantung, hutan terdegradasi, jenis yang dimanfaatkan, komposisi jenis.

INTRODUCTION

It is estimated that Indonesia has the largest area of peatland forest in the tropics (Page *et al*., 2011), containing 55–61 Gt of carbon (Siegert & Jaenicke, 2008; Shiodera *et al.,* 2012). Carbon is stored not only in the living biomass, but also in the peat soil (Draper *et al.,* 2014; Wang *et al*., 2018). In Kalimantan, peatland forest area is estimated to be between 3.1 to 6.3 million hectares (Wahyunto *et al*., 2004). This large uncertainty is indicative of the lack of knowledge about Indonesia's peatlands and forests more generally (Brearley *et al*., 2019).

Peat swamp forests are unique ecosystems due to extreme acidic, anaerobic and nutrient poor conditions (Shiodera *et al.,* 2012). They contain diverse forms of flora, fauna and microbes with many endemic and endangered species.

Furthermore, peat swamp forests provides food, shelter and products for the domestic market (Mac Dicken, 2002; Limin *et al.,* 2007). Most of Central Kalimantan's low-income population depend on its surrounding natural resources. Loss of edible, medicinal, and ritual plants risks the welfare of indigenous peoples and their cultural practices.

In spite of its importance, most of peat swamp forest in Central Kalimantan encounters fire and logging that threatens both biodiversity and the carbon stock. Peatland forest are also converted to oil palm plantation (Koh *et al.,* 2011). Studying the impacts of disturbance and deforestation is needed to document the threats to species used by local people (Cámara-Leret *et al*., 2019).

To build on our knowledge of Indonesian peat swamp forest we carried out a study on the diversity and uses of tree species in Bagantung forest area in Central Kalimantan, Indonesia. The objective of the present study is to obtain a basic descriptive account of the structure and floristic composition of a peat swamp forest in the area that may be useful for sustainable management, including long-term investigation of forest dynamics and floristic changes. In this paper, analysis of the species inventory data collected in the plots will be limited to the description of the forest in terms of the main structural parameters, species richness, pattern of relative abundance family composition and documentation of species used by local people.

MATERIALS AND METHODS

Field study was conducted between 18–28th September 2012 in the secondary peat swamp forest of Bagantung and two surrounding forest villages; Kalumpang and Katimpun. These sites are located in the Sub-District of Mantangai, Kapuas District, Central Kalimantan Province (Fig. 1).

The area is a river delta dominated by peat with depth of more than 0.5 m (920,000 ha) and more than 3.0 m (450,000 ha). Field measurement

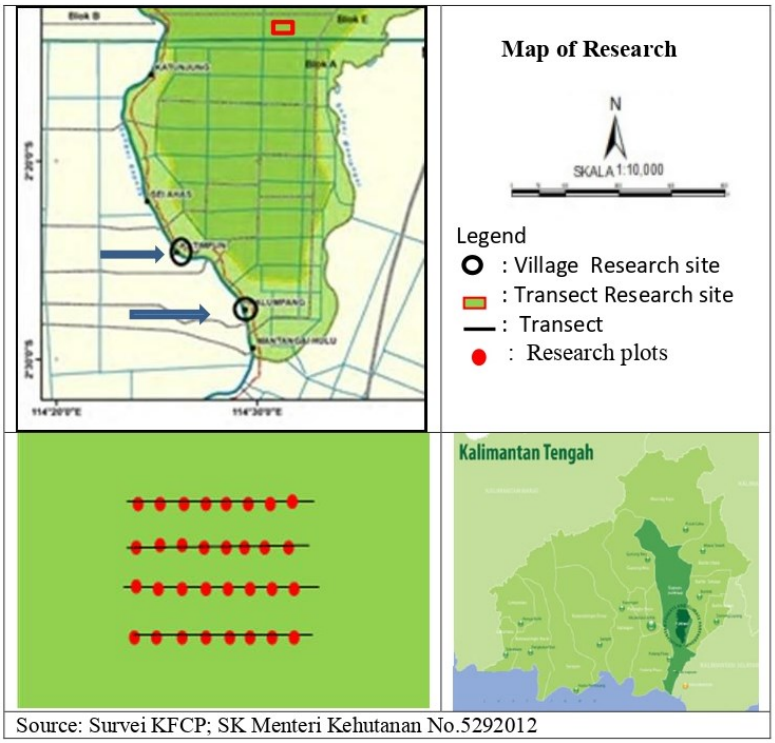


Fig. 1. Location of the study site in Central Kalimantan Province, Indonesia. Arrow ( ) indicates the two villages of Kalumpang and Katimpun at Bagantung area.

showed that the average temperature at daytime is 24°C–30°C, the average humidity is 80%–88% and the average soil pH is 4.1–5.5. Transect I, transect II, transect III and transect IV are located at 18–20 m asl; 23 m asl; 25 m asl and 23 m asl respectively. Geographic coordinates for the four transects can be found in Table 1.

Transects differ in their levels of anthropogenic disturbance. For large trees, small trees and saplings, transect I was the most disturbed, followed by transect III, transect IV and transect II. Whereas for the herb layer, most disturbance occurs at transect II, followed by transect III, I and IV. Each plot consisted of a nested design that had a 20 m × 20 m perimeter within which trees dbh >20 cm were measured. Within this was placed a 10 m × 10 m plot for small tree (dbh = 10–29.9 cm) measurement. Within this was a 5 m × 5 m plot for sapling measurement (dbh = 1– 9.9 cm) and a further nested 1 m × 1 m for herb layer (< 2 m high) measurement (Fig. 2). Tree species density, frequency, diameter, and height were obtained from each plot (Kent & Coker, 1992). The basal area, relative density, relative frequency, relative dominance and importance value index were quantified following Curtis & Cottam (1962). We counted the number of species (species richness) within each size class for each plot. Diversity was calculated using the Shannon-Wiener index (Hastuti *et al.,* 2014). Tree species use data were gathered via interview with 44 people from different occupations *i.e*. firewood collectors, farmers, fisherman and others. Respondents were selected from the villages of Kalumpang (24 respondents) and Katimpun (20 respondents).

In this study, contribution of collecting forest products to total income were also analysed. We calculated this by dividing income from forest product by total income, multiplied by 100.

RESULTS

A. General floristics

Previously, Bagantung Forest, Central Kalimantan was a primary forest habitat with various protected flora and fauna. At present the forest is slightly disturbed due to illegal logging and local community activities that use timber and forest products from the forest (Fig. 2).

The results of the analysis on four transects (32 plots) found there were various types of plants from the large tree level, small trees, sapling and herbaceous layers. We recorded 2,562 individuals, 116 species and 46 families with an area of 1,683 ha (Table 2).

For large trees, small trees and saplings, transect I shows the most severe disturbance, followed by transect III, transect IV and transect II. Whereas for the herb layer, the most disturbance occurs at transect II, followed by transect III, I, and IV.

Myrtaceae (410 individuals), Sapotaceae (321), Ebenaceae (191), Dipterocarpaceae (81), and Clusiaceae (42) were the most common families found for tree, small tree and sapling level in terms of the number of individuals. One hundred and sixteen species, belonging to 74 genera and 46 families were recorded in this study, of which 102 were dicotyledons, one monocotyledons, four ferns and one conifer species (Appendix 1). Twenty one families were represented by single species, while seven families were represented by more than five species. Myrtaceae was the most diverse with 11 species, followed by Lauraceae (8), Dipterocarpaceae (6) and Myristicaceae (6).

Overall there were 56 species of large trees (dbh > 20 cm) distributed into 40 genera and 30 families. Out of which only one species (*Diospyros areolata*) was found in all the study sites. Nineteen species were represented at all growth rates, nine as large trees only, six as small trees only, seven as sapling only and 18 as herbs and lianas. Two species were collected as sapling and herb layer, 23 as large tree, small tree and sapling, 11 small tree and sapling, eight large tree and sapling, eight small tree, sapling and seedling, while one as large tree, small tree and seedling. The number of large trees species were more in the transect III and IV, followed by transect II and I. Small tree and sapling tendencies are the same, namely in transect III, IV followed by transect II and I. The herb layer was present in the slightly disturbed area (transect II, III, I). *Nepenthes* spp., *Coleus amboinicus* and *Carex baccans* were very abundant and covered open areas, particularly at transect I and II.

Shannon Wiener Diversity Index of large tree, small tree, sapling, and herb layer stages across all plots were 1.461, 1.749, 1.626 and 1.345 respectively. Table 3 shows 12 species having high Importance Value for large tree, small tree, sapling and herb layer stages.

B. Uses of Tree Species by Local People

There were 16 tree species and two non-tree species used by local people for house construction, boat, furniture, handicrafts, medicine, and insect repellent (Table 4). These plants have been used by the community for generations.

Tree species were mostly used for timber (14 species) in building construction (Table 4, 5). A comprehensive list of uses is provided in Appendix 1. There are also some tree species that are sold outside the local area and used for boat construction such as (*Calophyllum hose*, *C. nodosum*, *Nothaphoebe umbelliflora*, *Shorea balangeran*, *S. rugosa*, *Gomphia serrata*, *Parastemon urophyllus*, and *Pouteria maingayi*).

Table 1. The geographical measurements of each transect in Bagantung forest.

Transect	Coordinates
I	02° 12 48.7 South Latitude and 114° 36 39.6 East Longitude
II	02° 12 23.4 South Latitude and 114° 34 20.0 East Longitude
III	02° 12 38.1 South Latitude and 114° 37 33.9 East Longitude
IV	02° 12 55.8 South Latitude and 114° 36 30.1 East Longitude

Table 2. Number of individuals, species, genera, and family in Bagantung peat swamp forest for large trees, small trees, sapling and the herb layer.

Stage	Number				Total
	Herb layer	Sapling	Small tree	Large tree	
Total area (ha)	0.003	0.08	0.32	1.28	1.683
Individual	562	867	607	526	2,562
Species	54	77	71	56	100* 16**
Genera	44	52	45	40	74
Family	35	36	30	30	46

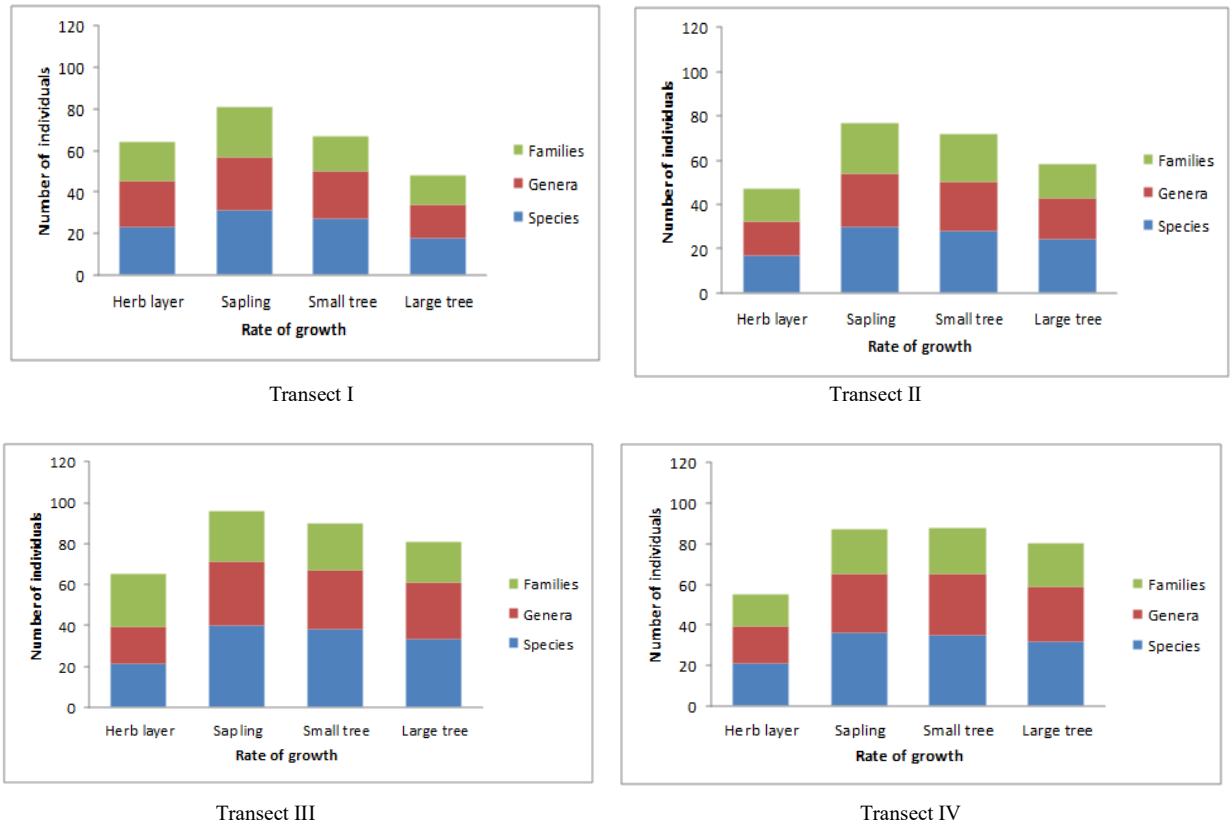
*tree species
**non-tree species

Table 3. The highest three dominant species of all sample plots in Bagantung peat swamp forest Mantangai Sub-District, Kapuas District, Central Kalimantan.

Species	Importance Value Index (%)			
	Herb layer	Sapling	Small tree	Large tree
Calophyllum nodusum Vesque	-	20.76	29.08	38.87
Camnosperma auriculatum (Blume) Hk.f.	-	11.66	-	-
Carex baccans Nees **	21.24**	-	-	-
Diospyros areolata King & Gamble	-	-	18.20	-
Stemonurus scorpiodes Becc.	-	44.95	-	-
Nepenthes melampora Blume **	24.96**	-	-	-
Nepenthes rafflesiana Jack**	24.96**	-	-	-
Palaquium cochlearifolium P.Royen.	-	-	19.03	29.11
Shorea teysmanniana Dyer ex Brandis	-	-	-	26.44
Syzygium garcinaefolia King	21.08	-	-	-
Mangifera similis Blume	9.63	-	-	-
Microcos ovatolanceolata Burr.	9.63	-	-	-

a b c

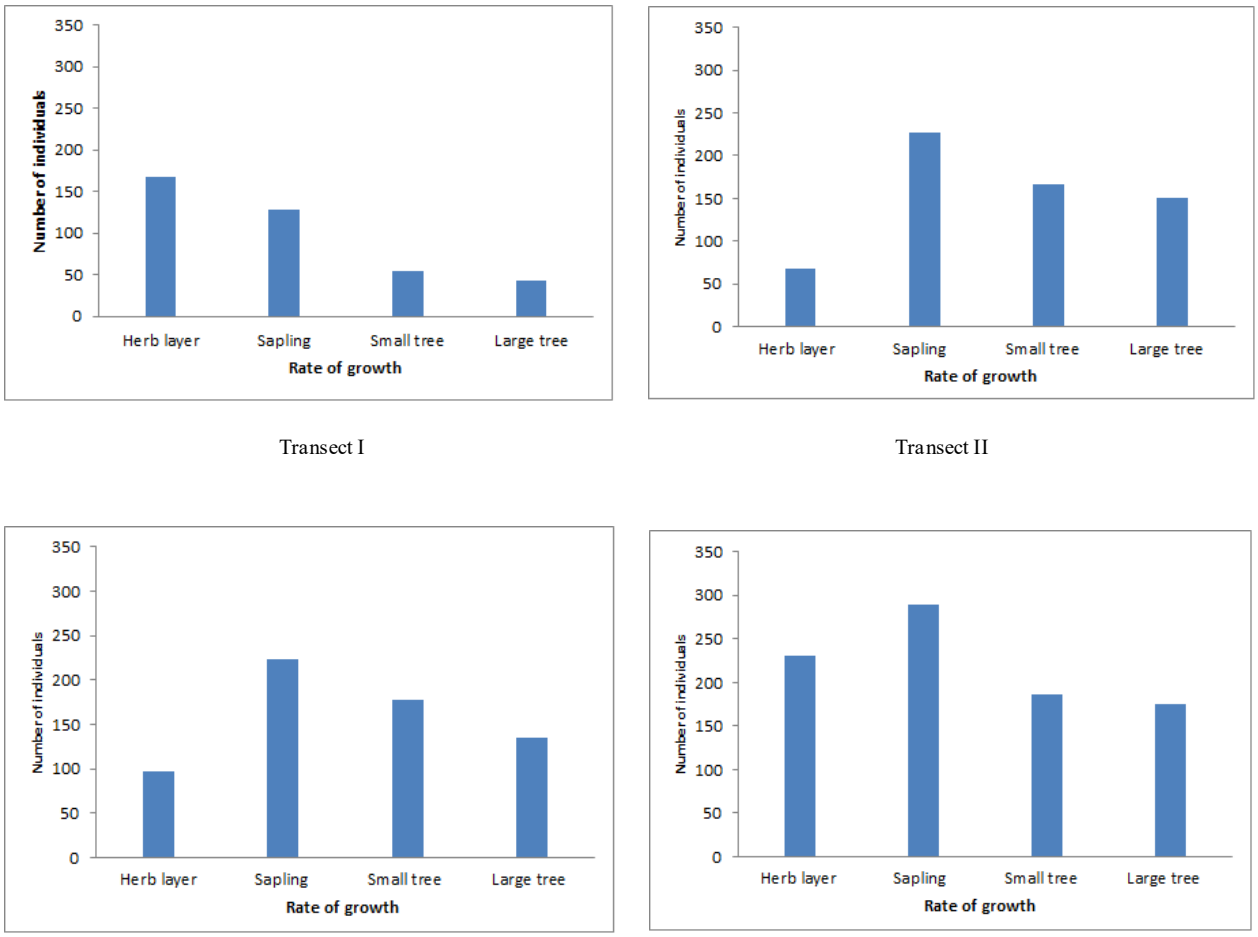
Fig. 2. Local community collection of timber products (*Shorea balangeran*) (a & b) and (c) a non timber product (*Nothaphoebe umbelliflora)* at the research site in Bagantung logged-over peat swamp forest (Photos by T. Kalima).



Transect I Transect II

Transect III Transect IV

Fig. 3. Number of individuals for species, genera, and family for each growth rate on peat degraded swamp forest at four transects.



Transect I

Transect II

Transect III

Transect IV

Fig. 4. Number of individuals for each growth rate on degraded peat swamp forest at four transects.

Fig. 5. Example of plot site in Central Kalimantan peat swamp forest (Photo by T. Kalima).

There were some other tree species that we did not sample across our plots that were also used for boat construction (*Eusideroxylon zwageri*, *Callophyllum soulatri*, and *Dipterocarpus tempehes*). Species required for building and boat construction but not gathered from the surrounding forest, are purchased elsewhere.

Few tree species are used for food. There were edible fruit-producing trees (*Garcinia parvifolia, G. havilandii, G. celebica,* and *G. morella*), but fruits are consumed rarely by the local community.

The contribution of forest products to total income in Katimpun and Kalumpang was 4.6% and 3.6% respectively. The contribution of forest product could be higher if illegal logging for commercial purpose is included. However, it was difficult to estimate the income derived from illegal logging as this was kept secret.

Some tree species are cultivated (Table 6). Seven to eight year old rubber trees are tapped an average of 3–5 times a week and the latex can be sold easily. Rattan, which formerly was gathered from forest, is planted in combination with the cultivated tree species.

In addition, some plant species in the research plot have economic value and some potential uses. General information including family names, regional names, plant species names with simple usage descriptions of those plant species are presented in Appendix 1. There are 116 plant species that have been recorded consisting of 74 genera and 46 families that are used as food, medicines, building materials, cosmetics and other uses. Some of these species have multiple functions.

DISCUSSION

A. General Floristics

We found a total of 2,562 individual plants recorded in the surveys, consisting of 526 large tree, 607 small tree, 867 saplings and 562 layer herbs (Table 2). The number of individuals recorded at the study site is much higher compared to the results of the Mirmanto survey (2010) in the Sebangau Peat Swamp Forest, Kalimantan who recorded 1,660 individuals and Kalima & Denny (2019) in the Lake Punggualas Sebangau National Park who recorded 2,253 individuals.

Also, the number of species recorded at the study site was much higher compared to the results from other studies. Kalima & Denny (2019) recorded 99 species in the Sebangau peat swamp forest, while Mirmanto, (2010) found there were 103 species in the Sebangau National Park peat swamp forest. Subsequently Nugroho (2012) reported there were 113 species found at peat swamp forest, Sebangau National Park, Central Kalimantan and according to survey results from Randi *et al*. (2014), there were 107 species of trees making up peat swamp forest, Danau Sentarum National Park, Kapuas Hulu.

Peat swamp forests are a key part of tropical megadiversity (Draper *et al*., 2018). Posa *et al*. (2011) lists 30–122 tree species in one ha peat swamp forest plots in Southeast Asia, while degraded (and burnt) peat swamp forest have only 7–10 species (Giesen, 2009). In the disturbed peat swamp forest at Bagantung, Central Kalimantan we found 116 species. We found more large (56) and small tree species (71) compared to other forests in Mantangai Sub-District (Awan, 2009; Daryono, 2009) (Table 6). But we found less species compared to secondary peat swamp forest in Pontianak Regency where 119 tree species and 33 families were recorded within 1.6 ha in eight plots (Susiarti & Mirmanto 2002). These differences are likely due to different levels of forest degradation.

B. Threatened Species

At our sites *Nepenthes melampora* and *N. rafflesiana* dominate the herb layer. Both species are protected by Government Regulation (PP) No. 7/1999 and are also included in CITES Appendix II. This species is widely traded internationally, therefore the trade quota is limited. In addition, this species is commonly used as traditional medicinal plant (Bhore *et al.*, 2013).

We identified 11 threatened species, from the IUCN Red List (IUCN, 2016) that have economic value in the study area. These species are *Shorea teysmaniana* (Endangered/ENA1cd (Ashton, 1998a); *S. rugosa* (endemic species, Critically Endangered / CRA1cd, C2a) (Ashton, 1998b), *S. balangeran* (endemic species, Critically Endangered/CR A4cd; C1) (Robiansyah & Purwaningsih, 2020), *S. uliginosa* (Vulnerable/ VUA1cd) (Ashton, 1998c), *Vatica rassak* (Vulnerable/VU A4 cd) (Kalima & Wardani, 2020), (*Cotylelobium melanoxylon* (Least Concern) (Barstow, 2019), *Dyera polyphylla* (Vulnerable / VUA1cd) (WCMC,1998a), *Mangifera similis* (Vulnerable / VUA1c) (WCMC, 1998b), *Combretocarpus rotundatus* (Vulnerable/VU A1cd) (WCMC, 1998c), and *Gonystylus bancanus* (Endangered/EN A2c, Appendix II CITES) (Pratama, 2020). Currently, these species occurr naturally in the logged-over Bagantung peat swamp forests. Their conservation needs special attention because they are among the most important commercial timber species.

C. Uses of Tree Species by Local People

Most local people need the forest to meet their daily needs. This has been the case for generations (Parhusip *et al.,* 2019; Suharti *et al*., 2016a; Suharti *et al.,* 2016b). Main livelihoods

Table 4. List of tree and non-tree species used by local people from Katimpun and Kalumpang Villages, Mantangai Sub-District, Kapuas District, Central Kalimantan.

No	Local Name	Scientific Name	Utilization
	A. Tree Species		
1	Gemor	*Nothaphoebe umbelliflora* Blume	Insect repellent (bark)
2	Mahadingan	*Callophylum nodusum* Vesque	Boat construction
3	Tumih	*Combretocarpus rotundatus* Dans	Building construction
4	Kayu malam	*Diospyros areolata* King & Gamble	Building construction
5	Pantung, jelutung	*Dyera polyphylla* (Miq.) Steenis	Building constr., bubble gum
6	Ramin	*Gonystylus bancanus* (Miq.) Kurz.	Building constr., furniture
7	Gelam punai	*Melaleuca cajuputi* Maton & Sm. Ex R. Powell	Medicine (leaf)
8	Keput pajuput	*Mangifera similis* Blume	Building construction
9	Belangeran, kahoi	*Shorea balangeran* Burck	Building constr., furniture, roof
10	Meranti	*S. retusa* Meijer	Building construction
11	Meranti lanan	*S. rugosa* F.Heim	Building construction
12	Meranti rawa	*S. teysmanniana* Dyer ex Brandis	Building construction
13	Meranti lanan	*S. uliginosa* Foxw.	Building construction
14	Kayu tulang	*Stemonurus scorpioides* F.Heim	Medicine
15	Gelam tikus	*Syzygium curtisii* (King) Merr. & L. M. Perry	Building construction
16	Rasak	*Vatica rassak* Blume	Building construction, floor
	B. Non Tree Species		
1	Rotan cabang	*Korthalsia rigida* Blume	Handicraft
2	Pandan	*Pandanus helicopus* Kurz ex Miq	Handicraft

Table 5. Percentage of tree and non-tree species used by local people in the research site.

	Utilization	Tree Species		Non-Tree Species	
		Number	%	Number	%
1	Timber	14	14.0*	-	-
	a. Building construction	13	13.0*	-	-
	b. Boat construction	1	1.0*	-	-
	c. Furniture	2	2.0*	-	-
2	Medicine/insect repellent	3	3.0*	-	-
3	Gum	1	1.0*	-	
4	Handicraft	-	-	2	12.5 (**)
	All Species	16	14.7 (*)	2	1.7 (*)

* Compared to all tree sp. (100) and **to all non-tree sp. (16)
(*) Compared to all species (116)

Table 6. Tree and non-tree species cultivated by local people.

No	Local name	Scientific name	Utilization
1	Jelutung	*Dyera polyphylla* (Miq.) Steenis	Building construction, bubble Gum
2	Rubber tree	*Hevea brasiliensis* (Willd. ex A.Juss.) Müll.Arg	Rubber
3	Mahang	*Macaranga pruinosa* (Miq.) Műll. Arg.	Light building constr., firewood
4	Gelam	*Melaleuca cajuputi* Maton & Sm. ex R.Powell	Poles and fuelwood, medicine (leaf)
5	Sengon	*Paraserianthes falcataria* (L.) I. C.Nielsen	Peat land rehabilitation
6	Rotan irit	*Calamus trachycoleus* Beccari**	Handicraft

** non-tree species

Table 7. Number of species and families of the studies conducted in several different study sites

Site	Total Area (ha)	Number of Species / Families			Source
		Small tree	Large tree	Small tree & large tree	
1. Dayak Kendayan, Pontianak Regency	1.6	—	—	119/33	Susiarti & Mirmanto (2002)
2. Sei Mantangai, Central Kalimantan	3.0	29/17	24/14	—	Awan (2009)
3. SPI-21, MRP-Central Kalimantan	1.2	20/—	25/—	—	Daryono (2009)
4. Katunjung, Central-Kalimantan	2.0	—	—	103/30	Sidiyasa (2012)
5. Tuanan, Central Kalimantan	1.0			80/33	Sidiyasa (2012)
6. Bagantung, Central Kalimantan	1.28	71/30	56/30	80/35	This study in 2012

are farming, handicraft makers and fishing. Farming activities in the research site usually focused more on staple food and cash crop cultivation. Farmers and fishermen rely heavily upon plants, both cultivated and wild from the forest. In this study, we found 100 tree species and 16 non tree species that have economic value. Some species have multiple functions, such as mangosteen bark (*Tristaniopsis whiteana*) for medicine (Setyowati *et al.*, 2005) and wood for construction (Boer & Lemmens, 1998 & Mahmudah *et al.*, 2013). Most of the plants used for food, medicine, construction purposes, and culture by the community come from forests (Akiefnawati & Rahayu, 2016; Cámara-Leret *et al.*, 2019).

A study on traditional medicinal plants used by Dayak Desa community in Sintang, West Kalimantan found that there are 25 species of medicinal plants from nine families used by the community. Medicinal plants are used as the first alternative step to treat diseases. Species from Araceae family dominate the medicinal plants used. They make use of all parts of the plants as medicine. But the most widely used part is the leaves (48%) (Supiandi *et al.*, 2019). In our study, we found there were more medicinal species than those used by the Ngaju Dayak Tribe (26 species) in Tumbang Senamang region, Katingan, Central Kalimantan (Irnawati, 2016) and the Dayak Bakumpin tribe (40 species) from Murung Raya, Central Kalimantan (Ibrahim, 2016). However, according to Denny & Kalima (2016) and Yantoko (2014), there were more medicinal plant species found at those locations.

In Bagantung forest, people collect *Nothaphoebe umbelliflora* locally known as gemor. Gemor is scattered through all provinces in Kalimantan. There are two gemor species harvested by the community for their bark *i.e. Nothaphoebe coriacea* and *N. umbelliflora* (Adinugroho *et al.*, 2010). Both species are native to Kalimantan and have high economic value (Andriani *et al.*, 2016). Gemor bark contains alkaloids, tannins, phenols, flavonoids, triterpenoids and glycocydic compounds which are natural bioinsecticides (Cahyana & Rachmadi, 2011). Susanti *et al.* (2013) found that gemor bark detrimentally effects *Aedes aegypti* larvae. These mosquitos carry the virus that causes *Dengue Hemorrhagic Fever* (DHF).

Many people also use plants as materials for making crafts and souvenirs. Putra *et al.* (2011) documented this for *Diospyros maingayi* and *D. siamang*. Siska *et al.* (2015) and Gusniati (2017) mentioned that in Kasromego Village, Beduai Subdistrict, Sanggau used *Korthalsia rigida* stems collected from natural forests for making handicrafts. Shoots were also cut into pieces to be cooked. The use of rattan plants by local people in Katimpun Village and Kalumpang Village is based on knowledge gathered generations previously (Soekarman & Riswan, 1992). Nowadays, traditional wisdom dictates the need to preserve rattan species. In Paru Village Forest, Sijunjung, West Sumatra, rattan is the main non timber forest product. They process rattan into semi-finished or finished goods such as simple furniture and sell it outside the region.

There are also some tree species that are planted by farmers. An example being, jelutung (*Dyera polyphylla*) that produces latex, used for chewing gum and insulation of cables. This species occurs naturally in peat swamp forest. Around Kalumpang, several thousand logs are removed each month mainly consisting of jelutung (*D. polyphylla*) and terentang (*Campnosperma coriaceum*) (Giesen, 2008).

In Central Kalimantan, gelam (*Melaleuca cajuputi*) occurs naturally in the research site (Bagantung forest). Gelam produces the cajuputi essential oil, which is extracted from leaves. Cajuput oil is used for various ointments, balms (*e.g.* tiger balm), medicines and aromatherapy. Cajuput oil is not produced in Central Kalimantan province. Most of the gelam related trade is carried out by business person. The main gelam products in Central Kalimantan are used for poles and fuelwood. Poles are often sold in Banjarmasin and Java, while fuelwood is mainly for the local market. Gelam poles are widely used

in Indonesia for construction purposes (scaffolding, piles) and for lining water courses, while thicker trunks are used for sawn timber, high quality fuelwood and charcoal.

Another tree species commonly cultivated by local people at the research site is mahang *(Macaranga pruinosa)*. Mahang is mainly used for tanning. *Macaranga* leaves are also used for rice and cake packages by several tribes in Kalimantan including Dayak Kenyah Uma 'Tukung, Dayak Benuaq, and Dayak Agabaq (Atmoko *et al.*, 2016; Puri, 2001). For local communities in Kalimantan, due to the large size of the leaves, the use of macaranga leaves for food wrappers is common.

Hevea brasiliensis is commonly planted and used as the main source of natural latex. Rubber plantations cover a total land area of 396,708 ha and is the primary cash crop for the people in the research site. Rubber is produced year-round, but yield great fluctuates from month to month.

Paraserianthes falcataria is planted as an ornamental and shade tree. Often planted in home gardens for fuelwood (charcoal), and the leaves can be used as fodder for chickens and goats. *Paraserianthes falcataria* is a nitrogen-fixing species, and is commonly planted to improve soil fertility in forest restoration projects (Rojo *et al*., 1994b). The natural drop of leaves and small branches contributes nitrogen, organic matter and minerals to the upper layers of soil (Krisnawati *et al*., 2011).

Two peat swamp non forest tree species have been identified as being commonly used for weaving hats and mats, *i.e.* 1) *Pandanus helicopus* (Denny & Kalima, 2017). This species is also commonly used for traditional roofing material and construction of walls (Bappenas & Ditjen Sumber Daya Air, 2013); 2) *Calamus trachycoleus* is cultivated in plantations to produce good quality cane. *Calamus trachycoleus* fine cane is split and used for weaving as well (Jasni *et al*., 2010), but is not found at the study site.

There are a lots of trees with potential economic value that can be taken and used from the forest that can generate additional income for the community, but from the results of the interviews, contribution of forest products to total income in Katimpun and Kalumpang was still relatively low (less than 5%). The low contribution shows that local people use plant products from the forest mostly for subsistence and not for commercial purposes. By taking forest products in moderation, the local community have played an important role in current forest conservation. When marketing the forest products, the people in the research site sell it in the form of raw material or semi-finished material, resulting in limited economic value being added to the products.

CONCLUSION

The local people of Bagantung are strongly dependent upon the existence of forest for supporting their livelihood by providing construction materials, ship building materials and firewood. The cultivation of some other tree species should be developed to fulfill local people requirements of forest products, mainly timber. It could be developed on communal or customary forest. Management of the existing communal forest has to be supported. We suggest that state forest could use a utilization, conservation, and preservation zonation system. In utilization zone, community has access to cultivate the land and take forest products both for subsistence and commercial purpose as long as it does not damage forest function. The rules in the conservation zone would be stricter, preventing the excessive use of natural resources and limiting, as much as possible, damage to flora and fauna. Here use should only account for what the people need to ensure the resources aren't entirely depleted for future generations. In the Preservation zone, the rules would be far more stringent than the previous zones. The Preservation zone, would be areas with little or no signs of human life - to maintain and safeguard the forest. This should help reduce forest degradation.

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APPENDIX 1. List of families, species and use of found in Bagantung peat swamp forest

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
1	Amaryllidaceae	Sawang hutan	*Hymenocallis caribaea* (L.) Herb.	Leaf	Traditional medicinal ingredients anti-rheumatic, antiseptic	Balai Besar Litbang Tumbuhan Obat, 2008
		Tarantang	*Campnosperma auriculatum* (Blume) Hk.f.	Leaf	Traditional medicinal ingredients	Balai Besar Litbang Tumbuhan Obat, 2008
2	Anacardiaceae	Keput pajuput	*Mangifera similis* Blume	Fruit	Juicy sweetly acid	Rahadiantoro, 2014. http://tropical.theferns.info/viewtropical.php?id=Mangifera+similis (Accessed 19 April 2018)
		Kambalitan	*Mezzettia umbellata* Becc.	Wood	Building materials, household appliances	Arifiani & Mahyuni, 2012
		Haranjang	*Xylopia fusca* Thomson	Leaf	Anti-inflammatory	Denny & Kalima, 2016
				Bark	Anti-inflammatory	Denny & Kalima, 2016
3	Annonaceae	Jangkang, haranjang	*Xylopia malayana* Hk.f.et Th.	Twig	Antimicrobial activity which may be useful and potential ingredient in the production of health care products.	Ghani *et al.*, 2015
4	Apocynaceae	Pantung	*Dyera polyphylla* Steenis	Latex, resin	Industrial production of tubes, pipes and varnish	Tata *et al*., 2018
				Timber	Pencils,light contruction and furniture	
		Jambu-jambuan	*Ilex bogorensis* Loes.	Timber	Firewood and to construct houses	Tan *et al.*, 2010
				Leaves	For treating sprains	
5	Aquifoliaceae	Kambasira	*Ilex cymosa* Blume	Roots	For treatment of fever and ripening boils	Tan *et al.*, 2010
				Timber	Firewood and to construct houses	
6	Araceae	Lampoyang, ulat bulu,	*Aglaonema marantifolium* Blume	Extracts of plant	Used in the control of these stored product pests. Useful source for the development of new potent antibacterial agents	Islam *et al.*, 2019; Roy *et al*., 2011
				Leaf	Traditional medicinal to induce labour.	Garvita, 2015
				Leaves, Bark	Laxative	Setyowati, 2003
7	Arecaceae	Owe sigi , owe paka, owe jerakah	*Korthalsia rigida* Blume	Leaf	Traditional medicinal ingredients	Personal communication,2012
				Fruits	Sometimes eaten	http://tropical.theferns.info/viewtropical.php?id=Korthalsia+rigida (Accessed 23 September 2019)
8	Aspleniaceae	Bahakung, paku kajang	*Asplenium nidus* L.	Leaf	Treating cancer and tumors	Due, 2013
				Leaf	Deep wounds, eliminating dandruff	Sari *et al*., 2015.
9	Bonnetiaceae	Pantimon, tantimun, bingir	*Ploiarium alternifolium* Melch.	Leaf	Soften hair	Noviantina *et al*., 2018
10	Chrysobalanaceae	Bintan	*Licania splendens* Prance	Timber	The wood is used railway bearing	Amirta *et al*., 2016
				Fruits	The fruit is edible.	
11	Clusiaceae	Jinjit	*Calophyllum hosei* Ridley	Timber	Used for furniture, ply-wood and to build boats	Turjaman *et al*., 2006
		Maha-dingan, bintangor	*Calophyllum nodosum* Vesque	Timber	Construction of boats, furniture, plywood	Lemmens, 2003a
				Fruits	The fruits are edible.	Personal observation

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
				Timber,	Construction of boats, furniture, plywood.	
		Jinjit	*Calophyllum* sp.	Bark, latex, leaves, flowers and seeds	Bark and latex is used for diarrhea, after childbirth treatment, eye diseases healing and rheumatism. Leaves, flowers and seeds are also used for medicinal need	Lemmens, 2003c
		Kakal	*Calophyllum rigidum* Miq.	Timber	Used in ship building and for general construction.	Septiana & Simanjuntak, 2017
				Bark, leaves	Antioksidan	Septiana & Simanjuntak, 2017
			C.calaba L. var. *bracteatum* (Wight) P.F.Stevens	Latex	Used as a fish poison, and in Cambodia for shampoo.	Lemmens, 2003b.
				Fruits	The fruits are edible.	Personal observation
		Gandis, Nipa, asam kandis	*Garcinia parvifolia* Miq.	Fruits	Antioxidant	Hassan *et al.*, 2013
		Kayu aci	*Garcinia havilandii* Stapf.	Fruits	Fruit skin has benefits as a source of natural antioxidants, anti-inflammatory, antihistamines, and antibacterial	Lailati, 2017
		Manggis, beruwas	*Garcinia celebica* L.	Rind	Lower blood	Due, 2013
				Fruit is rather acidic	Food seasoning	Dahlan *et al*., 2009
		Murau	*Garcinia* sp.	Flower	Eliminates body odor	Due, 2013
12	Crypteroniaceae	Martibu	*Dactylocladus stenostachys* Oliv.	Timber	Furniture and ukiran	Krisdianto & Dewi, 2012
13	Cyperaceae	grising	*Carex baccans* Nees**	Leaf	Poultry feed is very good for increasing egg production	Heyne, 1987
		Rasak	*Cotylelobium melanoxylon* Pierre	Bark	The bark is used locally to prevent frothing in sweet palm juice and to arrest fermentation of toddy and local wine	Matsuda *et al.*, 2009; Idramsa *et al.*, 2016
				Leaves	Antibacterial drugs. Antibabesial.	
		Lanan, belangiran, kahoi	*Shorea balangeran* Burck	Bark, timber,	The bark is used for the walling of houses Construction of boats, furniture, plywood	Heyne, 1987; Kochummen *et al.*, 1994a Robiansyah & Purwaningsih, 2020. In press
14	Dipterocarpaceae			Resin	Lighting	
		Meranti rawa, meranti lentang bitik	*Shorea teysmanniana* Dyer ex Brandis	Bark	The bark is used local houses for walls and floord and for temporary shelters. Antioxidants, antibacterial	Kochummen *et al.*, 1994c
		Lanan	*Shorea uliginosa* Foxw.	Timber	Used for interior and exterior necessary such as flooring, panelling and cabinetwork even for building boats or doors.	Kochummen *et al.,* 1994d; http:I//tropical.theferns.info/viewtropical.php?id=Shorea+uliginosa. (Accessed 23 September

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
		Rasak danum	*Vatica rassak* Blume	Timber	Furniture, kitchen set, carving	Krisdianto & Dewi , 2012
				Resin	Traditionally, dammar is used for purposes such as caulking boats and baskets, as an adhesive, a medicine, as a fuel for torches and sometimes in foods.	Kochummen *et al,.* 1994e; Kalima & Wardani., 2020. In press
		Meranti lanan	*Shorea rugosa* F.Heim	Timber	The timber used for boats, doors, and frames	Kochummen *et al.,* 1994b
15	Ebenaceae	Kayu malam	*Diospyros areolata* King & Gamble	Timber	The raw materials for handicrafts, furniture and building materials as additional livelihoods	Sunaryo, 2002
		Hampuak, kayu taji	*Diospyros maingayi* (Hiern.) Bakh.	Timber	The raw materials for handicrafts, furniture and building materials as additional livelihoods	Sunaryo, 2002
		Ehang	*Diospyros siamang* Bakh.	Timber	The raw materials for handicrafts, furniture and building materials as additional livelihoods	Sunaryo, 2002
		Nonang	*Antidesma cuspidatum* Mull.Arg.	Fruit	Edible	Dahruddin *et al.,* 2005
		Kambasira	*Chaetocarpus castanocarpus* (Roxb.) Thwaites	Leaf	Antimicrobial, diabetes	Dey & Rahman, 2013.
				Bark, fruit	Ringworm, hot inside	http://tropical.theferns.info/viewtropical.php?id=Baccaurea+bracteata. (Accessed 23 September 2019)
16	Euphorbiaceae	Tampuak	*Baccaurea bracteata* Mull.Arg.	Bark	The bark is used to relieve eye inflammation	
				Shoots	The shoots used in long-house contruction	Idris, 1998
				Fruit	The fruits are edible, sour	
17	Fabaceae	Keranji	*Dialium indum* L.	Timber	Used in construction, e.g.for joinery, beams, door and window frames, sills, posts, joists, rafters.	Rojo & Alonzo, 1994a
				Bark	Bark used as betel nut alternation, and diarrhoea and herpes curing also can be used for tanning.	Rojo & Alonzo, 1994a
				Fruit	The fruits are edible	Rojo & Alonzo, 1994a
		Tapanggang	*Parkia singularis* Miq.	Fruit, seed	Fruits and seeds are edible.	http://tropical.theferns.info/viewtropical.php?id=Parkia+singularis (Accessed 8 October 2019)
				Seed	The seed is usually cooked before eating, though it can also be eaten raw.	
				Bark	The bark of most species is rich in tannins and can be used as a dye and preservative for ropes etc.	Boer *et al.,* 1995
18	Fagaceae	Tampaning	*Lithocarpus conocarpus* Rehder	Timber	The wood is used locally for purposes such as house building, fence posts, mining props, shingles, boat building, and for making tool handles, rice pounder, poles for carts	

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
			Lithocarpus dasystachius Rehder	Timber	Wood is suitable for preparation of pulp and paper. It is a good firewood and is suitable for making charcoal	Govaerts & Frodin (1998)
				Bark	Antioxidant	
19	Hypericaceae	Nipa, garonggang	*Cratoxylum arborescens* (Vahl) Blume	Timber	Wood for firewood and charcoal manufacture.	Kartasubrata *et al.,* 1994a
				Resin	Resin is used as remedy for scabies and leg wounds.	
				Bark, leaves and roots	A decoction of the bark, leaves, roots has been used against tooth ache, stomachache, and fever.	
20	Icacinaceae	Keput pajuput, kayu tulang	*Stemonurus scorpiodes* Becc.	Timber	Timber soft, not durable, locally used for planks and household utensils.	Kebler & Sidiyasa, 1994
				Fruit	Fruits are edible	Alonzo, 1998
21	Laminaceae	Kujang/keladi	*Coleus amboinicus* Lour.**	Leaf	Headaches, centipede stings,	http://www.mpbd.info/plants/coleus-amboinicus.php (Accessed 18 April 2018)
			Plectranthus amboinicus (Lour.) Spreng		Asthma, chronic cough, bronchitis chronic, epilepsy and seizures.	
22	Lauraceae	Mahang, medang pahawas	*Alseodaphne bancana* Miq.	Timber	The wood is used for heavy outdoor construction, ship, boat building and salt-water piling The wood is used buildings, household appliances, medicine	Suhandono, 1998a; Cahyana & Rahmadi, 2011; Arifiani & Mahyuni, 2012
		Tagola	*Alseodaphne insignis* Gamble	Timber	The wood is used for house building, interior finish, furniture and cabinet making carving and agricultural implements.	Suhandono, 1998b
		Gemor	*Nothaphoebe umbelliflora* (Blume) Blume	Timber	The wood is used for house building, interior finish, furniture and cabinet making carving and agricultural implements.	*Asian Plant Net* http://www.asianplant.net/Lauraceae/Nothaphoe-be_umbelliflora.htm. (Accessed 21 February 2020)
				Bark	Bark from the bong tree contains gum, a useful sticking agent, and aromatic oils. Pulverized bark is used to make incense sticks, also an ingredient of mosquito coils and glue for carton and particleboard. When mixed with soil, the bark can be molded into statues and household items.	Rahmanto *et al*., 2001; Zulnely & Martono, 2003
		Kayu katanjung	*Cryptocarya crassinervia* Miq.	Timber	The wood is used contruction, house posts and furniture	Sunarno *et al.,*1995a
		Tagula	*Cryptocarya ferrea* Blume	Timber	The wood is used contruction, house posts and furniture	Sunarno *et al.,*1995b
		Asam-asam, kasar bakey, tagua	*Cryptocarya zollingeriana* Miq.	Timber	Building house and furniture making	Personal observation
		Madang	*Litsea firma* (Blume) Hook.f.	Timber	The wood is used under cover (for house contruction)	Soerianegara *et al.*, 1995a
				Fruit	The fruits are edible	
		Kamahas	*Litsea grandis* (Wallich ex Ness) Hook.f	Timber	The wood is used for carving and furniture	Soerianegara *et al.*, 1995b
				Seed	Seed oil can be used as hair cream	

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
23	Loganiaceae	Karandau	*Fagraea racemosa* Jack	Flower	Species have been used in traditional medi-cine, perfumery, and aromatherapy. The flowers are featured in the traditional artwork of	Motley, 2004
24	Melastomataceae	Pahawas, tema bala	*Memecylon costatum* Miq.	Fruit	Fruits are edible and some are used as spices.	Lafrankie & James, 2010.
		Pelawan	*Memecylon multiflorum* Bakh.f	Leave	Extracted from leaves are traditionally used for	
		Kaja laki	*Aglaia rubiginosa* (Hiern) Pannell	Bark, root	Antimicrobial	Kissinger *et al.,* 2013
25	Meliaceae	Rambangun, papung	*Sandoricum beccarianum* Baill.	Fruit, leaves,bar k, root and wood	Fruits are fresh or made into jams,jelly. Wood is used for contryc-tion,carpentry. Leaves, bark,root have numerous medical uses (Ambient)	Jensen, 1995
		Payayit	*Sandoricum borneense* Miq.	Fruit and wood	Edible fruit and wood is used as sapé- meterial	http:// portal.cybertaxonomy.org/ flora-malesiana/node/13128 (Accessed 3 February 2020)
26	Moraceae	Beringin	*Ficus sundaica* Blume	Leaves, twigs	Antimicrobial	Winara & Mukhtar, 2016
		Lunuk	*Ficus parietalis* Blume	Leaves	The wound	Winara & Mukhtar, 2016
		Pakan	*Parartocarpus venenosa* (Zoll. & Moritzi) Becc.	Fruits	The ripe fruit is edible (like breadfruit), but the unripe seeds are poisonous	Soepadmo *et al.,* 2002
				Seed	The ripe, chestnut-like seeds are eaten roasted or stewed	
				Timber	Locally, the wood is used for light construction, for making boxes, crates, wooden pallets and veneer.	
		Kumpang	*Gymnacranthera farquhariana* (Hook.f & Thoms.) Warb.	Fruit seed	Gonorrhea, lungs	Winara & Mukhtar, 2016
		Kandarahan	*Horsfieldia crassifolia* (Hook.f. & Thomson) Warb.	Wood	Heavy construction	Mahmudah *et al*., 2013
		Kayu daha	*Horsfieldia irya* (Gaertn.) Warb.	Fruit, leaves, twigs	Antibacterial. The fruits are often eaten by monkeys and there are occasional reports of them being eaten by humans	Sam *et al.,* 2004
				Seed	Oleoresin of the seed is used asa varnish material	https://www.nparks.gov.sg/ florafaunaweb/flora/2/9/2964 (Accessed 3 February 2020)
27	Myristicaceae	Kayu daha	*Horsfieldia irya* (Gaertn.) Warb.	Bark, latex	Bark can be used for sore throats medication, while latex is used in the ulcers curing.	https://www.nparks.gov.sg/ florafaunaweb/flora/2/9/2964 (Accessed 3 February 2020)
				Leaf	Traditional medicinal for boils and sores	https://www.nparks.gov.sg/ florafaunaweb/flora/2/9/2964 (Accessed 3 February 2020)
				Root	Along with lime juice, root can heal toxic snake bites	https://www.nparks.gov.sg/ florafaunaweb/flora/2/9/2964 (Accessed 3 February 2020)
				Timber	Wood is useful for bottle lid making.	https://www.nparks.gov.sg/ florafaunaweb/flora/2/9/2964 (Accessed 3 February 2020)

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
		Kumpang	*Myristica lowiana* King	Latex	The red sap,can be used as a dye that gives a permanent brown stain	Soepadmo *et al.,* 2002
				Timber	A light hardwood, it is mainly used for light construction work, partitioning, flooring, wall-panelling, moulding and other types of interior finishing, and for making tool-handles, woodcrafts, match boxes and splints, packing cases, crates, and household utensil	Soepadmo *et al.,* 2002
		Nonang	*Knema galeata* J. Sinclair	Timber	The wood is used for contruction.	Personal observation
		Kumpang	*Mezzettia umbellata* Becc.	Timber, bark	The durable wood is used in S. Sumatra for interior timber work. Bark some times used for rope making	Heijden & Keßler, 1990
28	Myrsinaceae	Rasak, papung	*Ardisia villosa* Roxb.	Root, leaf	Traditional medicinal ingredients	Muhaimin *et al*., 2016
		Gelam punai	*Melaleuca cajuputi* Maton & Sm. ex R.Powell.	Leaf, fruit	Diarrhea, wounds, painkillers	Kissinger *et al*., 2013; Al-Abd *et al.,* 2015
		Galam tikus, belawan tikus	*Syzygium zeylanicum* (L.) DC..	Leaf	Traditionally leaf extracts has been used to treat various ailments such as joint pain, head ache, arthritis and fever.	Anoop & Bindu, 2015
		Belawan merah	*Syzygium claviflorum* (Roxb.) Wall. ex A.M. & J.M.Cowan	Fruit	Edible	Soh & Parnell, 2015
				Wood	Firewood and for constructio	Soh & Parnell, 2015
		Gelam tikus	*Syzygium curtisii* (King) Merr. & L.M.Perry.	Root	Nutritious to cure diabetes	Nursanti *et al.,* 2018
		Tatumbu	*Syzygium garcinaefolia* (King) Merr.& Perry	Timber	The wood is used for contruction	Haron *et al*., 1995
				Fruit	The ripe fruits are preserved as pickle	Haron *et al*., 1995
29	Myrtaceae	Katumbu putih	*Syzygium grande* (Wight) Walp.	Timber	The wood is used for a number of products including posts, poles, round wood, and other construction materials	Islam, 2003; National University of Singapore, 2015
				Fruits, seed, bark	The fruits often eaten by animals such as monkeys, bats, and squirrels which aid in the dispersal of the seeds.	
		Tapohot	*Syzygium laxiflorum* (Blume) DC	Bark	Bark to paint	Zuhud *et al.,* 2003
				Leaf, fruit	leaf and fruit as a source of primate feed	Personal observation
		Belawan	*Syzygium clavimyrtus* K.et V.	Leaf	Essential oil	Zuhud *et al.,* 2003
		Papahot, tatumbu habang, nyak beruk	*Syzygium* sp.	Leaf and skin roots, stalks, leaves, sap and fruit	Stomach medicine, cough Natural colourant plant (black) Source of food consumed by the community	Anoop & Bindu, 2015 Harbelubun *et al.*, 2005

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
		Belawan	*Tristaniopsis stellata* O. Ktse	Timber	The wood is used building material	Akbarini, 2016
				Bark	The bark for insectisida	
		Manggis	*Tristaniopsis whiteana* (Griffith) Peter G.Wilson &T.Waterhouse	Wood	Heavy construction such as for house or bridge poles	Boer & Lemmens, 1998; Mahmudah *et al*., 2013
30	Nepenthaceae	Kantong semar	*Nepenthes ampullaris* Jack**	Leaf	Antibacterial	Bhore *et al*., 2013
		Kantong semar	*Nepenthes melampora* Blume**	Young flower	Kidney stones	Winara & Mukhtar, 2016
		Kantong semar	*Nepenthes rafflesiana* Jack**	Young flower	Kidney stones	
				Timber	The wood is used in house building (raffers, poles, planks) and has been used for boats, pumps and blocks.	
31	Ochnaceae	Kayu sapat	*Gomphia serrata* (Gaertn.) Kanis	Leaves	The leaves are chewed by native people in Peninsular Malyasia.	Kochummen, 1998
				Root	The bitter roots and leaves is applied medicinally as a stomachic and anti-emetic tonic in India.	
				Branches	The young branches are used against toothache in Cambodia.	
32	Orchidaceae	Anggrek tanah	*Spathoglottis* sp.**	Plant	The plant is used as an ornamental plant	Personal observation
				Bulbs	Efficacious bulbs as ear inflammation medicine.	Personal observation
		Rasau kelep	*Freycinetia angustifolia* Blume**	Leaf	Essential oil	Zuhud *et al*., 2003
33	Pandanaceae	Pandan	*Pandanus helicopus* Kurz ex Miq.**	Leaf	Antioxidants, rheumatism. Alternative food favorite proboscis monkey and orangutan	Due, 2013
		Idas	*Pandanus* sp.**	Root	Treat high blood pressure	Maria, 2017
				Leaf	Food coloring	Santa *et al*., 2015
34	Podocarpaceae	Alau/cemara	*Dacrydium pectinatum* Parl.	Timber	Wood used for building and ships material A softwood, it should be suitable for decorative works and can be used for panelling, partitioning, veneers, plywood, joinery and furniture making	http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=210000447 (Accessed 8 October 2019); Wong, 2002
35	Polygalaceae	Kemuning	*Xanthophyllum cf ellipticum* Korth.	Bark	Stomach medicine	Ajiningrum, 2017
				Seed	Cancer sores	Ajiningrum, 2017
		Kandarin	*Xanthophyllum* sp.	Wood	Heavy construction, Art craft	Mahmudah *et al*., 2013
36	Polypodaceae	Kakambat	*Polypodium congenerum* (Blume) C. Presl.**	Plants	The plants is used for decorative plants	Personal observation
		Paku-pakuan kalakai	*Stenochlaena palustris* (Burm F) Bedd**	Leaves, stems	Blood booster, fever	Kissinger *et al*., 2013
		Paku-pakuan / bejakah	*Taenitis blechnoides* Sw.**	Leaves	A decoction of the leaves of *T. blechnoides* is taken as a postnatal protective medicine in Malaysia.	Schneider & Tawan, 2003
37	Rhizophoraceae	Tumih	*Combretocarpus rotundatus* Dans	Leaves	Antioxidants, antibacterials	Kissinger *et al*., 2013

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
38	Rosaeae	Galam tikus	*Parastemon urophyllus* (A.DC.)A.DC.	Timber	The wood is used for house building and for boat building	Uji, 2005
39	Rubiaceae	Sari rapat	*Gardenia* sp.**	Bark, leaf	Malaria, mag, childbirth	Kissinger *et al.,* 2013
				Burned leaf	scabies, sores, ulcers, smallpox, boils,	Ranaweeran *et al*., 2016
				Burned leaf	stomach ailment	Ranaweeran *et al*., 2016
				Root, Bark + leaf	For cosmetic fragrances. Contains aromatic, essential oils	http://www.mpbd.info/plants/A-cat.php#medicat(Accessed 18 April 2018) belum ada di refences); Rodrigo, *et al.* 2007;
40	Rutaceae	Ehang, kayu samidra	*Acronychia pedunculata* (L.) Miq.	fruit	Extracts of its leaves, bark, stems and fruits are widely used in herbal medicinal applications against sores, scabies and intestinal infections, due to their antifungal and antimicrobial properties. The ripe fruit is edible.	http://www.mpbd.info/plants/A-cat.php#medicat (belum ada di refences); Rodrigo, *et al.* 2007
				leaf, bark, stems		Ranaweeran *et al*., 2016
					The tender leaves are used in salads and as a condiment.	Uji, 2005
				Timber	The wood is used for carving, poles, house construction and making the charcoal preferred by goldsmiths.	Nurfadilah *et* al., 2017; Uji, 2005
		Sasar bakey	*Melicope* sp.	Leaf	Traditional medicinal ingredients	Permenkes, 2013
		Kemuning	*Murraya paniculata* (L.) Jack	leaf	raw materials of traditional medicine and extracts for medicinal herbs	
		Rambangun	*Tetractonia tetandrum* (Roxb.) Merr.	Trees	Tree as an source of food	Duma, 2007
		Rambutan hutan	*Nephelium cuspidatum* Blume	Timber	The wood is locally used as firewood	
		Bintan	*Nephelium juglanifolium* Blume	Timber	The wood is locally used as firewood	
41	Sapindaceae	Karanji, boa sanggit	*Nephelium lappaceum* L.	Fruit	Food material. Medical used: the fruit is said to be astringent, stomachic and anthelmin-tic.	Van Welzen & Verheij, 1991
				Roots	The roots are used in decoctions for treating fever	
				Bark	The bark as an astringent for disease of the tongue	
				Leaf	The leaves are used in	
		Hambiwi	*Pouteria maingayi* (C.B.Clarke) Baehni	Timber	The wood is very popular as a furniture and solid door timber. It is suitable for high classdecorative interior finishing such as panel-ling and partitioning. Other uses include strip andparquet flooring, ceilings boat decking, rotary and sliced veneers, plywood and pallets.	Lim & Chung, 2002
42	Sapotaceae	Katiau	*Madhuca motleyana* (de Vriese) J.F. Macbr.	Seed	Fat of the seeds for food ingredients	Kartasubrata *et al.,* 1994b
				Timber	Locally used for posts and planks in houses building.	
		Nyato	*Palaquium cochlearifolium* P.Royen.	Seed	The fat from the seeds is used in foods	Kartasubrata *et al.,* 1994c
				Timber	Locally used for posts and planks in houses building.	
		Nyato undus	*Palaquium ridleyi* King & Gamble	Timber	The timber is used for beams and posts.	Kartasubrata *et al.,* 1994d

No	Family	Vernacular name	Scientific Name	Plant Part used	Use	Reference
43	Sterculiaceae	Kayu pendok	*Sterculia gilva* Miq.	Bark, fruit, seed.	Free antiradical activity, antihyperlipidemia, anti-fungal, antibacterial, antiviral, overcoming menstrual disorders, liver damage, and disease	Asih *et al*., 2010.
				Leaf	Antioxidant and antihy-perlipidemic activity through lipase inhibition	Zulviyati *et al*., 2016.
				Timber	Wood carvings, pegs, fence, the other items of turnings, panels, door components, tables, and wall coverings.	Supriadi, 2019 Alimah, 2014
44	Tetrameristaceae	Tantinum	*Tetramerista glabra* Miq.	Timber	The timber is used for purlins, ceilings, flooring, posts, beams, door and window frames and all other interior joinery and structural work not in contact with the ground.	Supriadi, 2019 Alimah, 2014
				Fruit	The tree produces a sour and fresh, red fruit which is used in fruit salads	Supriadi, 2019 Alimah, 2014
45	Thymelaeaceae	Ramin	*Gonystylus bancanus* (Miq.) Kurz.	Leaves, roots	Traditional medicinal ingredients	Akeng *et al*., 2018 Pratama, 2020
				Timber	Timber is widely used for furniture, decorative cabinets and interior decoration	Akeng *et al*., 2018 Pratama, 2020
				Timber	The wood is used for pulping and has been used for fuel.	
46	Tiliaceae	Plimping Jamek	*Microcos lanceolata* Burret	Bark	Bark pulp can be used for intoxicateing fish	Chung & Soepadmo, 2011
				Resin	Bark resin for fuel	
				Fruit	The fruits are edible	
		Keput pajuput	*Microcos ovatolanceolata* Burr.	Plant	The plant is used by people to treat malaria	Chung & Soepadmo, 2011

**Non-tree species

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Scope. *Reinwardtia* is a scientific regular journal on plant taxonomy, plant ecology and ethnobotany published in June and December. Manuscript intended for a publication should be written in English.

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