PHYTOSOCIOLOGICAL STUDY ON THE VEGETATION OF KUTAI NATIONAL PARK, EAST KALIMANTAN, INDONESIA

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I INTRODUCTION

In this study, we studied a phytosociological classification of the actual vegetation of Kutai National Park, East Kalimantan, Borneo Island after an extensive fire of the 1983. Especially, we attempted to compare the vegetations between burnt and unburnt areas using the method of Braun-Blanquet (1951). Indo-Malayan rain forests which are estimated to cover about 250 x 1 million ha have been more extensively disturbed or destroyed by timber extraction (Whitmore, 1984). The tropical rain forest of Kutai National Park in East Kalimantan, however, has been known as one of the most developed and well preserved in the world. In this forest, the area damaged by the forest fire in 1983 was estimated at 3.5 million ha in East Kalimantan (Wirawan, 1984; Malingreau et al., 1985). We carried out the vegetation survey at Kutai National Park from July to Seprember, 1986 after the forest fire in order to make clear the process of earlier recovery of the tropical an extensive rain forest after a large scale fire. Miyawaki et al. (1982) made a phytosociological research at Sotek near Balikpapan, East Kalimantan in 1980 and 1981. They reported the floristic compositions of three climax forest types, secondary forests and grassland, and attempted to test the applicability of Braun-Blanquet method to the tropical rain forests with the highest species diversity.

II Area studied

Kutai National Park of East Kalimantan, Borneo Island is

situated at 0°10' - 0°35'N and located in the north of Bontang and the south of Sangata River (see the text). In the study area, the low hill with gentle slopes extend. The elevation of the highest is 350 m alt. The area is composed of six geological formations. Among them, the bed rock of Pamaluan and Balikpapan formations are mainly composed of sandstone occupied around Camp sites Km 45 and Km 24, those of Pulau Balang formation is mainly composed of mud stone including thin layers of sandstone around Km 37. The study sites were mainly occupied by three formations. Annual mean rainfall near study area is 2,108 mm (in Bontang, 1963-1981), annual mean temperature 26.3°C (in Samarinda).

III METHODS

The 18 sampling quadrats were selected in various vegetations in the Kutai National Park. In the plant sociology, we usually used to express the cover degree and sociability per unit area for estimation of species quantities (Braun-Blanquet method). Instead of these criteria, we adopted to the estimation of the basal area. which is the areal outline of the plants near the ground surface. In trees it is estimated through the diameter measurements, usually taken at the breast height.

For each sample plot, physiographic feature and habitat conditions such as topography, altitude, slope aspect, slope degree, geology and at the level of artificial impact for forest were recorded.

By the tabular method of Braun-Blanquet (1951), we compared the floristic composition of each plot. But the plants of herb layer were not included in Table 1, because the measurement methods for these plants differed from those for tree and shrub layer plants.

IV RESULTS AND DISCUSSION

Based on the tabular comparison analysis, we could classified the vegetations into ten communities (Table 1).

The forest vegetation of the study area were divided roughly into the natural forest and secondary forest by the presence of the species groups 1 and 2. In the natural forest Shorea polyandra, S. dasyphylla, Polyalthia lateriflora, P. sumatrana, Aporosa grandistipulata, A. lunata, Ardisia sp., Baccaurea spp., Diospyros

spp., Eugenia spp., Urophyllum corymbosum, etc. were commonly observed, especially Shorea spp. and Polyalthia spp. were abundant (Table 1. species group 1).

The secondary forest is characterized by species group 2 including as Melastoma malabathricum, Uncaria attenuata, Zingiberaceous plants, Macaranga pruinosa and Mallotus lackeyi, etc.

1. Shorea spp. forest

In this community, the topmost or emergent layer was composed of the Dipterocarpaceae, Shorea sp. (tree height 55 m), Lauraceae, Eusideroxylon and Octomeles sumatrana, the height trees of emergent layer was about 60 m. The community is characterized by Aglaia odoratissima, Baccaurea sumatrana, Canarium denticulatum, Helicia robusta, Knema latifolia, Lophopetalum javanicum, Lithocarpus spicatus and Pithecellobium sp., etc. (Table 1. species group 3). One of the emergent trees, Octomeles (tree height 59 m) is generally not element of the climax forest. It is found frequently in the secondary forest frequently. Thus it may be considered to be a gap species in the tropical rain forest. This forest type was observed on the Pamaluan formation which is composed of muddy soils around Km 37 (Plot No. P-1 and P-2).

2. Dryobalanops forest

This forest type was dominated by Dryobalanops sp. which constituded an emrgent layer in the vegetation of the area around Km 45. This community is characterized by Dryobalanops sp., Blumedendron sp., Durio griffithii, Heliciopsis, Gonystylus sp., Hopea bracteata, Horsfieldia sp., etc. The reason of this difference in the dominant species of the forests, Shorea forest at Km 37 and Dryobalanops forest at Km 45 are not known. The difference in the geological habitats, however, may explain to some extent the observed difference in the both vegetations. Some Dryobalanops trees were found on the sandstone area around Km 24 In all cases, Dipterocarpaceae were common in both habitats and Dipterocarpaceae, Annonaceae, Euphorbiaceae, Bursellaceae and Ebenaceae were abundant in the natural forest of Kutai National Park.

3. Shorea scrub

This scrub grows on the abandoned logging road. The habitat of

this scrub was surrounded by tall trees of other secondary forest. This vegetation type is characterized by species group 5, such as Shorea johorensis, S. gratissima, Hedyotis ocimoides, Uncaria gambir, Litsea densiflora, Polyalthia rumphii, Cissus rostrata, etc. In this stand, many pioneer species observed Dicranopteris dichotoma, Uncaria spp., Macaranga gigantea, M. trichocarpa, Dillenia sp. and Ficus uncinata. It contains both groups of species light-demanders and shade-bearing species preferring sunny and shady habitats, respectively.

4. Macaranga gigantea - Macaranga trichocarpa community

This community is characterized by many species of secondary forest such as some species of Macaranga, Mallotus, Glochidion, etc. Especially, Mac. gigantea and Mac. trichocarpa are abundant. This community is subdivided further into three subordinate units, such as subordinates of typicum, Mac. hypoleuca and Evodia alba. Subordinate of typicum was found on the Pamaluan and Balikpapan formations. This forest type is characterized by the absence or few species of differential species group and is dominated by Mac. gigantea, and Mac. trichocarpa. The latter two subordinate units (species groups 6-2 and 6-3) were found on the Pulau Balang formation. Subordinate of Macaranga hypoleuca is characterized by Mac. hypoleuca, Mac. bancana, Canarium odoratum Omalanthus giganteus and Ficus fistulosa. Subordinate of Evodia alba is dominated by only one species of E. alba. The reason of established of those subordinates in these secondary forests are not known. It seems to be correlated with the geological habitat, age of forest, soil condition and distance from the pioneer trees as the seed source, etc.

5. Anthocephalus chinensis community

Anthocephalus chinensis community had a single dominant species of A. chinensis (species group 7). This community was found along logging roadside on the dry habitat. We could frequently see the nests of Oran Utan on the canopy of these trees.

6. Croton argyratus community

Croton argyratus community was distinguished from other communities by the presence of Croton argyratus, Cassia nodosa, Milletia antropurpurea, etc.(species group 8). This community develops on the logging sites near rides. The areal extent of this

community was very narrow.

7. Homalanthus populneus community

This community is characterized by the dominancy of Homalanthus populneus (species group 9). The Homalanthus populneus stand was found on the upper slopes and ridges near the peak of hill 350 m alt. This community had been disturbed by logging in the past. The effect of the fire on this site was great and the floristic composition of this forest very poor.

8. Duabanga moluccana community

This community are characterized by a single, Duabanga moluccana (species group 10). This species grew most quickly and dominated in the vegetations along roadsides and was found frequently on the Pamaluan formation. There are two genus in the Sonneratiaceae, one of which is Duabanga, and the other Another one genera is Sonneratia, the major constitute genus of mangal.

9. Tristania whitiana community

Tristania whitiana community is characterized by a single species (species group 11). This community grows in most dry habitats along the logging roadsides and ridges. These communities are characterized by many sun plants (light-demanders) such as Melastoma, Uncaria, Zingiberaceous plants, Macaranga pruinosa, Mallotus lackeyi, etc. were occurred frequently (species group 11).

10. Melasatoma malabathricum community

Melastoma malabathricum community is a scrub which is commonly seen in the open land, such as roadsides, clear cutting over lands and land slide stands. It seems to be established at the earliest stage of a secondary succession except for the stands of grassland.

Pioneer vegetation

In the study area, we could observe the grassland vegetation consisting of Imperata cylindrica, Dicranopteris dichotoma, Blechnum orientalis, Pityrogramma calomelanos, Paspalum orbiculare, Paspalum conjugatum, Lycopodium cernuum, Selaginella sp., Scleria sp., Oplismenus sp., etc. These species are distributed widely in the dry habitat of the tropical and subtropical regions of Asia. In the Kutai National Park, however, the grassland of these species

is not developed. They were found commonly on the forest floor in the secondary forests.

Whitmore (1984) noted that the secondary succession is 'deflected' to a fire climax and or biotic climax and instead of trees, stands of shrubs develop including Melastoma malabathricum, Lantana, etc. Whitmore (1984) also said that ultimately, disturbance leads to the development of an open grassland of Imperata cylindrica, which has underground diffuse rhizomes and survive fires. Furthermore he reported that the association of Paspalum conjugata appeared as a pioneer vegetation after forest clearance, after that Imperata cylindrica association is formed as an effect of burning.

Influence of geology

As above mentioned, it is not certain that the factor of distribution of vegetation of National Park, but it seems to be reflective of geology in either cases of natural and secondary vegetation e.g. species group 3, 4 in the natural forest, species groups 6-1, 6-2 and 6-3 in the secondary forest. In the table 1, distributions of species groups 12 and 13 are considered to correspond the geology, the former are found on the mud stone area, the latter are found on the sand stone area, respectively.

Influence of forest fire

In the burnt forests, we could observe many dead trees such as Shorea spp., Eusideroxylon zwageri, Omalanthus sp., Dacryodes sp., etc. But there were some living trees surviving the forest fire. Big trees which lived just before fire seemed unburnt. They included Eusideroxylon zwageri, Ellipanthus beccarii, Dacryodes sp. and Shorea leprosula (species group 14). One of them, E. zwageri was representative.

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Table 1. Floristic composition of the vegetation of Kutai National Park.

1. Shorea spp. forest (differential species group 3). **2.** Dryobalanops forest (species group 4). **3.** Shorea scrub (species group 5). **4.** Macaranga gigantea - Macaranga trichocarpa community (species group 6). **5.** Anthocephalus chinensis community (species group 7). **6.** Croton argyratus community (species group 8). **7.** Homalanthus populneus community (species group 9). **8.** Duabanga moluccana community (species group 10). **9.** Tristania whitiana community (species group 11). **10.** Melastoma malabathricum scrub (species group 2). Abbreviation symbols are as follows. Topography: US, Upper part of slope; LS, Lower part of slope; R, Ridge; MS, Middle part of slope; V, Valley. Geology: P, Pamaluan and Balikpapan formations; PB, Pulau Balang formation. Forest condition: U, Unburnt area; PB, Partially burnt area; B, burnt area; LB, Logging and after that burnt area; R, Road side or open land; S, Scrub land; Letters attached to the scientific names: T, Tree with DBH > 4.5 cm; S, Shrub with 4.5 cm < DBH. Figures are basal areas shown as km^2/ha.

	stand No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	Plot No.	P I 1	P I 2	P I 1 1	P I 1 3	P I 1 7	P I 6	P I 1 2	P I 1 0	P I 9	P I 7	P I 1 4	P I 1 6	P I 3	P I 5	P I 4	P I 8 I 2	P I 1 5	P I 8 I 1	
	Topography	US	LS	R	US	MS	US	US	LS	R	US	V	R	V	US	US	US	R	US	
	Altitude (m)	185	166	200	210	200	245	230	220	240	200	150	210	150	280	320	230	210	230	
	Slope aspect	S	NE	NW	NW		S	NE	NE	NE	NW		SW		SE	NE	NW	NE	N	
		0	50	52	78	0	0	22	80	40	0	0	78	0	45	45	10	22	0	
	Slope degree (°)	10	16	16	10	0	20	13	25	10	20	0	13	0	20	8	13	10	14	
	Geology	P	P	PB	PB	P	PB	PB	PB	PB	PB	P	P	P	P	P	PB	P	PB	
	Forest condition	U	U	U	U	R	PB	B	PB	B	B	LB	B	LB	B	B	B	R	S	
	Area (m2)	2000	2000	2000	2000	75	2000	400	400	400	600	400	200	400	420	400	200	200	100	
	Number of species	144	187	99	147	50	97	46	59	19	43	57	29	45	40	12	13	6	2	
	1. Differential species of natural forest																			
1	Shorea polyandra T	2.612	0.085	0.028	10.539	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
2	Shorea polyandra S	0.045	0.078	0.170	0.370	-	-	-	-	-	-	-	-	-	0.057	-	-	-	-	5
3	Shorea dasyphylla T	0.081	-	0.070	0.141	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
4	Shorea dasyphylla S	-	-	-	0.021	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	2
5	Shorea parvifolia 1 S	0.001	0.061	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
6	Shore sp.1 T	0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
7	Shoera spp. T	9.918	1.053	0.011	0.159	-	1.218	-	-	-	-	-	-	-	-	-	-	-	-	5
8	Shorea spp. S	0.010	0.002	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
9	Mallotus affinis 1 S	0.013	0.023	0.027	0.210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
10	Polyalthia sumatrana T	0.624	0.783	0.528	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
11	Polyalthia elliptica T	-	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
12	Polyalthia elliptica S	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
13	Polyalthia oblonga S	0.007	0.024	-	0.001	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	4
14	Polyalthia subcordata S	-	0.001	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
15	Polyalthia lateriflora 1 T	0.021	-	-	0.098	-	-	-	-	-	-	-	-	-	0.198	-	-	-	-	3
16	Polyalthia lateriflora 1 S	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
17	Polyalthia laterifolia 2 T	-	-	0.082	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
18	Polyalthia lateriflora 2 S	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
19	Polyalthia laterifolia S	0.002	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
20	Polyalthia sp.3 T	-	-	0.072	0.049	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
21	Polyalthia sp.2 T	-	-	-	0.040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
22	Palaquim sp.2 T	0.124	0.019	0.036	0.040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
23	Aporosa grandistipulata 1 T	0.020	0.011	-	0.063	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
24	Aporosa grandistipulata 1	-	0.035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
25	Aporosa grandistipulata 3 T	-	-	0.022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
26	Aporosa lunata T	0.026	0.020	0.135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
27	Aporosa lunata S	0.009	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
28	Ardisia sp.1 T	-	0.017	-	0.016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
29	Ardisia sp.1 S	0.004	0.078	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
30	Ardisia sp. 2 S	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
31	Actinodaphne sp.1 T	0.025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
32	Actinodaphne sp.2	0.142	-	-	0.069	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
33	Baccaurea angulata T	0.178	0.087	-	0.184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
34	Baccaurea angulata S	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
35	Baccaurea macrocarpa T	0.053	-	-	0.055	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
36	Baccaurea macrocarpa S	0.020	0.032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
37	Baccaurea stipulata T	0.435	0.668	0.053	0.037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
38	Baccaurea stipulata S	0.231	0.187	-	0.001	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	4
39	Chisocheton beccarianus S	0.005	-	-	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
40	Canarium littorale T	-	0.018	-	0.035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
41	Diospyros sumatrana T	-	0.009	0.021	1.737	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
42	Diospyros sp.2 T	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
43	Diospyros sp.4 T	0.625	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
44	Diospyros sp.5 T	0.012	-	-	0.067	-	-	-	-	-	-	-	-	0.075	-	-	-	-	-	3
45	Diospyros sp.5 S	0.011	0.002	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
46	Diospyros sp.6 T	-	-	-	0.078	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
47	Diospyros sp.6 S	0.019	-	0.008	0.014	-	-	-	-	-	0.004	-	-	-	-	-	-	-	-	4
48	Didimocheton nutan 1 T	-	0.129	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
49	Drypetes longifolia T	1.076	0.071	0.193	0.441	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
50	Endiandra sp. T	0.069	-	-	0.037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
51	Endiandra sp. S	0.001	0.001	-	0.037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
52	Eugenia perspecinnervia S	0.043	-	0.011	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	3
53	Eugenia sp.3 T	-	-	0.203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
54	Eugenia sp.3 S	0.033	-	0.023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
55	Eugenia sp.9 T	-	-	0.030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
56	Heliciopsis artocarpoides S	0.027	-	-	0.028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
57	Lophopetalum javanicum T	-	0.024	-	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
58	Microcos lorzinggi T	-	0.024	-	0.199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
59	Microcos lorzinggi S	0.001	0.001	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
60	Urophyllum corymbosum T	0.014	-	-	0.036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
61	Urophyllum corymbosum S	0.001	0.002	-	-	-	0.001	-	-	-	-	0.001	-	-	-	-	-	-	-	4
62	Urophyllum arboreum 1 T	-	0.017	0.014	0.019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
63	Urophyllum arboreum 1 S	-	0.013	0.005	0.026	-	0.011	-	0.001	-	-	-	-	-	-	-	-	-	-	5
64	Urophyllum arboreum 3 S	-	0.012	0.001	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
65	Urophyllum macrophyllum T	-	-	-	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
66	Urophyllum macrophyllum S	0.027	0.006	-	0.009	-	-	-	-	-	-	0.003	-	-	-	-	-	-	-	4
67	Lauraceae spp.	0.195	-	1.608	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2

No. of emergence

	stand No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
2. Differential species of secondary forest and Melastoma malbathricum community																				
68	Melastoma malabathricum S	-	-	-	-	-	0.006	0.002	0.038	0.002	0.067	-	0.004	0.007	-	-	0.032	0.045	0.496	10
69	Uncaria attenuata T	-	-	-	0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
70	Uncaria attenuata s	-	-	-	0.008	0.062	-	0.044	0.014	0.164	0.131	0.056	0.044	-	0.230	-	0.003	-	-	10
71	Uncaria spp. S	-	-	-	-	-	0.002	0.009	0.014	-	-	0.008	-	0.020	-	-	-	0.008	-	6
72	Macaranga pruinosa T	-	-	-	-	-	1.011	-	1.474	-	-	11.780	-	1.429	-	-	-	-	-	4
73	Macaranga pruinosa S	-	-	-	-	0.061	0.369	2.325	-	0.044	0.028	-	0.190	-	-	-	0.024	-	-	7
74	Mallotus lackeyi T	0.143	-	-	-	-	-	-	-	-	-	-	-	0.120	-	-	-	-	-	2
75	Mallotus lackeyi S	-	-	-	-	-	-	-	-	-	0.005	0.061	-	0.589	0.392	0.202	-	-	-	5
76	Zingiberaceae sp. red S	-	-	-	0.001	-	0.001	1.000	0.001	0.001	0.001	0.001	0.001	1.103	-	-	0.008	-	-	10
77	Zingiberaceae sp. white S	-	-	-	0.001	-	1.000	0.001	0.001	-	0.001	-	0.001	0.038	-	-	0.001	-	-	8
78	Zingiberaceae spp. H	-	-	-	-	0.001	-	0.001	0.001	-	-	-	-	-	-	0.772	-	-	-	4
79	Xylopia ferruginea S	-	-	-	-	0.008	0.006	0.288	0.002	-	-	-	-	-	-	-	0.016	-	-	5
80	Clerodendron buchanani S	-	-	-	-	-	0.007	-	0.001	-	0.001	-	-	-	-	0.024	-	-	-	4
81	Vitaceae heart shaped leaf S	-	-	-	-	-	-	0.001	0.018	-	-	-	-	-	-	-	0.001	-	-	3
82	Lygodium circinatum S	-	-	-	-	-	-	0.001	-	-	-	-	-	-	0.001	-	-	-	-	2
83	Callicarpa longifolia T	-	-	-	-	-	0.008	-	-	-	-	-	-	-	-	-	-	-	-	1
84	Callicarpa longifolia S	-	-	-	-	-	-	0.021	0.025	-	-	-	-	-	-	-	-	-	-	2
3. Differential species of Shorea forest																				
85	Aglaia odoratissima	0.046	0.159	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
86	Baccaurea sumatrana T	0.037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
87	Baccaurea sumatrana S	0.002	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
88	Canarium denticulatum T	-	0.080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
89	Canarium denticulatum S	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
90	Canarium odontophyllum S	0.009	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
91	Ficus strangler spp.	0.023	0.109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
92	Helicia robusta 1 T	0.023	0.021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
93	Knema latifolia S	0.014	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
94	Lophopetalum javanicum S	0.020	0.063	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
95	Lithocarpus spicatus S	0.006	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
96	Leguminosae sp.1 S	0.010	0.025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
97	Meiogyne virgata S	0.001	0.017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
98	Nephelium mutabile S	0.012	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
99	Oxymitra cesnerformis T	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
100	Oxymitra cesnerformis S	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
101	Polyalthia lateriflora 3 S	-	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
102	Polyalthia lateriflora 3 T	0.042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
103	Pithecellobium sp. T	0.749	3.855	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
104	Pithecellobium sp. S	0.077	0.082	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
105	Palaquim sp.1 Ficus? T	0.011	0.024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
106	Shorea koordesii T	0.010	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
107	Santiria griffithii T	-	0.023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
108	Santiria griffithii S	0.002	0.048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
109	Santiria sp. S	0.015	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
4. Differential species of Dryobalanops forest																				
110	Dryobalanops sp. T	-	-	29.453	17.428	-	-	-	-	-	-	-	-	0.326	-	-	-	-	-	3
111	Dryobalanops sp. S	0.011	-	0.390	0.087	-	-	-	-	-	-	0.029	-	-	-	-	-	-	-	4
112	Blumedendron tokbai T	-	-	0.027	0.040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
113	Durio griffithii T	-	-	0.027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
114	Durio griffithii S	-	-	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
115	Heliciopsis artocarpoides T	-	-	0.035	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
116	Gonystylus keytii T	-	-	0.312	0.166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
117	Horsfieldia lanceifolius T	-	-	0.138	0.126	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
118	Hopea bracteata T	-	-	0.105	0.432	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
119	Hopea bracteata S	-	-	-	0.001	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	2
120	Horsfieldia lanceifolius S	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
121	Knema laurina T	-	-	0.158	0.260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
122	Knema laurina S	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
123	Microcos hirsuta T	-	-	0.071	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
124	Shorea eximia(S.ovalis) T	-	-	0.083	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
125	Shorea eximia(S.ovalis) S	-	-	-	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
126	Diptrocarpaceae spp. T	-	-	12.542	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
127	Sageraea lanceolata T	-	-	0.232	0.017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
5. Differential species of Shorea scrub																				
128	Shorea johorensis T	-	-	-	-	0.596	-	-	-	-	-	-	-	-	-	-	-	-	-	1
129	Shorea gratissima S	-	-	-	-	0.029	-	-	-	-	-	-	-	-	-	-	-	-	-	1
130	Hedyotis ocimoides S	-	-	-	-	0.149	-	-	-	-	-	-	-	-	-	-	-	-	-	1
131	Uncaria gambir S	-	-	-	-	0.027	-	-	-	-	-	-	-	-	-	-	-	-	-	1
132	Celtis sp. S	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	1
133	Litsea densiflora S	-	-	-	-	0.029	-	-	-	-	-	-	-	-	-	-	-	-	-	1
134	Polyalthia rumphii S	-	-	-	-	0.016	-	-	-	-	-	-	-	-	-	-	-	-	-	1
135	Psychotria sp.2 S	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	1
136	Urophyllum sp.2 S	-	-	-	-	0.008	-	-	-	-	-	-	-	-	-	-	-	-	-	1
137	Guioa bijuga S	-	-	-	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	1
138	Gleichenia dichotoma H	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	1
139	Uncaria arboreum 1 S	-	-	-	-	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	1
140	Cissus rostrata S	-	-	-	-	0.089	-	-	-	-	-	-	-	-	-	-	-	-	-	1
141	Vitex sp. S	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	1

	stand No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
6. Differential species of Macaranga gigantea - Macaranga trichocarpa community																				
142	Ficus uncinata 1 T	-	-	-	-	-	0.022	-	-	-	-	-	-	-	-	-	-	-	-	1
143	Ficus uncinata 1 S	-	-	-	-	0.123	0.002	0.021	0.092	-	0.294	0.051	0.181	-	-	-	-	-	-	7
144	Macaranga trichocarpa T	-	-	-	-	-	0.180	-	-	-	-	-	-	-	-	-	-	-	-	1
145	Macaranga trichocarpa S	-	-	-	-	0.047	0.292	1.617	0.374	6.876	0.633	-	0.328	-	-	-	-	-	-	7
146	Macaranga gigantea T	-	-	-	-	-	2.785	8.217	0.518	-	0.161	-	3.196	-	-	-	-	-	-	5
147	Macaranga gigantea S	-	-	-	0.002	2.415	0.118	-	-	0.181	-	0.032	-	-	-	-	-	-	-	5
148	Uncaria glabra S	-	-	-	-	0.144	0.001	0.037	-	-	-	0.003	0.032	-	-	-	-	-	-	5
149	Melodorum kentii S	-	-	-	-	0.009	0.040	0.015	0.014	0.003	-	0.005	-	-	-	-	-	-	-	6
150	Rubus moluccanus S	-	0.028	-	-	-	-	-	0.010	0.038	0.002	-	0.010	-	-	-	-	-	-	5
151	Artabotrys suaveolens S	-	-	-	-	0.002	-	0.007	0.008	-	-	0.003	-	-	-	-	-	-	-	4
152	Dillenia sp.2 S	-	-	-	-	0.016	0.043	0.149	0.039	-	-	-	0.030	-	-	-	-	-	-	5
153	Stenochlaena palustris S	-	-	-	-	0.006	0.002	0.002	-	-	0.001	-	-	-	-	-	-	-	-	4
154	Embelia ribes S	-	-	-	-	0.001	-	0.001	-	-	-	0.010	-	-	-	-	-	-	-	3
155	Phrynium capitatum S	-	-	-	-	-	0.001	-	0.001	-	0.001	-	-	-	-	-	-	-	-	3
156	Embelia javanica S	-	-	-	-	-	-	-	0.001	-	-	0.021	0.063	-	-	-	-	-	-	3
157	Embelia philippinensis S	-	-	-	-	-	-	-	-	0.006	0.012	-	0.005	-	-	-	-	-	-	3
6-1. Subordinate of typicum																				
158	Mallotus paniculatus 1 T	-	-	-	-	-	1.383	-	0.745	-	2.466	-	-	-	-	-	-	-	-	3
159	Mallotus paniculatus 1 S	-	-	-	-	-	0.496	0.971	-	0.511	-	-	-	-	-	-	-	-	-	3
160	Mallotus paniculatus 2 T	-	-	-	-	-	0.023	-	-	-	-	-	-	-	-	-	-	-	-	1
161	Plagiostachys sp. S	-	-	-	-	-	0.001	-	1.000	-	-	-	-	-	-	-	-	-	-	2
162	Glochidion capitatum T	-	-	-	-	-	-	-	-	-	5.824	-	-	-	-	-	-	-	-	1
163	Glochidion capitatum S	-	-	-	-	-	-	-	0.003	-	-	-	0.354	-	-	-	-	-	-	2
6-2. Subordinate of Macaranga pruinosa																				
164	Macaranga hypoleuca T	-	-	-	-	-	-	-	-	-	-	8.169	-	-	-	-	-	-	-	1
165	Macaranga bancana T	-	-	-	-	-	-	-	-	-	-	0.051	-	-	-	-	-	-	-	1
166	Canarium odoratum T	-	-	-	-	-	-	-	-	-	-	0.481	-	-	-	-	-	-	-	1
167	Omalanthus giganteus T	-	-	-	-	-	-	-	-	-	-	0.181	-	-	-	-	-	-	-	1
168	Ficus fistulosa S	-	-	-	-	-	-	-	-	-	-	0.129	-	-	-	-	-	-	-	1
169	Dissochaeta palison S	-	-	-	-	-	-	-	-	-	-	0.023	-	-	-	-	-	-	-	1
170	Hopea dryobalanoides S	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	-	-	-	-	1
171	Ixora havilandii S	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-	-	-	-	-	1
172	Smilax odoratissimus T	-	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	1
6-3. Subordinate of Evodia alba																				
173	Evodia alba T	-	-	-	-	-	-	-	-	-	-	1.926	14.465	0.754	-	-	-	-	-	3
174	Cyclea robusta S	-	-	-	-	-	-	-	-	-	-	-	0.143	-	-	-	-	-	-	1
175	Ampleocissus ochracea S	-	-	-	-	-	-	-	-	-	-	-	0.037	-	-	-	-	-	-	1
176	Vernonia sp. S	-	-	-	-	-	-	-	-	-	-	-	0.019	-	-	-	-	-	-	1
177	Breynia cernua (Liana?) S	-	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-	-	-	-	1
7. Differential species of Anthocephalus chinensis community																				
178	Anthocephalus chinensis T	-	-	-	-	-	-	-	-	-	1.330	-	-	20.301	-	-	-	-	-	2
179	Vernonia cinerea S	-	-	-	-	-	-	-	-	-	-	-	-	0.097	-	-	-	-	-	1
180	Canarium odontophyllum T	-	-	-	-	-	-	-	-	-	-	-	-	0.043	-	-	-	-	-	1
181	Ridelia munitiflora T	-	-	-	-	-	-	-	-	-	-	-	-	0.139	-	-	-	-	-	1
182	Glochidion borneensis T	-	-	-	-	-	-	-	-	-	-	-	-	0.085	-	-	-	-	-	1
183	Glochidion borneensis S	-	-	-	-	-	-	-	-	-	-	0.190	-	0.067	-	-	-	-	-	2
8. Differential species of Croton argyratus community																				
184	Croton argyratus T	-	-	-	-	-	-	-	-	-	-	-	-	0.057	13.835	-	-	-	-	2
185	Croton argyratus S	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	1
186	Cassia nodosa T	-	-	-	-	-	-	-	-	-	-	-	-	-	0.698	-	-	-	-	1
187	Milletia atropurpurea S	-	-	-	-	-	-	-	-	-	-	-	-	-	0.032	-	-	-	-	1
188	Chionanthus sp. S	-	-	-	-	-	-	-	-	-	-	-	-	-	0.004	-	-	-	-	1
189	Tetrastigma pedunculare S	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	-	1
190	Tinomiscium sp. S	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	1
9. Differential species of Homalanthus populens community																				
191	Homalanthus populens T	-	-	-	-	-	-	-	-	-	-	-	-	-	2.418	11.838	-	-	-	2
192	Piper cf. argenteus? S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.177	-	-	-	1
193	Blumea chinensis S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.025	-	-	-	1
10. Differential species of Duabanga moluccana community																				
194	Duabanga moluccana T	-	-	-	-	-	-	-	1.101	-	-	-	-	1.203	-	-	9.563	-	-	3
195	Duabanga moluccana S	-	-	-	-	-	-	-	-	-	-	-	0.034	-	-	-	-	-	-	1
11. Differential species of Tristania whitiana community																				
196	Tristania whitiana T	-	-	-	-	1.012	-	-	-	-	-	-	-	-	-	-	-	4.948	-	2

	stand No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
12. Species growing on the Pamaluan and Balikpapan formation.																				
197	Eugenia sp.1 T	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
198	Eugenia sp.1(E.argyrocalyx) S	0.001	0.026	-	-	-	-	-	-	-	-	0.034	-	0.027	-	-	-	-	-	4
199	Psueduvaria reticulata T	0.021	0.260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
200	Psueduvaria reticulata S	0.006	-	-	-	-	-	-	-	-	-	-	-	0.010	-	-	-	-	-	2
201	Leea aculeata T	-	-	-	-	-	-	-	-	-	-	-	-	0.085	-	-	-	-	-	1
202	Leea aculeata S	-	0.430	-	-	-	-	-	-	-	-	0.109	-	0.175	0.039	0.059	-	-	-	5
203	Diospyros malayana? S	0.009	0.103	-	-	-	-	-	-	-	-	-	-	-	0.081	0.242	-	-	-	4
204	Dillenia excelsa T	-	0.146	-	-	-	-	-	-	-	-	-	-	-	0.123	-	-	-	-	2
205	Dillenia excelsa 1 S	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	0.014	-	-	-	2
206	Euphorbiaceae spp. T	0.042	0.184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
207	Euphorbiaceae spp. S	-	0.001	-	-	-	-	-	-	-	-	0.007	-	-	-	-	-	-	-	2
208	Mallotus miquerianus S	0.175	0.052	-	-	-	-	-	-	-	-	0.001	-	0.099	-	-	-	-	-	4
209	Pavetta sylvatica S	0.002	0.005	-	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	3
13. Species growing on the Pulau Balang formation																				
210	Borassodendron borneensis T	-	-	2.281	0.468	-	4.729	4.690	1.710	-	0.387	-	-	-	-	-	-	-	-	6
211	Borassodendron borneesis S	-	-	-	-	-	0.001	-	-	-	-	-	0.001	-	-	-	-	-	-	2
212	Artocarpus rigidis 1 T	-	-	-	-	-	-	-	-	-	0.275	-	-	-	-	-	-	-	-	1
213	Artocarpus rigidus 2 T	-	-	0.863	0.157	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
214	Dipterocarpus elongatus T	-	-	0.020	-	-	0.966	-	-	-	-	-	-	-	-	-	-	-	-	2
215	Dissochaeta gracilis T	-	-	0.193	-	-	0.783	-	-	-	-	-	-	-	-	-	-	-	-	2
216	Koilodepas brives T	-	-	1.737	2.286	-	0.009	-	-	-	-	-	-	-	-	-	-	-	-	3
217	Koilodepas brevis S	-	-	-	0.199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
218	Mallotus echinatus T	-	-	1.300	1.340	-	0.003	-	-	-	-	-	-	-	-	-	-	-	-	3
219	Mallotus echinatus S	-	-	-	0.037	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
220	Parastemon urophyllum T	-	-	0.125	-	-	0.967	-	-	-	-	-	-	-	-	-	-	-	-	2
221	Polyalthia sp.2 S	-	-	-	0.014	-	-	-	0.003	-	-	-	-	-	-	-	-	-	-	2
14. Remained species after forest fire																				
222	Eusideroxylon zwagvri T	8.636	17.039	11.233	1.518	-	3.074	-	6.037	-	-	14.523	-	-	-	-	-	-	-	7
223	Eusideroxylon zwageri S	0.058	0.169	-	0.045	-	-	-	-	-	-	-	-	0.027	-	-	-	-	-	4
224	Ellipanthus beccarii var. peltatus	0.023	0.055	0.043	0.084	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
225	Ellipanthus baccarii var. peltatus	0.036	0.023	0.063	0.011	-	0.025	-	0.012	-	-	-	-	-	0.001	-	-	-	-	7
226	Drypetes longifolia S	0.103	0.091	0.014	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	-	4
227	Aporosa frutescens T	0.363	1.793	0.065	-	-	-	-	-	-	-	-	-	0.192	-	-	-	-	-	4
228	Aporosa frutescens S	0.001	0.014	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	3
229	Aglaia tomentosa T	-	0.012	-	0.023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
230	Aglaia tomentosa S	0.028	0.009	-	-	-	-	-	0.325	-	-	-	-	-	-	-	-	-	-	3
231	Artocarpus lanceifolius T	-	0.049	0.475	0.287	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
232	Artocarpus lanceifolius S	-	-	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	1
233	Annonaceae spp. T	0.001	-	0.106	0.012	-	-	-	-	-	-	-	-	-	0.299	-	-	-	-	4
234	Annonaceae shrub S	-	-	-	-	-	0.003	-	-	-	-	-	-	-	-	-	-	-	-	1
235	Diospyros sp.(Annona No.1) T	-	-	-	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
236	Diospyros sp. (Annona No.1) S	-	0.032	0.001	0.001	-	-	-	-	-	0.001	-	-	-	0.005	-	-	-	-	5
237	Dacryodes rostrata T	0.067	0.063	0.090	0.055	-	0.014	-	-	-	-	-	-	-	-	-	-	-	-	5
238	Dacryodes rostrata S	0.002	0.010	-	0.001	0.045	0.003	0.006	0.006	-	-	-	-	-	0.065	-	-	-	-	8
15. Companions																				
239	Omphalea bracteata S	0.045	0.027	-	0.003	-	-	-	-	-	-	0.008	-	-	0.078	0.003	0.003	-	-	7
240	Pternandra rostrata T	-	-	-	-	-	0.062	-	-	-	-	-	-	-	-	-	-	-	-	1
241	Pternandra rostrata S	0.012	0.001	-	0.017	1.174	0.002	-	-	0.015	-	-	-	-	-	-	-	-	-	6
242	Paranephelium nitidum T	-	0.796	-	-	-	-	-	-	-	-	-	-	0.569	-	-	-	-	-	2
243	Paranephelium nitidum S	0.092	0.007	-	0.035	-	-	-	-	-	-	0.178	-	-	0.798	-	-	-	-	5
244	Tetracera sp.1 big leaf S	-	0.015	-	-	-	0.004	-	-	0.004	-	-	-	-	-	-	-	-	-	3
245	Tetracera spp. S	-	0.003	0.002	0.081	0.065	0.019	0.002	-	-	-	0.012	0.001	0.003	-	-	-	-	-	9
246	Vitaceae spp. S	-	0.001	0.001	0.006	0.012	0.001	-	-	-	0.001	0.001	0.003	-	-	-	-	-	-	8
247	Xxxx T	1.149	0.196	0.147	0.406	-	6.426	-	-	-	6.303	1.237	-	-	-	-	-	-	-	7
248	Xxxx S	0.005	-	0.034	0.001	0.004	0.003	0.004	0.035	-	-	-	0.012	0.141	-	0.008	0.001	-	-	11
249	Costus speciosus S	-	-	-	-	-	-	-	-	-	0.005	-	-	-	-	-	0.014	-	-	2
250	Scleria purpurascens S	-	-	-	-	-	-	-	-	-	-	-	0.008	-	-	-	-	0.001	-	2
251	Dillenia sp.2 T	-	-	-	-	-	-	-	-	-	-	0.187	-	-	-	-	-	-	-	1
252	Ficus shrub spp. S	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	1
253	Ficus sp.2 S	-	-	-	-	-	-	-	0.005	-	0.001	-	-	-	-	-	-	-	-	2
254	Cissus sp. S	-	-	-	-	-	-	-	-	-	0.005	-	-	-	-	-	-	-	-	1
255	Aphanamixis humile T	-	-	-	0.009	-	0.369	-	-	-	-	-	-	-	-	-	-	-	-	2
256	Annonaceae spp. S	-	-	-	0.009	-	-	-	0.002	-	0.001	0.003	-	0.004	-	-	-	-	-	5
257	Blumea balsamifera S	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	0.023	-	0.036	3
258	Aglaia spp. S	0.001	-	-	-	-	-	-	-	-	-	-	-	0.010	-	-	-	-	-	2
259	Aglaia tomentosa ? S	-	0.026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
260	Aglaia argentea S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
261	Ardisia macrophylla T	-	-	-	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
262	Ardisia macrophylla S	-	-	-	-	-	-	-	-	-	-	-	-	0.072	-	-	-	-	-	1
263	Agelaea borneensis S	-	0.007	0.029	-	-	-	-	-	-	-	0.046	-	-	-	-	-	-	-	3
264	Antidesma stipulare T	-	0.479	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
265	Antidesma stipulare S	-	-	-	-	0.008	-	-	-	-	-	-	-	-	-	-	-	-	-	1
266	Agelaea trinervis 1 S	-	0.001	-	0.027	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	3
267	Agelaea trinervis 3 T	-	-	-	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
268	Agelaea trinervis 3 S	-	0.019	0.001	0.001	-	-	0.001	-	-	-	0.001	-	-	-	-	-	-	-	5
269	Baccaurea javanica T	0.237	-	-	-	-	0.018	-	-	-	-	-	-	-	-	-	-	-	-	2
270	Baccaurea javanica S	-	-	-	-	-	0.008	-	-	-	-	-	-	-	-	-	-	-	-	1
271	Agelaea borneensis S	-	-	-	0.040	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	2

	stand No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
272	Rourea minosoides ? S	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
273	X Liana A538 opposite leaf	0.105	0.041	0.010	0.004	0.011	-	0.001	0.001	-	-	-	-	0.007	-	-	-	-	-	8
274	Canarium hirsutum 1 T	-	0.019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
275	Canarium hirsutum 2 T	-	-	-	-	-	-	-	-	-	0.212	-	-	-	-	-	-	-	-	1
276	Calamus sp.4 S	-	-	-	-	-	0.008	-	-	-	-	-	-	-	-	-	-	-	-	1
277	Calamus sp.5 S	-	-	0.001	-	-	-	-	0.006	-	-	-	-	-	-	-	-	-	-	2
278	Connarus grandis S	0.001	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	2
279	Coccium sp.(Coseinum fenestratum) S	-	-	-	-	0.001	-	-	-	-	-	-	-	-	0.023	-	-	-	-	2
280	Coccium sp. S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
281	Dehaasia cf. firma T	-	0.048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
282	Dehaasia cf. firma S	-	-	-	-	-	-	-	0.003	-	-	-	-	-	-	-	-	-	-	1
283	Cratoxylum cochinchinense S	-	-	-	-	0.037	-	-	-	-	0.095	-	-	-	-	-	-	-	-	2
284	Dysoxylum sp.1 T	-	-	-	-	-	-	-	-	-	-	-	-	-	0.094	-	-	-	-	1
285	Dysoxylum sp.1 S	-	0.021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
286	Eugenia sp.4 T	-	0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
287	Eugenia sp.4 S	0.001	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	2
288	Eugenia sp.10 S	0.023	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	2
289	Eugenia sp.5 T	-	0.029	-	-	-	-	-	-	-	-	-	-	0.051	-	-	-	-	-	2
290	Eugenia sp.5 S	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	1
291	Eugenia sp.6 T	-	-	0.016	0.224	-	0.040	-	-	-	-	-	-	-	-	-	-	-	-	3
292	Eugenia sp.6 S	-	0.003	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
293	Eugenia sp.8 T	-	-	-	0.021	-	2.082	-	-	-	-	-	-	-	-	-	-	-	-	2
294	Embelia beccariana S	-	-	-	-	-	-	-	-	-	-	-	-	0.006	-	-	-	-	-	1
295	Eugenia sp.7 S	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	1
296	Eugenia desyphyens S	-	-	-	-	0.030	-	-	-	-	-	-	-	-	-	-	-	-	-	1
297	Ficus uncinata 2 T	0.037	-	-	-	-	-	-	-	-	-	-	-	0.152	-	-	-	-	-	2
298	Ficus uncinata T	0.080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
299	Ficus uncinata 2 S	-	-	-	-	-	-	-	-	-	-	0.277	-	-	0.265	-	-	-	-	2
300	Fagraea racemosa S	-	-	-	-	-	-	-	-	-	-	0.255	-	-	-	-	-	-	-	1
301	Ficus variegata S	-	-	-	-	-	-	-	-	-	-	0.297	-	-	0.074	-	-	-	-	2
302	Ficus obscura S	-	-	-	-	-	-	-	-	0.002	0.021	-	-	-	-	-	-	-	-	2
303	Goniothalamus macrophyllus T	0.020	-	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
304	Goniothalamus macrophyllus S	0.020	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-	2
305	Glochidion arborscens S	0.006	0.021	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	3
306	Gardenia sp. S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	1
307	Harpulia sp. T	-	-	0.103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
308	Korthasia spp. T	0.052	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
309	Korthalsia spp. S	0.032	0.088	-	-	-	-	-	0.019	-	-	-	-	-	0.088	-	-	-	-	4
310	Korthalsia robusta 1 S	-	-	-	-	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	1
311	Leguminosae spp. S	0.003	-	-	-	-	-	-	0.560	-	-	-	-	-	-	-	-	-	-	2
312	Litsea oppositifolia 1 T	-	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
313	Litsea oppositifolia 2 S	-	0.017	-	-	-	-	-	-	-	-	-	-	-	0.041	-	-	-	-	2
314	Litsea spp. T	-	0.100	-	-	-	-	-	-	-	-	-	-	0.096	-	-	-	-	-	2
315	Litsea angulata ? T	0.009	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
316	Litsea angulata S	-	0.042	0.001	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	3
317	Litsea robusta T	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
318	Litsea ferruginea S	-	-	-	-	-	0.001	0.026	-	-	-	-	-	-	-	-	-	-	-	2
319	Lithsea sp.1 T	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
320	Lithocarpus spp. T	-	-	-	-	-	0.026	-	-	-	-	-	-	-	-	-	-	-	-	1
321	Lauraceae spp. S	-	-	-	0.003	-	-	-	0.042	-	-	-	-	-	-	-	-	-	-	2
322	Leguminosae spp. T	-	-	-	-	-	-	7.264	-	-	-	-	-	-	-	-	-	-	-	1
323	Myristicaceae spp. T	0.726	-	0.974	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
324	Myristicaceae spp. T	-	0.152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
325	Milletia sp. (endissima) 2 T	-	-	-	-	-	0.007	-	-	-	-	-	-	-	-	-	-	-	-	1
326	Milletia sp. (endissima) 2 S	-	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	1
327	Myristicaceae spp. S	-	-	-	-	-	-	-	-	-	-	-	-	-	0.022	-	-	-	-	1
328	Nephelium sp.2 T	-	-	-	-	-	-	-	-	-	-	-	-	0.110	-	-	-	-	-	1
329	Nephelium sp.2 S	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
330	Nauclea orientalis	-	-	0.122	-	0.033	-	-	-	-	-	-	-	-	0.297	-	-	-	-	3
331	Nauclea spp. T	-	-	-	-	-	0.217	-	-	-	-	-	-	-	-	-	-	-	-	1
332	Nauclea subdita 1 T	-	-	-	0.274	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
333	Oxymitra cuneiformis? S	-	-	-	0.003	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-	2
334	Oxymitra canaeformis S	-	-	-	0.001	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	2
335	Cayratia geniculata 1 S	-	0.001	-	-	-	-	-	-	-	0.026	-	-	-	-	-	-	-	-	2
336	Dehaasia coriantha S	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
337	Popovia pisocarpa 1 S	-	0.028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
338	Popovia pisocarpa 1 T	-	0.042	-	-	-	-	-	-	-	-	-	-	-	0.023	-	-	-	-	2
339	Popovia piscocarpa 2 S	-	-	-	0.025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
340	Piper sp. S	-	0.007	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	2
341	Piper spp. S	-	0.001	-	-	-	-	-	-	-	0.008	-	-	-	-	-	-	-	-	2
342	Plectronia sp. S	-	0.019	-	-	-	-	-	-	-	-	-	-	0.010	-	-	-	-	-	2
343	Pentace burmanica S	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	1
344	Prastemon urophyllum S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	-	1
345	Rubiaceae spp. S	0.011	-	-	0.005	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	3
346	Saurauia sp. T	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
347	Saurauia sp.(exavata) S	-	0.050	-	0.005	-	-	-	-	-	-	0.118	-	-	-	-	-	-	-	3
348	Sapindaceae spp. T	-	-	-	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
349	Semecarpus sp.2 T	-	0.057	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
350	Stemonurus sp. S	-	0.006	-	-	-	-	-	0.001	-	-	0.002	-	-	-	-	-	-	-	3
351	Semecarpus sp.4 T	-	-	-	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
352	Semecarpus sp.3 S	-	0.038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
353	Shorea parvifolia 2 S	-	-	-	-	-	-	-	-	-	-	-	-	-	0.098	-	-	-	-	1
354	Scorodicarpus borneensis S	-	-	-	-	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	1
355	Sindora coriaceae T	-	-	-	-	-	-	-	-	-	-	-	-	0.221	-	-	-	-	-	1
356	Sindora coriaceae S	-	0.028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
357	Talauma beccari T	-	0.034	-	-	-	0.009	-	-	-	-	-	-	-	-	-	-	-	-	2