

Heart of Borneo Series 6
**Checklist of Plants of Lanjak Entimau
Wildlife Sanctuary**



FOREST DEPARTMENT SARAWAK



The Heart of Borneo Series 6: Checklist of Plants of Lanjak Entimau Wildlife Sanctuary

**THE HEART OF BORNEO SERIES 6:
CHECKLIST OF PLANTS OF LANJAK
ENTIMAU WILDLIFE SANCTUARY**

Sarawak Forest Department

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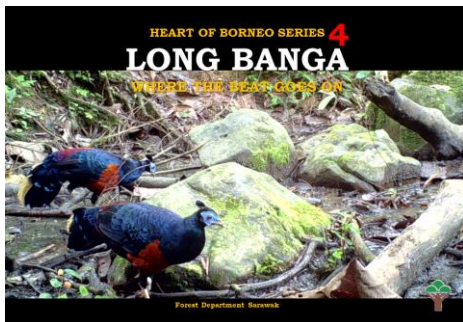
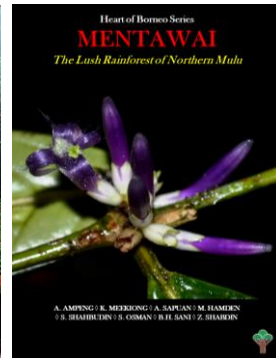
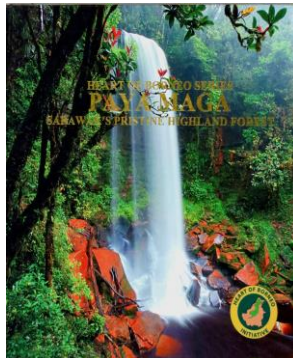
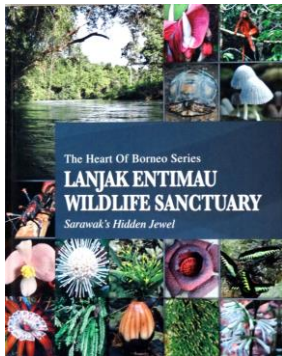
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INAUGURAL

The Heart of Borneo (HoB) Initiative is a voluntary transboundary cooperation between Brunei, Indonesia and Malaysia. The Declaration was signed on February 2007. The project aims to protect the biological, ecological, cultural richness and as well as for conservation of rainforest of Borneo. In Sarawak, the HoB covers 2.689 million ha over a contiguous block along Sarawak's boundaries with Kalimantan, Sabah and Brunei. The HoB is fully in line with existing policies by both state and federal government. The HoB focusing on three key elements; people welfare, biodiversity conservation and protection of environment based on five pillars, (1) sustainable forest management, (2) ecotourism-based on cultural, adventure and nature, (3) conservation of biological diversity, (4) sustainable landuse, and (5) community-based poverty eradication program.

This plants checklist book is our six serial from the Heart of Borneo Series in conjunction with the scientific expedition conducted in Lanjak Entimau Wildlife Sanctuary in 2008 and data from the past research conducted in the areas.



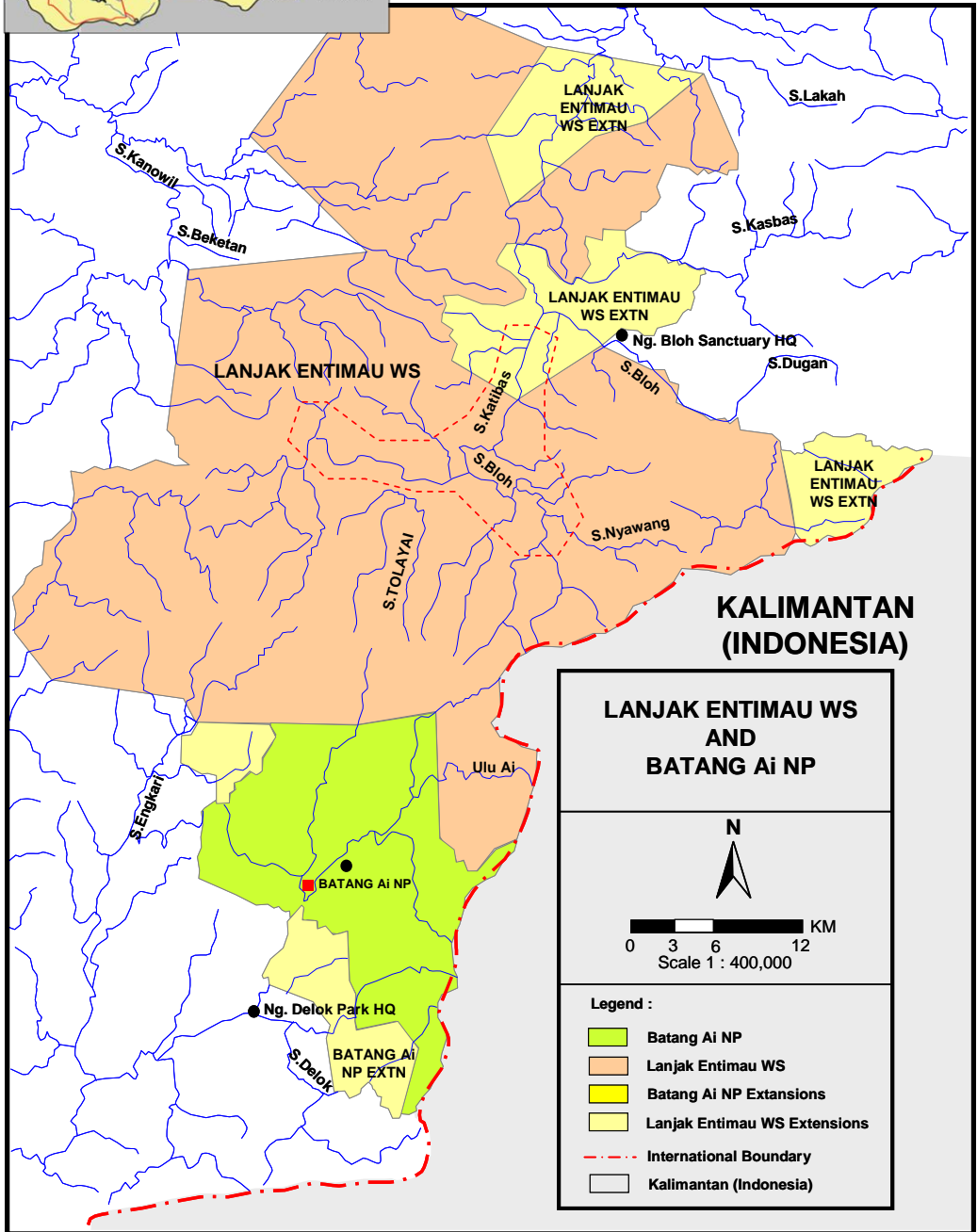
INTRODUCTION

Lanjak Entimau Wildlife Sanctuary (LEWS) was constituted as a wildlife sanctuary on 2nd February 1983 specifically for the protection of orangutan and hornbills. The role is fully realised as it becomes a vital part of the Transboundary Biodiversity Conservation Area with Betung Kerihun National Park, Kalimantan, Indonesia in 1994. It is situated in the southwestern part of Sarawak in the watershed of Lupar and Rejang Rivers within the Second, Third, Six and Seventh Divisions. LEWS is the largest Totally Protected Area in Sarawak with the coverage areas of 168,758 ha (1983) and a proposal has been made to increase the size to 191, 568 ha. It is one of the richest sites for flora in Borneo with an equally distinct selection of animals. The HoB Scientific Expedition in 2008 for example, have discovered nine new species of plants [5 gingers, 2 begonias, 1 each for *Mapania* and *Rhizanthes* (possibly new)] and includes many new records of fauna such as 27 species of butterflies, eight species of bats and 4 species of tree shrews.

This series, however only covers the list of plants (includes bryophytes and fungi) that recorded and reported from the LEWS areas based on the data from the ITTO Scientific Expedition (1997), the HoB Scientific Expedition 2008 and various scientific publications.



Figure 1: insert on the top left corner, map of Sarawak; below map of Lanjak Entimau Wildlife Sanctuary including the Batang Ai National Park.



TOPOGRAPHY

The topography of LEWS is rugged throughout the area, with its most strongly dissected terrain located in the south. Elevation range from 60 m above sea level in the flood plains of the north to a maximum of 1285 m at the summit of Bukit Lanjak in the sanctuary southwestern quadrant. Bukit Lanjak (1,285 m), Bukit Entimau (975 m) and Bukit Spali (975 m) are the three major peaks in the sanctuary. Steep slopes with narrow V-shaped valleys prevail.

In areas where impervious sandstone is dominant especially in the southern part of the study area, it usually forms typical parallel to sub-parallel strike ridges running in almost east-west direction crosscut by fault lines which are now marked by lineaments or straight river channels. The northern part of the study area is dominated by shale, hence the topography is rather unsystematic showing no trend at all. The area is also heaved because the shale is more easily eroded forming smooth and rolling topography.

The LEWS is an important water-catchments area and is drained by the Rivers Ensirieng, Mujok, Poi, Ngemah, Katibas, Bloh, Apoh and Kanowi. The rivers of the sanctuary cut mostly across the regional strike crossing deeply eroded valleys through a complex of highly dissected steep ridged with little flood plain development.

GEOLOGY

Basically, the area is occupied by the sedimentary rocks of the Belaga Formation. The formation comprises shale and sandstone which were deposited from Cretaceous until Upper Eocene time (Wolfenden, 1959) (from 90 million years to 38 million years ago) in deep marine environments.

The Belaga Formation is divided into five members namely Layar, Kapit, Pelagus, Metah and Bawang members. Lithologically the formation consists of steeply dipping strata of very thin to very thickly bedded, fine to medium-grained sandstone interbedded with the argillaceous rock.

The Belaga Formation is one of the Rajang Group sedimentary deposits that have been uplifted during the subduction of the Mesozoic oceanic lithosphere beneath West Sarawak continental basement. The Rajang Group includes the Lupar, Belaga, Kelalan and Mulu Formation. The convergence resulted in the closure of Rajang Sea and formed the Rajang Group as accretionary wedge complex. The accretion occurred during the Early Paleocene, Middle Eocene, Upper Eocene and Upper Oligocene (Tongkul, 1996; Madon, 1999).

THE CHECKLIST

The checklist is based on material housed in the Forest Department Herbarium in Kuching and Herbarium Universiti Malaysia Sarawak. Also included a list of plants that extracted from technical reports, technical papers, books, field notes or any published materials regarding the plants from Lanjak Entimau Wildlife Sanctuary (LEWS) and Batang Ai National Park (BANP). The nomenclature follows Turner (1995).

The checklist includes all species known to occur in LEWS, exotic or introduced plant for any purposes, e.g. cultivated for agricultural use, ornamental and for medicine and also includes common weeds as long as the plants are found and recorded in the Sanctuary that includes settlement areas within the areas. A few species are referred to only with numbers, or as 'sp.'. These are apparently distinct species which are currently unidentified and may, in some instances represent undescribed species.

Species entry format

The entry in this checklist for each species can be summarized as followed:

Code number; **species name**; synonym; habit; habitat; uses; notes

Code number – each taxon is referred to by code (e.g. 5.5.73) of three numbers separated by stops. The first number refers to the family, the second for the genus and the third for the species. When a species is represented by more than one infraspecific taxon then each is separately referred to by suffixed letters beginning from a.

Species name – The species name is given in bold type at the start of each entry.

Synonym/basionym – the synonym/basionym of the species is given in the box bracket, italicised but not bold type.

Habit – the general habit of the species is given, often tree, shrub, herb, climbing, epiphytic and etc.

Habitat – the general habitat of the species is given, often being reduced to lowland MDF or hill, or Kerangas or secondary forest. The natural condition of where the plant recorded (occasionally) and the soil types are also included.

Uses – Any uses of the plants that reported is given, including general use, medicinal and others.

Notes – extra notes on the species is given (e.g. new species, a new record, field identification etc.).

Abbreviation used in the list

alt.	=	altitude
Bid.	=	Bidayuh
Ib.	=	Iban
Kay.	=	Kayan

Ked.	=	Kedayan
Kel.	=	Kelabit
Ken.	=	Kenyah
LB.	=	Lun Bawang
LEWS	=	Lanjak Entimau Wildlife Sanctuary
m.	=	meter
Mal.	=	Malay
MDF	=	mixed dipterocarp forest
Mel.	=	Melanau
MSF	=	mixed swamp forest
Pen.	=	Penan
PSF	=	peat swamp forest
Pun.	=	Punan

RESULTS

From *The Heart of Borneo Series: Checklist of Plants of Lanjak Entimau Wildlife Sanctuary*, the number of taxa recorded from Lanjak Entimau Wildlife Sanctuary and its vicinities areas was representing as follow:-

224 families

130 flowering plants (trees and non-trees)

2 gymnosperm family

18 ferns families

2 fern-allies families

22 bryophytes families

50 fungi families

A total of 2664 plant species represented by 582 genera of flowering plants (including trees and non-trees), 134 genera of ferns and fern-allies, 128 genera of bryophytes and 106 genera of macrofungi.

The best-represented plant families are (10 most specious):

Orchidaceae – 57 genera with 149 species [including 20 *Bulbophyllum* spp., 13 *Coelogyne* spp., 12 *Eria* spp., 9 *Dendrobium* spp. and 8 *Appendicula* spp.]

Rubiaceae – 33 genera with 129 species [including 16 *Ixora* spp., 14 *Urophyllum* spp., 13 *Lasianthus* spp., 11 *Psychotria* spp. and 8 *Pleiocarpidia* spp.]

Dipterocarpaceae – 7 genera with 99 species [including 55 *Shorea* spp., 13 *Hopea* spp., 13 *Vatica* spp. and 11 *Dipterocarpus* spp.]

Arecaceae – 17 genera with 99 species

Annonaceae – 27 genera with 82 species [including 17 *Polyalthia* spp.]

Zingiberaceae – 15 genera with 77 species

Myrtaceae – 4 genera with 75 species [including 72 *Syzygium* spp.]

Lauraceae – 12 genera with 72 species [including 25 *Litsea* spp.]

Meliaceae – 7 genera with 62 species [including 36 *Aglaia* spp.]

Myristicaceae – 5 genera with 59 species [including 25 *Knema* spp.]

The most specious genera are (16 most specious):

Syzygium – 72 species

Shorea – 55 species

Aglaia – 36 species

Diospyros – 32 species

Ficus – 28 species

Elaeocarpus – 26 species

Knema, Litsea – 25 species

Calamus – 24 species

Cyrtandra, Pinanga, Baccaurea – 22 species

Aporosa – 20 species

Bulbophyllum – 20 species

Calophyllum – 19 species

Polyalthia – 17 species

Ethnobotanical

The ethnobotanical uses recorded included medicinal plants the used by the humans, as food (included fruits, vegetables and spices), constructions and handicrafts, veterinary uses (mostly to treat worms and diseases in dogs, chickens and pigs), used for wrapping and as well as for ornamental.

Note: *Air masak* is a tonic drink for preventing sickness and maintaining health. Different communities had different ingredients of the plant they have used to prepare the concentration of *Air masak*. For example, the Kedayan community used a mixture of 48 varieties of plants together added with *jintan bitam* (fennel seed) and shallot. The mixtures then boiled in water to make a drink (Chai, 2000). For the Melanau community, the mixtures of plants sometimes fermented in *arake putih* (white beer) that also can be used as body massage oil beside as health tonic. However, the similarity of plants that been used was depending on their believed and knowledge gained from their folks.

1. ARAUCARIACEAE

- 1.1.1 *Agathis borneensis* Warb. Bindang, Damar minyak, Buloh (Ib.); canopy/emergent, midstorey/subcanopy; hill MDF, lower mossy forest; slope, ridge; alluvial clay soils, sandy clay soils.

2. GNETACEAE

- 2.1.1 *Gnetum cuspidatum* Blume. Akar dundun (Ib.); climber, liana, stragling shrub; lowland MDF, hill MDF, secondary forest, emperan; slope, ridge; sandy soils, clay rich soils.
- 2.1.2 *Gnetum diminutum* Markgr. Akar dundun (Ib.); liana, climber; submontane forest; occasional near the stream; alluvial clay soils.
- 2.1.3a *Gnetum gnemon* L. Melinjau; Belinjau; Daun sambong (Ib.); midstorey/ subcanopy, tree, treelet; lowland MDF, degraded MDF, Kerangas, secondary forest; flat ground, gentle slope; alluvial soils. **Uses:** young shoot cooked as vegetable.
- 2.1.3b *Gnetum gnemon* L. var. *brunonianum* (Griff.) Markgr.; Akar dundun (Ib.); lowland MDF, emperan; sandy soils.
- 2.1.4 *Gnetum klosii* Merr. Akar kikat; Akar dundan (Ib.); climber, liana; lowland MDF, hill MDF, sometimes riverine; gentle slope, valley bottom.
- 2.1.5 *Gnetum latifolium* Blume. Akar dundun (Ib.); montane forest; alt up to 1400 m; alluvial clay soils.
- 2.1.6a *Gnetum leptostachyum* Blume. Akar dundun (Ib.); lowland MDF, emperan, occasional near stream; sandy soils.
- 2.1.6b *Gnetum leptostachyum* Blume. var. *robustum* Markgr. Akar dundun (Ib.); lowland MDF, emperan, riparian; sandy soils, clay rich soils.
- 1.1.7 *Gnetum raya* Markgraf. Akar tegang (Ib.); climber, liana, stragling shrub; lowland MDF, hill MDF, emperan; slope, ridge.

- 2.1.8 *Gnetum* sp.3 Liana, climber; lowland MDF, gentle slope, valley bottom; alluvial soils.

3. ACTINIDIACEAE

- 3.1.1 *Saurauia acuminata* Merr. Mata ikan; small tree or treelet; riparian forest, river-bank; sandy soils.
- 3.1.2 *Saurauia amoena* Stapf. Mata ikan; small tree or treelet; montane forest, raiparian forest, river-bank; sandy soils.
- 3.1.3 *Saurauia ferox* Korth. Mata ikan; small tree or treelet; widely distributed in MDF mainly riparian, submontane forest; alt up to 1200 m; sandy alluvial soils.
- 3.1.4 *Saurauia glabra* Merr. Mata ikan; midstorey/subcanopy, small tree or treelet; occasional in MDF and Kerangas forest; alluvial clay soils.
- 3.1.5 *Saurauia heterophylla* Merr. Mata ikan; midstorey/subcanopy, small tree or treelet; lowland MDF, old secondary forest.
- 3.1.6 *Saurauia myrmecoidea* Merr. Mata ikan; small tree or treelet; occasional in MDF mainly riparian; fertile clay soils.
- 3.1.7 *Saurauia nudiflora* C. DC. Mata ikan; midstorey/subcanopy; lowland MDF, riparian forest; sandy soils.
- 3.1.8 *Saurauia cf. planchonii* Hook.f. Mata ikan; small tree or treelet; lowland MDF, secondary forest; alluvial clay soils.
- 3.1.9 *Saurauia reinwardtiana* Blume. Mata ikan; small tree or treelet; occasional in MDF and secondary forest.
- 64.1.10 *Saurauia subcordata* Korth. Mata ikan, Igol-igol (Ib.); midstorey /subcanopy, understorey, treelet; lowland MDF, hill MDF; gentle slope, steep slope; alluvial soils, clay rich soils.

4. ALANGIACEAE

- 4.1.1 *Alangium havilandii* Bloemb. Jadam paya; hill MDF; slope, ridge; sandy clay soils.
- 4.1.2a *Alangium javanicum* (Blume) Wangerin var. *javanicum*. Midong (Ib.); canopy/emergent tree, treelet; lowland MDF; gentle slope, steep slope; yellow sand clay soils.
- 4.1.2b *Alangium javanicum* (Blume) Wangerin var. *ebenaceum* (C.B. Clarke) Harms. Midong (Ib.); old secondary forest, lowland MDF, hill MDF; gentle slope, ridge; alluvial clay soils, clay rich soils.
- 4.1.2c *Alangium javanicum* (Blume) Wangerin var. *meyeri* (Merr.) Berhaman. Midong (Ib.); lowland MDF; gentle slope, ridge; clay rich soils.
- 4.1.3 *Alangium longiflorum* Merr. Jadam, Midong (Ib.), Kayo kavek (Kay.); canopy/emergent, midstorey/subcanopy, treelet; lowland MDF, hill MDF; gentle slope, ridge; sandy soils.
- 4.1.4 *Alangium nobile* (C.B. Clarke) Harms ex King. Midong (Ib.); old secondary forest; gentle slope, sandy clay soils.

5. ANACARDIACEAE

- 5.1.1 *Androtium astylum* Stapf. Rengas padang; summit ridge forest; slope, ridge; alluvial clay soils.
- 5.2.1 *Buchanania arborescens* (Blume) Blume. [basionym: *Coniogeton arborescens* Blume; syn: *Buchanania lucida* Blume]. Terentang chit (Ib.) Otak udang (Mal.); medium size tree to 20 m tall; widely distributed on a variety of soils; secondary forest and riverine.
- 5.2.2 *Buchania insignis* Blume. Otak udang; midstorey/subcanopy; lowland MDF, old secondary forest; slope; alluvial soils.
- 5.2.3 *Buchanania sessilifolia* Blume. Rengas; Otak udang (Mal.); midstorey/subcanopy; lowland MDF, old secondary forest, river-bank; alluvial soils, clay rich soils.

- 5.3.1 *Campospermum auriculatum* (Blume) Hook.f. Terentang bertelinga; midstorey/ subcanopy tree, lowland MDF, old secondary forest, degraded secondary forest; sandy soils.
- 5.3.2 *Camposperma squamatum* Ridl. Terentang tikus; midstorey/ subcanopy; lowland MDF; slope; alluvial clay soils.
- 5.4.1 *Dracontomelon dao* (Blanco) Merr. & Rolfe. Sengkuang; canopy/ emergent, midstorey/subcanopy; lowland MDF, old secondary forest; slope; clay rich soils.
- 5.5.1 *Drimycarpus luridus* (Hook.f.) Ding Hou. Rengas; canopy/ emergent, midstorey/subcanopy; lowland MDF, hill MDF, summit ridge forest; slope, ridge; alluvial soils, clay soils.
- 5.6.1 *Gluta aptera* (King) Ding Hou. Rengas sudu; canopy/emergent, midstorey/subcanopy; old secondary forest, lowland MDF, hill MDF, summit ridge forest, submontane forest, montane forest; slope, ridge; wide range of soils. **Note:** poisonous latex can cause itchness and dead.
- 5.6.2 *Gluta beccarii* (Engl.) Ding Hou. [basionym: *Melanorrhoea beccarii* Engl.] Rengas; canopy/emergent, midstorey/subcanopy; lowland MDF, river-bank; gentle slope, ridge; alluvial soils, sandy clay soils. **Note:** same as 4.6.1
- 5.6.3 *Gluta macrocarpa* (Engl.) Ding Hou. Rengas paya; canopy/emergent, midstorey/subcanopy; lowland MDF, hill MDF, summit ridge forest, submontane forest; slope, ridge; alluvial clay soils, sandy clay soils.
- 5.6.4 *Gluta rugulosa* Ding Hou. Rengas; midstorey/subcanopy; lowland MDF, emperan, riparian; clay-rich soils.
- 5.6.5 *Gluta speciosa* (Ridl.) Ding Hou. Rengas bulu; occasional in MDF; damp clay soils.
- 5.6.6 *Gluta velutina* Blume. Rengas; canopy/emergent, midstorey/ subcanopy; old secondary forest; alluvial soils, sandy soils. **Note:** poisonous latex.
- 5.6.7 *Gluta wallichii* (Hook.f.) Ding Hou. [syn: *Melanorrhoea wallichii* Hook.f.] Rengas; canopy/emergent, midstorey/subcanopy;

lowland MDF, river-bank; gentle slope, ridge; alluvial soils, clay rich soils. **Note:** poisonous latex.

- 5.7.1 *Mangifera caesia* Jack. Binjai; Buak binyok (Mel.); cultivated. **Uses:** fruit edible.
- 5.7.2 *Mangifera griffithii* Hook.f. Asam raba; buak nyabong bului (Mel.); lowland MDF; clay-rich soils; sometimes cultivated. **Uses:** fruit edible.
- 5.7.3 *Mangifera havilandii* Ridl. Raba (Ib.); buak nyabong (Mel.); canopy/emergent; lowland MDF, hill MDF, river-bank; flat ground, gentle slope; alluvial soils, clay rich soils; sometimes cultivated in the orchard. **Uses:** fruit edible.
- 5.7.4 *Mangifera indica* L. Empelam (Ib.); cultivated near the settlement. **Uses:** fruit edible.
- 5.7.5 *Mangifera khoonmengiana* Kosterm. Raba; midstorey/subcanopy; lowland MDF, hill MDF, river-bank; alluvial soils, sand clay soils. Sometimes cultivated. **Uses:** fruit edible.
- 5.7.6 *Mangifera odorata* Griff. Kwini; cultivated near the settlement. **Uses:** fruit edible.
- 5.7.7 *Mangifera pajang* Kosterm. Embang (Ib.); buak pangin (Mel.); cultivated in the orchard. **Used:** fruit edible.
- 5.7.8 *Mangifera parvifolia* Boerl. & Koord. Asam raba; midstorey/subcanopy; lowland MDF, riparian forest; clay-rich soils. **Uses:** fruit edible.
- 5.7.9 *Mangifera pentandra* Hook.f. Asam raba; midstorey/subcanopy; lowland MDF, emperan; sandy clay soils; sometimes cultivated. **Uses:** fruit edible.
- 5.7.10 *Mangifera torquenda* Kosterm. Kemantan, Lemantan; midstorey/subcanopy; lowland MDF, riparian forest; sandy clay soils; sometimes cultivated. **Uses:** fruit edible.
- 5.8.1 *Melanochyla beccariana* Oliv. [syn.: *Melanochyla ferruginea* Merr.] Rengas paya; midstorey/subcanopy hill MDF, summit ridge forest; damp clay soils.

- 5.8.2 *Melanochyla caesia* (Blume) Ding Hou. Rengas; midstorey/subcanopy; lowland MDF, hill MDF, summit ridge forest; wide range of soils.
- 5.8.3 *Melanochyla elmeri* Merr. Rengas hitam; midstorey/subcanopy; old secondary forest, lowland MDF; wide range of soils.
- 5.8.4 *Melanochyla fulvinervis* (Blume) Ding Hou. Rengas; small tree; lowland MDF, summit ridges forest; alluvial clay soils.
- 5.8.5 *Melanochyla semecarpoides* Ding Hou. Rengas (Mal.); canopy/emergent, midstorey/subcanopy; lowland DF, hill MDF, frequent on river-banks; sandy clay soils. **Note:** poisonous latex.
- 5.9.1 *Parishia insignis* Hook.f. [syn.: *Parishia borneensis* Ridl.]; Upi bung; Upi batu; canopy/emergent; old secondary forest; sandy clay soils.
- 5.9.2 *Parishia maingayi* Hook.f. [syn.: *Parishia polycarpa* Ridl.; *Parishia elmeri* Merr.] Upi paya; canopy/emergent; hill MDF, Kerangas forest; on igneous-derived soils. **Note:** frequent recorded in MSF on shallow coastal peat.
- 5.10.1 *Pentaspadon motley* Hook.f. Plajau; Emplanjau (Ib.); frequent on river-banks and riverine alluvial, subject to periodic flooding. **Uses:** fruit edible; bark and leaves are sometimes burnt to keep malevolent spirits away.
- 5.11.1 *Semecarpus bunburyanus* Gibbs. Rengas; canopy/emergent; old secondary forest; alluvial soils, sandy soils.
- 5.11.2 *Semecarpus cuneiformis* Blanco. [syn.: *Semecarpus ferrugineus* Merr.] Rengas; midstorey/subcanopy; old secondary forest; sandy clay soils.
- 5.11.3 *Semecarpus glaucus* Engl. [syn.: *Cassuvium glaucum* Kuntz.] Rengas; canopy/emergent, midstorey/subcanopy; lowland MDF, hill MDF; gentle slope, ridge; alluvial soils, sandy clay soils.
- 5.11.4 *Semecarpus heterophylla* Blume. Rengas (Mal.); canopy/emergent; occasionally in MDF or sometimes in secondary forest.

- 5.11.5 *Semecarpus minutipetalus* Kochummen. Rengas; midstorey/subcanopy; lowland MDF; alluvial clay soils.
- 5.11.6 *Semecarpus sandakanus* Kochummen. Rengas; midstorey/subcanopy; lowland MDF, hill MDF, riparian; gentle slope; alluvial clay soils.
- 5.12.1 *Spondias cytherea* Sonn. Kedondong; cultivated near the settlement. **Uses:** fruit edible.
- 5.13.1 *Spondias philippinensis* (Elmer) Airy Shaw & Forman [syn.: *Solenocarpus philippinensis* (Elmer) Kosterm]. Rengas; midstorey/subcanopy; lowland MDF, hill MDF; gentle slope; alluvial clay soils.
- 5.14.1 *Swintonia acuta* Engl. Pitoh ayer; canopy/emergent, midstorey/subcanopy; occasional in MDF on alluvial soils and riverine.
- 5.14.2 *Swintonia foxworthyi* Elmer. Pitoh (Ib.); canopy/emergent, midstorey/subcanopy; lowland MDF, hill MDF; flat ground, gentle slope; sandy soils, clay rich soils.
- 5.14.3 *Swintonia glauca* Engl. Pitoh paya; Pilog (Mel.); canopy/emergent, midstorey/subcanopy; Kerangas forest; alluvial clay soils. **Note:** also recorded in MSF.
- 5.14.4 *Swintonia schwenkii* (Teysm. & Binn.) Teysm. & Binn. ex Hook.f. Pitoh; canopy/emergent; occasional in MDF; sandy clay soils.

6. ANISOPHYLLEACEAE

- 6.1.1 *Anisophyllea beccariana* Boerl. Mertama; understory, treelet; lowland MDF, hill MDF, old secondary forest; gentle slope, ridge; sandy soils, clay rich soils. **Uses:** medicinal.
- 6.1.2 *Anisophyllea corneri* Ding Hou. Mertama; understory, treelet; old secondary forest; sandy soils.
- 6.1.3 *Anisophyllea disticha* (Jack) Baill. Mertama ribu (Mal.); Petagar ambun-ambun (Ked.); shrub or small pagoda tree to 7 m tall;

lowland to montane forest; common throughout. **Uses:** medicinal, used in *air masak*.

- 6.1.4 *Anisophyllea ferruginea* Ding Hou. Mertama; understory, small tree or treelet, shrub; old secondary forest, lowland MDF; sandy clay soils.

7. ANNONACEAE

- 7.1.1 *Alphonsea johorensis* J. Sinclair. Semukau (Ib.); Selukai; midstorey /subcanopy; lowland MDF, hill MDF; gentle slope; clay-rich soils. **Note:** also recorded from limestone areas in Bau.

- 7.2.1 *Anaxagorea borneensis* (Becc.) J. Sinclair. Pendok (Ib.); small tree or treelet; old secondary forest, lowland MDF, hill MDF; gentle slope; alluvial clay soils.

- 7.3.1 *Annona muricata* L. Durian belanda; cultivated in the orchard, near the settlement. **Uses:** fruit edible; young fruits are eaten after boiling in water for hypertension.

- 7.4.1 *Artabotrys cf. roseus* Boerl. Akar mersawa (Ib.); lowland MDF; gentle slope; alluvial clay soils.

- 7.4.2 *Artabotrys suaveolens* (Blume) Blume Akar mersawa (Ib.); climber; degraded MDF, Kerangas; gentle slope; terrace; ridges; periodically flooded; alluvial deposits clay soils. **Uses:** bark burnt and rubbed on affected caused by *Uvaria* sp.

- 7.5.1 *Cyathocalyx biovulatus* Boerl. Selemo paya; Empendok (Ib.); midstorey/subcanopy; old secondary forest, lowland MDF, Kerangas forest; clay rich soils, alluvial clay soils. **Note:** also recorded in MSF in Maludam NP.

- 7.5.2 *Cyathocalyx carinatus* (Ridl.) J. Sinclair. Pendok; midstorey/subcanopy, small tree; old secondary forest, lowland MDF, hill MDF; sandy clay soils.

- 7.5.3 *Cyathocalyx havilandii* Boerl. Selemo (Mel.); Pendok (Ib.); lowland MDF, old secondary forest; clay-rich soil.

- 7.5.4 *Cyathocalyx magnificus* (Diels.) J. Sinclair. Pendok asi (Ib.); occasional in lowland MDF.
- 7.5.5 *Cyathocalyx pruniferus* (Manigay ex Hook.f. & Thoms.) J. Sinclair. Pendok (Ib.); midstorey/subcanopy, treelet; lowland MDF, hill MDF; slope, ridge; sandy soils, clay rich soils.
- 7.5.6 *Cyathocalyx ridleyi* J. Sinclair. Pendok jugam (Ib.); midstorey/subcanopy, small tree; lowland MDF; alluvial clay soils.
- 7.6.1 *Dasymachalon chussiflorum* Merr. Semukau; midstorey/subcanopy, small tree; lowland MDF; alluvial soils.
- 7.7.1 *Desmos dasymaschala* (Blume) Saff. Semukau; small tree, treelet; lowland MDF; sandy clay soils.
- 7.7.2 *Desmos dumosa* (Roxb.) Saff. Semukau; small tree, treelet; lowland MDF, hill MDF; sandy clay soils.
- 7.8.1 *Disepalum anomalum* Hook.f. Karai manok; Selukai lada; small tree, treelet; lowland MDF, Kerangas forest, summit ridge forest; slope, ridge; sandy clay soils, alluvial clay soils.
- 7.8.2 *Disepalum cf. pulchrum* (King) J. Sinclair. Hujan panas; small tree, treelet; summit ridge forest; alluvial soils.
- 7.9.1 *Enicosanthum coriaceum* (Ridl.) Airy Shaw; Karai; Selukai; midstorey/subcanopy; old secondary forest, lowland MDF, hill MDF; clay-rich soils. **Note:** occasional on limestone forest.
- 7.9.2 *Enicosanthum grandiflorum* (Becc.) Airy Shaw. Karai; small tree, treelet; old secondary forest; sandy clay soils.
- 7.9.3 *Enicosanthum paradoxum* Becc. Karai; small tree, treelet; lowland MDF; on igneous-derived soils.
- 7.10.1 *Fissistigma kingii* (Boerl.) Burkill. Akar malam; Liana, climber; degraded MDF, riparian forest, old secondary forest; alluvial clay soils.
- 7.10.2 *Fissistigma latifolium* Merr. Akar rarak (Ib.); liana, climber; hill MDF, summit hill forest; slope, ridge; alluvial clay soils.

- 7.10.3 *Fissistigma rigidum* Ridl. Akar rarak (Ib.); lowland MDF, Kerangas forest; gentle slope; alluvial clay soils.
- 7.10.4 *Fissistigma rugosum* J. Sinclair. Akar rarak (Ib.); liana, climber; riparian forest; sandy clay soils.
- 7.11.1 *Friedodielsia affinis* (Hook.f. et Thoms.) Steenis. Akar rarak (Ib.); climber; alluvial forest.
- 7.11.2 *Friesodielsia biglandulosa* (Blume) Steenis. Akar rarak (Ib.); woody climber; lowland MDF. **Used:** as an antidote for taking poisonous fungi.
- 7.11.3 *Friesodielsia borneensis* (Miq.) J. Sinclair. Akar malam, Akar rarak (Ib.); climber; lowland MDF.
- 7.11.4 *Friesodielsia glauca* (Blume) J. Sinclair. Akar rarak (Ib.); liana, climber; old secondary forest, lowland MDF.
- 7.12.1 *Goniothalamus longistipes* Mat Salleh; Semukau; Lukai kampong; small tree or treelet; lowland MDF; alluvial clay soils. **Used:** for fever and malaria.
- 7.12.2 *Goniothalamus macrophyllus* (Bl.) Hk.f. et Th. Selukai (Ib.); shrub to 5 m tall; common in lowland forest.
- 7.12.3 *Goniothalamus malayanus* Hook. f. et Th. Selukai (Ib.); Hujan panas paya; tree to 18 m tall; lowland MDF and kerangas forest.
- 7.12.4 *Goniothalamus parallelovenius* Ridl. Semukau; small tree, treelet; Alluvial forest.
- 7.12.5 *Goniothalamus ridley* King. Semukau; small tree or treelet; lowland MDF, montane forest; on igneous-derived soils.
- 7.12.6 *Goniothalamus roseus* Stapf. Tutud; Selukai (Ib.); small shrub; lowland MDF, hill MDF. **Used:** bark is dried and burnt as a mosquito repellent and to scare off evil spirits.
- 7.12.7 *Goniothalamus rufus* Miq.; Semukau; small tree or treelet; lowland MDF; on igneous-derived soils.

- 7.12.8 ***Goniothalamus sinclairianus*** Mat Salleh Selukai (Ib.); small tree or treelet; lowland MDF, hill MDF, emperan; gentle slope, valley bottom, periodically flooded; clay rich soils.
- 7.12.9 ***Goniothalamus tapis*** Miq. Lakom (Ked.); Selukai (Ib.); treelet; lowland MDF, hill MDF, occasional near stream; gentle slope, ridge, valley bottom; alluvial clay soils, damp clay soils. **Uses:** medicinal, used in *air masak* and to prevent cancer.
- 7.12.10 ***Goniothalamus uvaroides*** King. Selukai (Ib.); small tree; old secondary forest. **Used:** bark used as a mosquito repellent and to scare off jungle spirits.
- 7.12.11 ***Goniothalamus velutinus*** Airy-Shaw. Lim panas (Mal.); occasional in MDF, ridge or gentle slope. **Uses:** have medicinal properties and used for spiritual. **Note:** This species is the true *Kayu bujan panas* stick. **Uses:** same as 6.12.2
- 7.13.1 ***Marsypopetalum pallidum*** (Blume) Kurz. Semukau; small tree; old secondary forest, lowland MDF; sandy clay soils.
- 7.14.1 ***Mezzettia leptopoda*** (Hook.f. & Thoms.) Oliv. Kepayang babi; Barun; Merbatu (Ib.); Pisang (Mel.); canopy/emergent, midstorey/ subcanopy; lowland MDF, hill MDF, summit ridge forest, Alluvial forest; wide range of soils. **Note:** frequently recorded in MSF.
- 7.14.2 ***Mezzettia macrocarpa*** Heijden & Kesler. Kepayang babi; midstorey/subcanopy; lowland MDF; sandy clay soils.
- 7.14.3 ***Mezzettia parvifolia*** Becc. Kepayang babi; midstorey/subcanopy; lowland MDF, submontane forest; alluvial clay soils.
- 7.15.1 ***Mitrephora glabra*** Scheff. Semukau (Ib.); midstorey /subcanopy, treelet; lowland MDF, hill MDF, frequent in river-bank; gentle slope, steep slope; alluvial soils, clay rich soils. **Used:** for sore eyes.
- 7.16.1 ***Monocarpia eunneura*** Miq. Karai; small tree, treelet; lowland MDF; clay soils.