

The Belum-Temengor Forest Complex: A Comprehensive Review of The Floral Diversity, Ecology, Indigenous Community and Ecotourism

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Abstract: The Belum-Temengor Forest Complex (BTFC) is a recognised biodiversity nexus, home to numerous endemic and threatened species. This forest complex includes diverse ecosystems, ranging from lowland dipterocarp forests to highland areas, which are pivotal in ecological balance and local climate processes. The forest has been designated as an Environmentally Sensitive Area (ESA) Rank 1 due to its unique environmental value, highlighting the need for rigorous protection and conservation measures. The current study provided a comprehensive analysis of the existing literature on the BTFC, covering vital aspects such as floral composition, focusing on several important species, ecological role, ecotourism, and the interrelationships among the Orang Asli community within this forest complex. The findings revealed that the diverse floral species composition within the forest complex significantly enhances the ecotourism potential and supports the socio-economic development of the Orang Asli communities. Additionally, the current study highlighted the crucial ecological role of the forest and addressed several threats, including deforestation and habitat loss.

Keywords: *Belum-Temengor Forest Complex, floral composition, ecological role, Orang Asli, ecotourism.*

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1. Introduction to Belum-Temengor Forest Complex

Tropical rainforests that once covered 12% of the Earth's surface now occupy less than 5%. Despite this drastic reduction, these forests continue to provide essential ecosystem functions, supporting more species and biomass than any other forest type (Brandon, 2015). Tropical forest formation is distinguished by high temperatures, continuous sunlight year-round, abundant rainfall, and a diverse range of species. Brandon (2015) described tropical rainforests as ecosystems characterised by elevated temperatures and substantial annual rainfall of 1,500-3,000 mm, with a short dry season lasting three months or less, or potentially none. For instance, Southeast Asian rainforests form the world's third-largest tropical rainforest block, encompassing tropical, evergreen, and deciduous biomes in areas affected by seasonal droughts (Dong et al., 2012).

Southeast Asian rainforests also have dense canopies, with trees often exceeding 35 metres in height, while their extraordinary species diversity has made them a research focus, especially in Malaysia (Nakamura et al., 2017; Walsh, 1996). Malaysia is prominent in the region, being one of the world's 17 megadiverse countries due to its exceptional biodiversity, scenic landscapes, and unique ecosystems (Abdullah et al., 2013). The remarkable level of endemism in the country further enhances its global ecological importance. The BTFC is one of the largest and most intact tropical rainforest regions in Peninsular Malaysia, covering over 300,000 hectares of rainforest (Schwabe, 2015).

The Royal Belum State Park (RBSP) was first gazetted in 2007, encompassing 117,500 hectares. The rainforest covers approximately all of the former Belum Forest Reserve (132,133 ha), excluding a narrow southern strip named the Banding Forest Reserve. Collectively, the Gerik, Amanjaya, and Temenggor Forest Reserves form the continuous rainforest landscape of the BTFC (see Figure 1.1). The BTFC contains various forest types, distributed by elevation, ranging from lowland dipterocarp forests (0–300m) to hill dipterocarp forests (300–750m), upper dipterocarp forests (750–1200m), and montane forests (above

1200m). Meanwhile, altitudes within the BTFC range from 130 to 2161 metres above sea level (ASL), with Gunung Ulu Sepat being the highest peak (Latiff & Mat Salleh, 2001).

The BTFC is critical within the Central Forest Spine (CFS) of Malaysia, serving as the backbone for ecological connectivity by linking ESAs and other protected regions. As an ESA, the park and the BTFC are vital for protecting endangered species, such as the Asian elephant (*Elephas maximus indicus*), Malayan tiger (*Panthera tigris jacksoni*), Malayan tapir (*Tapirus indicus*), and helmeted hornbill (*Rhinoplax vigil*). The forest also contains significant plant diversity, with approximately 3,000 species of flowering plants, including four species of the large *Rafflesia*, 304 endemic species, and 104 threatened species (PLANMalaysia, 2023). The forest complex underwent significant structural changes during the 1970s. First, the construction of the 124-kilometre East-West Highway in 1975, which bisected the BTFC into two sections: The RBSP in the north and the Temengor Forest Reserve (TFR) in the south. This highway was built for strategic defense during the communist insurgency, fragmenting the forest and creating distinct ecological zones. The second major development was the completion of the Temengor Dam in 1977, which submerged vast forest areas, forming the Temengor Lake and leaving numerous islands that had once been hilltops (Yeap & Lim, 2020). This lake covers approximately 15,200 hectares and is the second-largest man-made lake in Peninsular Malaysia, serving as a vital water source for numerous states within the country.

The BTFC remains one of the largest intact forest complexes in Peninsular Malaysia despite these developments. The forest complex serves as a crucial ecological corridor, supporting biodiversity conservation and hydrological functions. This key component of the nation's ecological network underscores the importance of sustained conservation efforts amid ongoing environmental pressures.

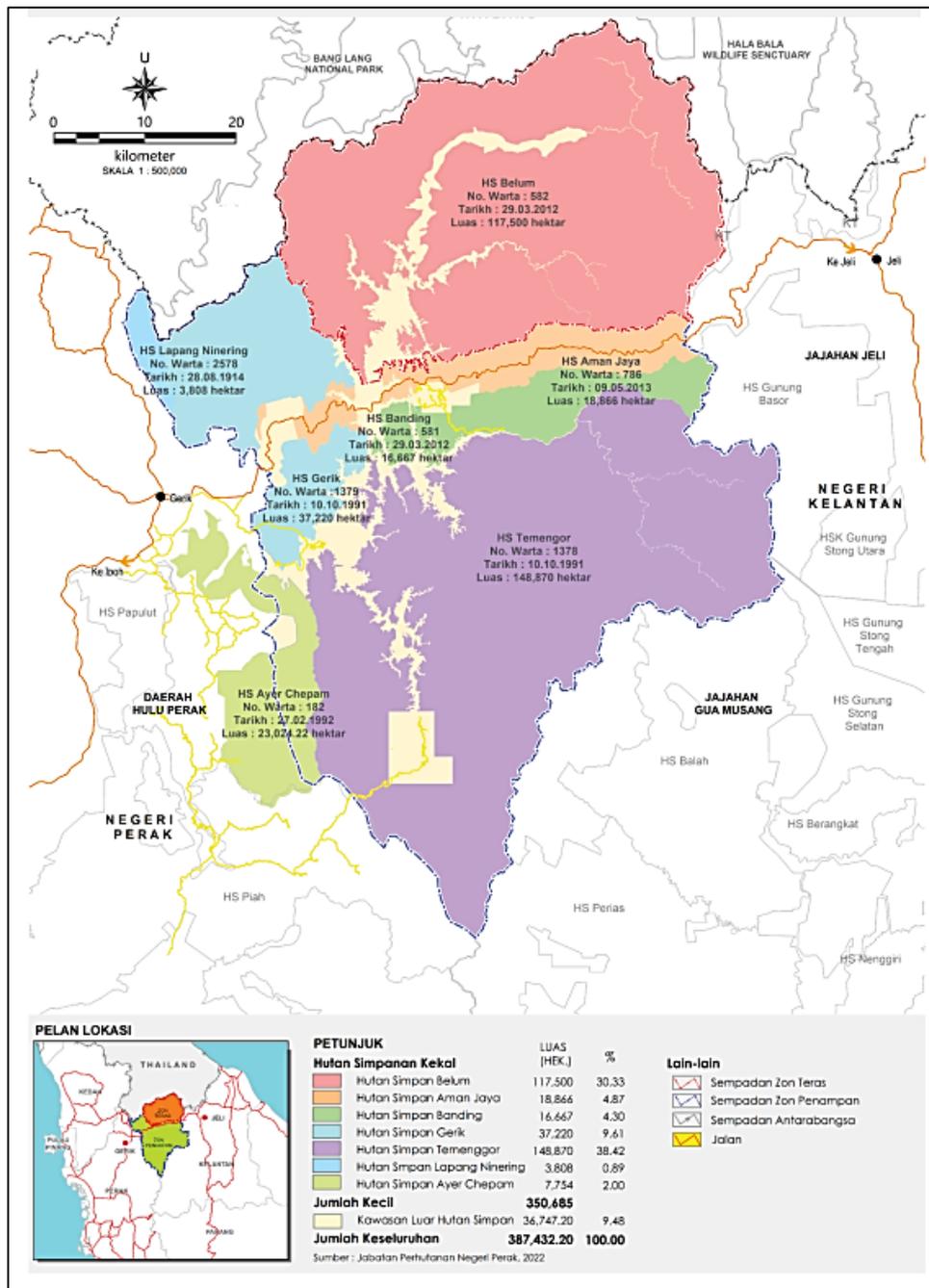


Figure 1.1. Map of the BTFC highlighting the various forest blocks in the area, including RBSP, Gerik, Temengor, Amanjaya, and Banding Forest Reserve, connected by the Temengor Lake (PLANMalaysia, 2023)

Table 1.1. Key components of BTFC

Area	Forest Classification	Size
Royal Belum State Park	State park	128,272 ha
Gerik Forest Reserve	Production forest and partially protected forest	37 220 ha
Temengor Forest Reserve (TFR)	Production forest	148 870 ha
Banding Forest Reserve	Production forest	16 667 ha
Amanjaya Forest Reserve	Production forest	18 866 ha
Temengor Lake		15 200 ha
East-West Highway		124 km

(Ching & Leong, 2011; PLANMalaysia, 2023)

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2. Floral and Tree Species Composition and Diversity in Belum-Temengor Forest Complex

Asian tropical rainforests possess a rich and diverse tree species, representing families such as Burseraceae, Arecaceae,

Annonaceae, Clusiaceae (mangosteen family), Fabaceae, Euphorbiaceae (spurge family), Ebenaceae (ebony family), Myristicaceae, Moraceae, Lauraceae, Meliaceae, Myrtaceae, Olacaceae, Rutaceae, Phyllanthaceae (phyllanthus family), Rubiaceae, Sapotaceae, and Sapindaceae (litchi family). In areas recovering from natural or human disturbances, young forests are usually dominated by pioneer species, such as *Macaranga* species and bamboo in Southeast Asia. Family Dipterocarpaceae (see Figure 2.1) trees dominate the forests in the Malay Peninsula and contribute to regional ecology and economy (Corlett & Primack, 2011).

The BTFC is a sanctuary for multiple ecologically significant and unique plant species. Towering dipterocarps cover the forest canopy, while vibrant orchids and other flora enrich its understorey. The forest complex is a biodiversity hotspot in Southeast Asia, harbouring rare and endemic species that showcase its global conservation value. Approximately 3,000 plant species, representing 171 families and 850 genera, have been recorded in BTFC, including 304 species endemic to Peninsular Malaysia and 104 species under the International Union for Conservation of Nature (IUCN) Red List. Zaki et al. (2014), Ahmad Fitri et al. (2017a), and Awang et al. (2023) identified dominant plant families, such as Dipterocarpaceae, Rubiaceae, and Euphorbiaceae, which significantly shape the ecological dynamics of the forest. Intriguing species include *Rafflesia*, *Thismia belumensis*, and *Johannesteijmannia perakensis*, thus accentuating the unique floral assemblage in this forest complex. Detailed plant lists in BTFC are provided in Appendices A, B, and C. The BTFC features various forest types, including lowland dipterocarp forests (below 300m ASL), hill dipterocarp forests (300–750m ASL), upper dipterocarp forests (750–1200m ASL), montane forests (over 1,200m ASL), riparian zones, and limestone forests. These forest types host diverse tree species and exhibit distinct structural characteristics that vary with elevation (Siti Eryani et al., 2023; Syahida-Emiza et al., 2023).

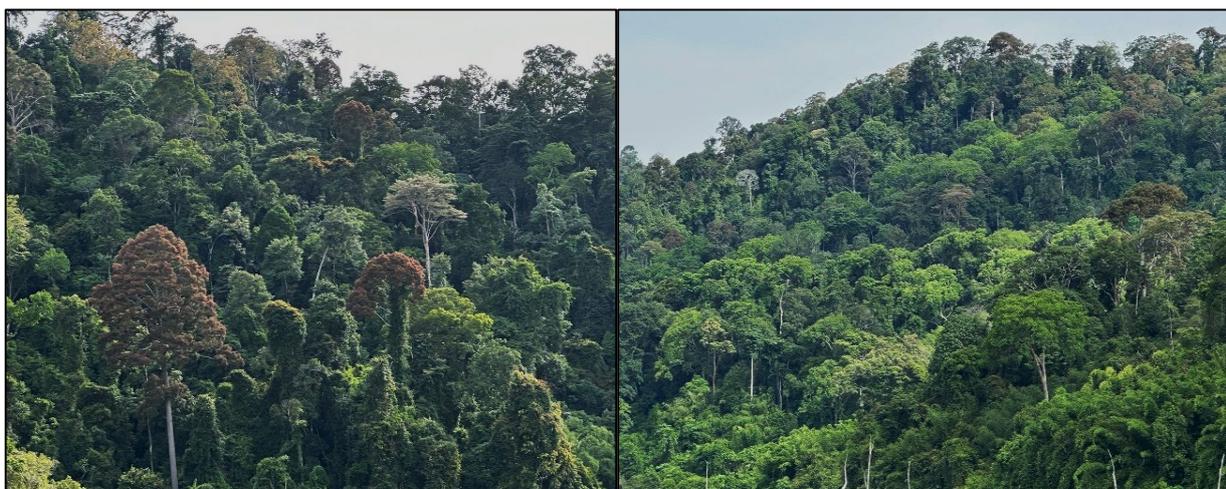


Figure 2.1. Tree species composition at the Royal Belum State Park, primarily dominated by the Dipterocarpaceae family

The riverine areas near boat drop-off points are rich in species, such as *Hibiscus floccosus* and *Scaphium linearicarpum* (Malvaceae), *Mallotus muticus* (Euphorbiaceae), and the dominant *Monocarpia marginalis* (Annonaceae). Riparian zones feature abundant *Saraca indica* (Fabaceae) and *Pometia pinnata* (Sapindaceae), while rocks and boulders along streams produce microhabitats for lithophytic ferns, such as *Bolbitis appendiculata* and *Selaginella* species. Additionally, palms, rattans, and bamboos are prevalent in these areas (Siti Eryani et al., 2023; Syahida-Emiza et al., 2023).

At an elevation of approximately 300 metres ASL, the forest comprises mainly Annonaceae, Malvaceae, Leguminosae, and Euphorbiaceae, with emergent trees, namely *Rubroshorea* and *Dipterocarpus* species. This zone supports numerous plants, including *Neesia altissima*, *Intsia palembanica*, and *Memecylon amplexicaule*. Forest gaps caused by fallen trees foster the growth of pioneer species, such as *Balakata baccata*, *Endospermum diadenum*, and *Macaranga hypoleuca*. Climbers (genus *Gnetum* and *Aristolochia*), shrubs ((*Cyrtandra cupulata* (Gesneriaceae) and *Clerodendron deflexum* (Labiatae)), and the herbaceous *Orchidantha longiflora* (Lowiaceae) cover the forest floor (Siti Eryani et al., 2023; Syahida-Emiza et al., 2023).

The floristic composition changes at an elevation of 900 metres ASL, particularly in the upper and main canopy, where trees have smaller girths and a thinner canopy. Species characteristic of the hill dipterocarp forest, such as *Rubroshorea curtisii* (Dipterocarpaceae), are commonly found on ridges, distinguished by their greyish-blue crowns. Several lowland species persist but are present in much lower abundance. The understorey in this area is enriched with edible non-dipterocarp species, including *Archidendron bubalinum* (kerdas), *Diplospora malaccense*, *Elaeocarpus nitidus*, and *Garcinia urophyll*. Gesneriads and ginger species are common along the hill ridges, adding to the botanical diversity. Palms such as *Iguanura polymorpha* and *I. wallichiana* extend from the lowlands into these upper hills, showcasing the adaptive range of these species within the dipterocarp forest (Siti Eryani et al., 2023; Syahida-Emiza et al., 2023).

The forest transitions into a lower stature 1,200 metres ASL, with trees typically not exceeding 30 metres in height. The canopy becomes more open, with reduced girth and density, and tall emergent trees are rare. Oaks and laurels, including *Syzygium* species (Myrtaceae) and *Lithocarpus* species (Fagaceae), dominate the landscape. In forest gaps formed by landslides or fallen trees, *Oxyspora curtisii*, *O. exigua* (Melastomataceae) and *Alpinia glabra* (Zingiberaceae) commonly establish themselves. On steep, damp, and shady slopes, tree ferns such as *Cyathea borneensis* (Cyatheaceae) are occasionally observed. The forest floor is covered with dense litter and layers of humus, which provide an ideal substrate for lithophytic ferns, lycophytes, orchids, and aroids. Moreover, mosses and liverworts thrive on numerous surfaces, including rocks, leaves, and tree trunks (Syahida-Emiza et al., 2023).

Towards the summits of Gunung Hulu Temin and Gunung Hulu Tan Hain, trees become smaller in diameter, reaching approximately six metres in height. The shaded understorey

supports diverse herbaceous plants, such as gesneriads, gingers, and ferns. Notably, *Codonoboea oreophila*, which grows in rock crevices, and *Phyllagathis hispida* (Melastomataceae), carpets the forest floor along slopes near the summit. Near the peak, a thick humus layer interspersed with patches of *Sphagnum* moss emerges, along with striking montane plants such as the pitcher plant *Nepenthes sanguinea* (Nepenthaceae). The summit landscape is adorned with blooming flowers of *Spathoglottis aurea* (Orchidaceae) and *Rhododendron klossii* (Ericaceae), thriving amid conifers, such as *Podocarpus neriifolius* and *Dacrydium elatum* (Podocarpaceae) (Syahida-Emiza et al., 2023).

The limestone hills near the Temengor Dam in BTFC are ecologically significant due to their unique flora and fauna. Most of these hills are partially submerged by the lake and host various species that thrive in the karst environments. For instance, *Cnesmone subpeltata* (Euphorbiaceae) is a vine species restricted to limestone habitats and has been recorded in the area, marking the species as the third locality in Peninsular Malaysia. *Homalium undulatum* (Salicaceae) is abundant on limestone slopes and features spiny leaves and is listed as vulnerable on the IUCN Red List. Another species is *Grewia sclerophylla*, a small shrub or tree found in these limestone regions, with tough, leathery leaves typical of its adaptation to harsh environments. Other notable species include *Cratoxylum arborescens* (Clusiaceae), *Diospyros lotus* (Ebenaceae), and *Phyllanthus tessellatus* (Phyllanthaceae), all adapted to the rocky terrain. Additionally, the hills are home to rare species, such as *Aporosa villosa* (Euphorbiaceae) and *Streblus elongatus* (Moraceae) (Turner et al., 1995). The limestone hills are critical as a significant tourist attraction and an essential habitat for endemic and specialised species. These karst formations provide a unique ecological niche, with each hill supporting diverse plant and animal species. The diversity of flora and fauna in these areas outlines the high conservation value of the limestone hills in BTFC, highlighting the need to protect these fragile ecosystems.

Tropical rainforests display distinct stratification, namely the understorey, canopy, emergent, and forest floor, each with unique structural and ecological characteristics. The emergent layer contains mature, light-demanding, and long-lived trees growing over the main canopy. This layer often exceeds 30 metres in height and features wide-spreading crowns. The main canopy layer below consists of mature trees reaching 20–30 metres. This layer is light-demanding and long-lived, forming a dense, interlocking cover that dominates the forest structure. The understorey layer lies beneath, where shade-tolerant species thrive in the limited light available, growing below 20 metres and forming the lower stratum of the forest (Ahmad Fitri et al., 2017a).

A study examined the lowland dipterocarp forest (260–440 m ASL) of the RBSP and recorded notable species across these layers. The emergent and primary canopy layers were dominated by members of the Dipterocarpaceae family, including *Shorea leprosula*, *S. guiso*, and *Anisoptera laevis*, alongside species from Leguminosae (*Intsia palembanica*, *Sindora coriacea*), Burseraceae (*Canarium littorale*, *Santiria laevigata*), and Fagaceae

(*Lithocarpus wallichianus*). In contrast, the understorey layer was predominantly composed of species from families, such as Annonaceae (*Alphonsea elliptica*, *Goniothalamus macrophyllus*), Ebenaceae (*Diospyros wallichii*), Euphorbiaceae (*Antidesma montanum*, *Aporosa* spp.), Lauraceae (*Beilschmiedia palembanica*, *Cryptocarya infectoria*), and Sapindaceae (*Nephelium cuspidatum*, *Paranephelium xestophyllum*). An endangered dipterocarp species, *Shorea farinosa*, was also recorded for the first time in Perak along Sungai Beruak. Furthermore, palms such as *Calamus castaneus* (Arecaceae) were abundant (Chua et al., 2000).

Stratification patterns were observed in the hill dipterocarp forest of the TFR (560–810 m ASL). The emergent layer was dominated by Dipterocarpaceae species, including *Anisoptera*, *Dipterocarpus*, *Parashorea*, and *Shorea*, as well as Leguminosae species, such as *Dialium platysepalum*, *Intsia palembanica*, and *Koompassia malaccensis*. Meanwhile, the main canopy layer featured species, such as *Hydnocarpus woodii* and *Elateriospermum tapos*, reflecting a different composition at higher elevations. These stratification patterns highlight the structural and species diversity of tropical forests, influenced by elevation and ecological conditions (Ahmad Fitri et al., 2017a).

The Rafflesiaceae family is renowned for its extraordinary flowers, namely *Rafflesia arnoldii*, which is the largest individual flower in the world (Kedri et al., 2018). The tropical rainforests in Southeast Asia host 42 *Rafflesia* species (Malabrigo et al., 2023), with three species: *R. azlanii*, *R. cantleyi*, and *R. kerrii* endemic to Peninsular Malaysia and the BTFC (Siti-Munirah, 2020). *R. cantleyi* and *R. azlanii* were discovered in Kampung Sungai Raba and Kampung Bongor in BTFC, with notable findings such as an individual *R. azlanii* flower displaying 10 petals in Sungai Gadong, Perak (Siti-Munirah, 2020).

The distribution of *R. azlanii* extends across Perak (Sungkai, Kinta, Sungai Halong, and Temengor) and Pahang (Taman Negara, Ulu Sungai Forest Reserve, and Sungai Peleting), while *R. cantleyi* spans Perak (Gerik, BTFC, and Ulu Geroh), Pahang (Raub, Jerantut, Taman Negara, and Pulau Tioman), Kelantan (Kuala Koh, Kuala Betis, and Ulu Sat), and Terengganu (Tasik Kenyir, Pasir Akar, and Besut) (Norhazlini et al., 2021). These species occupy distinct ecological niches, with *R. azlanii* favouring primary lowland dipterocarp forests and lower montane forests at altitudes of 150–400 m, while *R. cantleyi* thrives in primary and logged lowland dipterocarp forests at altitudes of 200–610 m. The survival of *Rafflesia* in these regions is connected to the availability and health of *Tetrastigma* vines, reinforcing its role as a vital species in these ecosystems.



Figure 2.2: *Rafflesia azlanii* of Royal Belum State Park

Note: A = flower in situ; B = a side view of the flower showing the eyeball-like tube perigone and diaphragm dome; C = flower from side view; D and F = perigone lobe (petal); E = warts (blotches) on perigone lobes; G = diaphragm (upper surface) and aperture (opening of diaphragm); H = wart dots on the diaphragm surface; I = wart dots (Siti-Munirah, 2020)

The BTFC is a critical sanctuary for endemic and threatened species, outlining its unparalleled ecological importance. For instance, endemic flora, such as *Actinodaphne cuspidata*, *Ardisia perakensis*, *Thismia belumensis*, and *Johannesteijsmannia perakensis* underscore the unique biodiversity of BTFC. The *T. belumensis* is a recently discovered achlorophyllous herb that thrives in the lowland forests of the RBSP (Siti-Munirah et al., 2021). Meanwhile, the towering erect stem and striking diamond-shaped leaves of *J. perakensis* are found only in Perak and parts of Kedah. Critically endangered species, such as *Pseuduvaria taipingensis*, *Aquilaria malaccensis* (agarwood), and *Gonystylus bancanus* are safeguarded within BTFC. *A. malaccensis* are threatened by overharvesting, habitat loss, and low regeneration rates. Meanwhile, *P. taipingensis*, endemic to Peninsular Malaysia, has a limited distribution and is subject to habitat degradation. The BTFC provides a refuge for these rare and valuable species, critical in sustaining their populations and preventing extinction, emphasising the need for its continued conservation.

The BTFC is a vast, biodiverse region that remains largely unexplored, with new species continually being discovered, such as *Castanopsis corallocarpus*, highlighting the rich potential of the area for scientific discovery. Tan et al. (2023) discovered this new species from the Fagaceae family in the RBSP. *Castanopsis* (D. Don) Spach ranks third among the genus in Fagaceae, with over

134 species. Click or tap here to enter text. The Fagaceae family is a significant component of the tropical rainforest in Peninsular Malaysia, comprising 72 species distributed across four genera, namely *Castanopsis*, *Trigonobalanus*, *Quercus*, and *Lithocarpus*. The genus is locally referred to as *berangan* in Malay or the Malayan chestnut. In Peninsular Malaysia, a total of 20 identified species of *Castanopsis* exist. Click or tap here to enter text..

In Tan et al. (2023), the team encountered a previously unknown species during the 2018 RBSP expedition, which was subsequently classified under the genus *Castanopsis*. The species is geographically limited to low to mid-elevation forests within the BTFC, specifically in Sungai Papan and Sungai Tiang. Thriving in lowland and hillside dipterocarp forests 300-450 m ASL, the species is characterised by low-nutrient, clay-rich soils typical of most dipterocarp ecosystems. *Castanopsis corallocarpus* (see Figure 3.5) is a moderate-sized tree distinguished from similar ones by its fruits, with distinct rows of blunt, coral-like spines on the outside surface of the cupule and unusual, rounded, rectangular nuts that are asymmetric. The IUCN Red List issued an initial assessment of the species conservation status as Critically Endangered (CR) based on two records from RBSP (Tan et al., 2023).

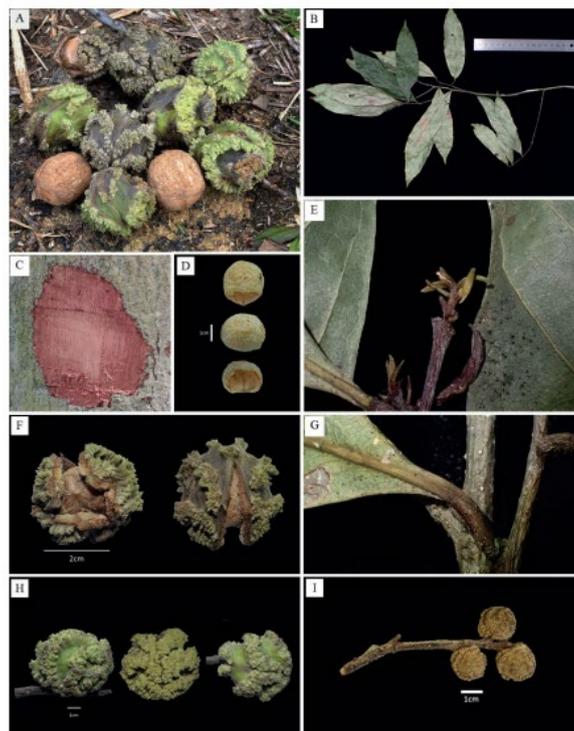


Figure 2.3: *Castanopsis corallocarpus* W.H.Tan & Strijk, sp. nov. W.H.Tan TWH002 (KEP)

Note: A and B = Fruits and leaves harvested during sample collection; C = Sapwood and bark; D = Nut from different view (top, side, front); E = New young leaf; F = Cupule of matured fruit with split-valves; G = Petiole; H = Mature fruit from different view (top, side, front); I = Inflorescence spike (Tan et al., 2023)

The trees of BTFC are vital in carbon sequestration, contributing significantly to global climate regulation. As a tropical rainforest, BTFC is a vital carbon sink, absorbing and storing substantial amounts of carbon dioxide from the atmosphere. The forest exhibits exceptional carbon storage capacity due to the high wood density and substantial biomass of its tree species, dominated by towering trees, particularly from families such as Dipterocarpaceae. For instance, *Shorea* and *Dipterocarpus* species grow to impressive heights and store vast amounts of carbon in their trunks, branches, and roots. Other large tree species in BTFC, such as *Koompassia excelsa* (tualang) and *Neobalanocarpus heimii* (chengal), further enhance this capacity. These trees have long lifespans and dense wood and accumulate carbon over decades, making them critical to mitigating climate change. The preservation of the extensive forests in BTFC is essential for biodiversity conservation and maintaining its role as a major carbon reservoir in Southeast Asia.

3. Ecology, Environmental Status, and Management of Resources Within The Belum-Temengor Forest Complex

Tropical rainforests are characterised by tall, dense, and evergreen vegetation, serving as the primary natural cover in wet tropical regions. These ecosystems thrive in consistently warm climates with minimal or no dry season, which is a unique adaptation to high levels of humidity and year-round precipitation (Corlett & Primack, 2011). Chapin et al. (2012) stated that tropical forests provide a vast array of ecosystem services due to climate, terrain, soil composition, water and nutrient availability, natural disturbances, including fires, various species, and human activities. The global comparison on the main regions of tropical rainforest is presented in Table 3.1.

Table 3.1: Characteristics of the main global rainforest regions

	Neotropics	Africa	Madagascar	Southeast Asia	New Guinea
Main Geographical features	Amazon basin and Mountains	River Congo basin	River eastern edge of island	Peninsula and islands on Sunda Shelf	Large, mountainous island
Largest country	Brazil	Democratic Republic of Congo	Malagasy Republic	Indonesia	Papua New Guinea
Annual rainfall (mm)*	2,000-3,000	1,500-2,500	2,000-3,000	2,000-3,000, often > 3,000	2,000-3,000, often > 3,000
Annual temperature	Ranges increase with distance from equator, ranges decrease with increasing altitude from ASL				
Wind	Affected by tropical cyclones				
Light availability	Vary between sites, seasons and phases of El Nino-Southern Oscillation (ENSO) cycles				

* Rainfall is highly variable within each region. These are the ranges over most of the core rainforest area (1,000 mm equals 40 inches). (Corlett & Primack, 2011).

The BTFC situated in Perak, Malaysia, is the largest intact forest complex in Peninsular Malaysia and one of the tropical rainforests in Southeast Asia. The climate in BTFC is mainly tropical, with elevation ranging from 140-2,161 m and characterised by dipterocarp trees. The region maintains a consistently warm and humid climate year-round, with an average temperature ranging from 24 to 29.9°C throughout the year. Meanwhile, the humidity levels in the area fluctuate between 70% and 98%, with significant rainfall occurring in April and October, and minimal rain in February and July (Aiman Hanis et al., 2014, Kanniah et al., 2018). This forest complex contains multiple ecosystems, including lowland dipterocarp woods and highland areas, which contribute to the distinctive environment that sustains a high degree of biodiversity.

The BTFC is one of the most biodiverse regions in Malaysia, hosting over 3,000 species of flowering plants. The rich biodiversity in the reserve extends to its animal population, with over 140 mammal species, including the critically endangered Malayan tiger, Asian elephant, and Sunda pangolin (Lazarus et al.,

2021; PLANMalaysia, 2023). The BTFC is home to nine species of primates, the highest diversity of primates in the Malay Peninsula. Birdlife is equally diverse, with over 336 species recorded (Yeap & Lim, 2020), including 10 hornbill species, making this landscape part of the larger landscape with the highest hornbill diversity globally. Additionally, the area supports numerous amphibians, reptiles, and freshwater fish, contributing to its status as a vital ecological hotspot.

The comparable biodiversity hotspot in Peninsular Malaysia is Taman Negara National Park (TNNP), the first and largest national park in the country, gazetted in 1938/1939. The TNNP is renowned for its rich biodiversity, hosting spectacular arrays of flora and fauna within one of the oldest rainforests in the world (UNESCO, 2014). This park exemplifies the national commitment to conservation and symbolises ecological preservation. Conversely, BTFC holds a unique position in regional conservation efforts due to its vital transboundary conservation role. As part of the Transboundary ASEAN Heritage Park (AHP), BTFC links Malaysian forests with protected areas in Thailand (Hala Bala

Wildlife Sanctuary and Bang Lang National Park) to facilitate wildlife migration and encourage genetic diversity across borders (PLANMalaysia, 2023). This connectivity underscores the significance of BTFC in the broader ecological network of Southeast Asia, making it an indispensable asset for regional biodiversity conservation.

In terms of the significance of forest reserves, a comparison between the BTFC and the Ulu Muda Forest Reserve (UMFR) emphasises their distinct ecological roles. Mei et al. (2017) mentioned that UMFR is a crucial water catchment area for the northern Peninsular Malaysian states of Kedah, Penang, and Perlis, while BTFC mainly supports localised ecosystems. Consequently, the biodiversity of UMFR is more centered on freshwater-dependent species. The rivers within UMFR also contribute to maintaining vital ecosystems, including the mudflats along the Kedah coast, which are important habitats for migratory birds and economically valuable shellfish (Rajoo et al., 2021).

Apart from being a biodiversity hotspot, the forest complex provides various ecosystem services, including regulating the hydrological cycle, providing clean water, and preventing erosion and sedimentation. The National Physical Plan has classified the forest as an ESA-Rank 1, meaning that development, farming, and logging are strictly forbidden, except for research, educational activities, and minimal impact tourism (Kanniah et al., 2018). The ESA is a land-use strategy originally developed by the United Kingdom and later adopted by Malaysia. The specific definition of ESA varies depending on the type of governance framework in place, which refers to a specific region vulnerable to any alterations in its ecology caused by internal or external natural processes, directly or indirectly (Munian et al., 2023).

The BTFC has significant economic value, direct and indirect. Gwee et al. (2019) expressed that one benefit is the direct value obtained from logging activities that may be instantly utilised. Private corporations could directly benefit from the income generated by logging activities, while Perak and the Malaysian government receive royalties and premiums based on the quantity of timber harvested and the land area used for logging (Schwabe et al., 2015). Furthermore, BTFC adds indirect benefit by acting as a catchment basin and supplying water to most northern states in Malaysia (Abdullah et al., 2013). The forest complex preserves the hydrological cycle and acts as a carbon sink, a flood-control device, and a study site for ecological and forest research. In the current global environment, Hurteau (2021) emphasised that forests are crucial in the uptake and sequestration of carbon dioxide, including overall maintenance of the global stock of carbon storage capacity. Ecotourism increases the utility of the BTFC by offering non-extractive benefits through recreational experiences for visitors (Gwee et al., 2019).

Southeast Asia experiences the highest rates of forest loss and degradation among tropical regions (Corlett & Primack, 2011). Laurance et al. (2010) stated that major threats to deforestation involve the extensive logging industry and the conversion of forests into agricultural plantations, specifically for cash crops such as oil palm. Beyond deforestation, tropical forests are

threatened by fragmentation. Rainforests that are cleared for agriculture often leave scattered forest fragments. Laurance et al. (2011) examined the Amazon rainforest and revealed that habitat fragmentation significantly reduces movement between these isolated patches. Numerous species, including birds, mammals, and insects, are unable or unwilling to cross even small open areas, with roads posing a notable barrier (Laurance et al., 2009). Fragmentation also alters the microenvironment at the edges of forest fragments, which can profoundly affect species composition. These outcomes cause the gradual loss of species within fragments. The rate and extent of species loss depend on fragment size, distance from other forested areas, and the surrounding land use.

The Malaysian National Forestry Act of 1984 was enacted in Perak to safeguard forests against the deterioration of BTFC (Kanniah et al., 2018). The National Forest Policy (NFP) 1977, later approved by the National Land Council in 1978, enables Malaysia to maintain its Permanent Reserved Forest (Mundher et al., 2022). The Amanjaya Forest Reserve spans 18,886 hectares and was officially gazetted in 2013 to strengthen ecological linkages between the RBSP and TFR as part of the Central Forest Spine Plan in Malaysia. The gazettement of the reserve aligns with the National Physical Plan, and serves as a crucial corridor to reduce fragmentation between forest blocks. Jewitt et al.'s (2017) research in South Africa applied connectivity corridors to connect protected areas in KwaZulu-Natal (KZN), facilitating species adaptation to environmental changes and preserving floristic variety amid land-cover and climate change.

The forest biodiversity conservation, community involvement in forest development, and genetic resource management were all given legal significance in 1992 due to legislative reforms. Nevertheless, the protection was inadequate and not extensive, resulting in the significant depletion of multiple forest regions (Kanniah, 2017). Globally, community-based conservation successes are demonstrated with the Green Belt Movement, an initiative led by Nobel Peace Prize laureate Wangari Maathai in Kenya, which encourages women to plant trees and restore degraded lands (Clauzel, 2024). Millions of trees were planted throughout this programme, increasing forest cover and boosting local economies. Consumer choices that support responsible producers reduce environmental damage. For example, consumers can choose products from companies with forest certifications, which prove that the forests are managed sustainably. Certifications, such as those from the Forest Stewardship Council (FSC), ensure that wood products meet strict environmental and social standards (Corlett & Primack, 2011). Consumers can help protect forests and encourage sustainable practices by purchasing certified products.

Conservation efforts in areas such as BTFC are vital for protecting wildlife, flora, and the overall ecosystem, preserving biodiversity and mitigating climate change. Nonetheless, these efforts could adversely affect the Indigenous communities that depend on the forest for their livelihoods. Indigenous communities in the Ankeniheny-Zahamena Corridor (CAZ) in Madagascar engage in activities such as swidden agriculture,

hunting, and gathering of forest products. These practices are critical for their subsistence and are deeply embedded in their cultural heritage. The implementation of conservation policies, such as those under the REDD+ initiative, aims to reduce deforestation and carbon emissions but impose significant restrictions on these traditional activities (Poudyal et al., 2018).

These conservation policies have caused substantial economic displacement for the local population. The restrictions on access to forest resources have resulted in high opportunity costs, comprising a significant portion of their annual income. Various households fail to secure alternative livelihoods, exacerbating their economic hardships. Compensation provided through initiatives, namely the social safeguard policies of the World Bank has been insufficient, leaving many families without adequate support (Poudyal et al., 2018). This situation underscores the need for a more balanced approach to conservation in areas such as BTFC. Although protecting biodiversity is essential, the socio-economic impacts on Indigenous communities must be considered.

The Agta hunter-gatherers of the Philippines are one of the few remaining Indigenous groups in Southeast Asia that primarily rely on traditional subsistence practices, namely hunting, fishing, and gathering forest resources. Their deep connection to the land and sustainable resource use has been integral to their cultural identity and survival. Nevertheless, the Agta encounter significant challenges due to displacement from their ancestral lands resulting from infrastructure development and extractive industries. This displacement disrupts their access to vital forest resources, threatens their traditional lifestyle, and leaves them vulnerable to poverty and food insecurity (Minter, 2010). Conservation policies should be designed and implemented to support environmental goals and the well-being of the local people, without neglecting their livelihoods and cultural practices.

Conservation efforts should prioritise protecting the most intact and representative examples of remaining rainforest communities. These preserved core areas serve as vital refuges that enable species to migrate and regenerate new forest ecosystems, safeguarding biodiversity for the future.

4. Orang Asli Community in Belum-Temengor Forest Complex

Demographic of Orang Asli In Belum-Temengor Forest Complex

The Orang Asli is the Indigenous population in Peninsular Malaysia who reside in the BTFC. The Orang Asli are divided into three groups: Senoi, Proto Malay, and Negrito or Semang, each divided into six ethnic groups. The Senoi group is divided into Jahut, Che Wong, Semoq Beri, Mahmeri, Temiar, and Semai; the Proto-Malay are Kenaq, Kuala, Semelai, Seletar, Temuan, and

Jakun, the Negritos are the least populated Orang Asli group comprising Kensiu, Kintaq, Jahai, Lanoh, Mendriq, and Bateq (Masron et al., 2013). The Orang Asli tribes were classified based on physical attributes, language, cultural customs, and geographic location.

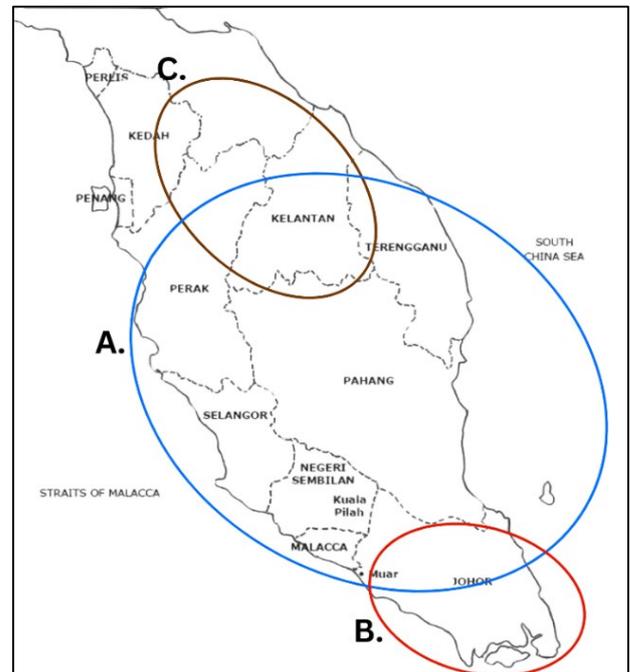


Figure 4.1: Demography of Orang Asli placement in Peninsular Malaysia

Note: A = Senoi; B = Proto-Malay; C = Negrito
(Jabatan Kemajuan Orang Asli, 2022)

Based on the International Work Group for Indigenous Affairs (2021), the number of people from the Orang Asli community accounts for only 0.7% of the overall population in Peninsular Malaysia. Figure 4.1 illustrates that the Senoi tribe holds the highest percentage, occupying the biggest area in Peninsular Malaysia. Masron et al. (2013) discovered that the Negrito tribe is the smallest and most isolated community among all tribes. Nor Awang et al. (2015) stated that Sungai Kejar and Sungai Tiang were the main settlements for the Jahai and Temiar tribes in RBSP, which became the main attraction for Indigenous tourism. The JAKOA has recorded the population of Orang Asli by their ethnicity and subtribes based on the state in Peninsular Malaysia where Jahai and Temiar settlements reside in Perak and Kelantan. Figure 4.2 focused on the population of the sub-tribe Jahai and Temiar from 2020 to 2023, where both communities have lived in the complex for ages.



Figure 4.2: Jahai’s and Temiar’s Population in Perak and Kelantan from 2020 to 2023 (Jabatan Kemajuan Orang Asli, 2024)

The graph depicts the distribution of the Jahai (Negrito) and Temiar (Senoi) tribes in Perak and Kelantan between 2020 and 2023. In Perak, the Temiar population increased steadily from 21,451 in 2020 to 22,132 in 2023, while the Jahai population remained small, with minimal fluctuations around 2,000 individuals. In Kelantan, the Temiar population is smaller but demonstrates gradual growth from 14,628 to 16,406 over the same period, whereas the Jahai population is substantially lower, never exceeding 750 individuals. These trends suggest that the Temiar tribe bear a stronger presence in both states, with Perak as their primary location, while the Jahai tribe is more concentrated in Perak but maintains a smaller, stable population, reflecting their nomadic lifestyle.

Socio-Economy of Orang Asli in Belum-Temengor Forest Complex

The Jahai and Temiar communities have long relied on the forest for their sustenance, engaging in traditional hunter-gatherer activities and collecting a wide range of forest resources. The Jahai are traditionally nomadic hunter-gatherers, but have recently adopted shifting cultivation. Meanwhile, the Temiar have established themselves as a settled agricultural community, with a focus on farming. Jabatan Hal Ehwal Orang Asli (Department of Orang Asli Affairs, JHEOA) and Itam Wali (1993) stated that the

primary economic activities of these communities involve gathering rattan, agarwood, resin, honey, and forest fruits, as well as fishing. Additionally, these groups practice subsistence agriculture, cultivating hill rice, cassava, and various food crops, which are integral to their cultural and economic existence in BTFC (Fadzil et al., 2013; Tabi & Zulnaidah, 2019).

Loke et al. (2020) mentioned that the Jahai hunter-gatherers residing in and around the RBSP are critical for conservation efforts as they primarily rely on hunting and fishing for their protein intake. Hunting practices in Malaysia are regulated under the Wildlife Conservation Act 2010, under which hunting protected species without a license constitutes a criminal offence. Special exemption was made for Orang Asli communities that allow them to hunt 10 specific protected mammal and bird species without requiring a license (Hassan, 2015). Nonetheless, this exemption is limited as it does not authorise the commercial trade in these species or hunting within the designated protected areas. Abdullah et al. (2011) highlighted that most of the Orang Asli in BTFC engage in hunting and gathering forest resources for consumption (see Table 4.1). The Orang Asli refrained from participating in these tasks for reasons such as advanced age, deteriorating health, full-time household duties, or a diminished need for forest resources for their sustenance.

Table 4.1: Utilisation of wild animals by Orang Asli in BTFC

Wild animals	Use of Forest Resources			Total respondents' involvement (%)
	Personal consumption (%)	For sale only (%)	Personal consumption and for sale (%)	
Fish	28.9	7.7	29.2	65.8
Frog	16.5	15.1	28.5	60.2
Soft-shelled terrapin	19.4	9.2	24.6	53.2
Monkey	45.1	0.0	0.4	45.4
Wild boar <i>Sus scrofa</i>	39.8	1.8	1.1	42.6
Barking deer <i>Muntiacus muntjak</i>	38.7	0.4	2.1	41.2
Bird	36.3	0.4	4.2	40.8
Deer	31.3	0.7	1.8	33.8
Pangolin <i>Manis javanicus</i>	9.9	5.7	4.2	19.8
Gaur <i>Bos gaurus</i>	11.3	0.0	0.0	11.3
Malayan Sun Bear <i>Helarctos malayanus</i>	8.1	0.0	0.7	8.8
Snake	3.9	0.0	0.0	3.9
Sumatran rhinoceros <i>Dicerorhinus sumatrensis</i>	2.1	0.4	0.4	2.8
Asian elephant <i>Elephas maximus</i>	1.8	0.0	0.0	1.8
Tiger <i>Panthera tigris jacksoni</i>	0.4	0.0	0.0	0.4

(Source: Abdullah et al., 2011)

In Abdullah et al. (2011), the Orang Asli noted that the availability of natural resources in the forest began to decline approximately 10 years ago. Although the Jahai people are the sole permanent residents of the area, the armed forces also conduct patrols in the region. Additionally, foreign poachers trespass into the park for hunting and fishing (Clements et al., 2010). According to Ching and Leong (2011), the Orang Asli community, local populations, and individuals from neighbouring countries including Thailand, Cambodia, and Indonesia, are engaged in the illegal hunting and trafficking of animals in the BTFC. The situation is alarming as severe defaunation caused by hunting in tropical rainforests leads to the depletion of wildlife populations and extinction of species, including long-term ecological consequences (Dirzo et al., 2014). The disruption of these ecological processes due to hunting-induced defaunation can significantly impact tree regeneration and alter biome-level aboveground biomass, underscoring the urgent need for effective conservation measures (Berzaghi et al., 2019; Harrison et al., 2013).

The Orang Asli Resettlement Plan (*Rancangan Penempatan Semula*, RPS) by JHEOA involves consolidating scattered indigenous communities into a centralised location equipped with essential infrastructure and opportunities for economic activities (Awang et al., 2012). Some resettlement sites, such as Pos Kemar in Temengor, could trace their history to the establishment of jungle forts, whereby army posts were established strategically in the forest to win the hearts and minds of the people through the provision of educational and health services to the nearby communities. The objectives of the resettlement schemes were to alleviate poverty, modernise communities through the provision of basic facilities, reorganise them in suitable centres, and ensure their security against subversive elements, such as communism (Mohamad et al., 2023). Other developments were also implemented through the resettlement scheme, such as the development of rubber plantation projects, the installation of power supply, housing, and schools (see Figure 4.3) (Ramli, 2024).

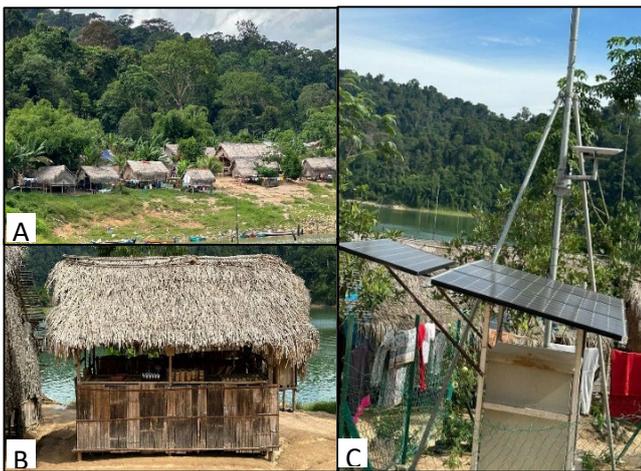


Figure 4.3: A Jahai tribe settlement by the lake, allowing for easy access to water and transportation by boat

Note: A = Jahai tribe souvenir booth made out of bamboo and palm leaves; C = Solar panels have been installed at the Jahai tribe villages to power communication facilities for the residents

The Jahai from Kampung Tiang, through the village cooperative called Koperasi Orang Asli Sungai Tiang, were involved in the development and management of the fish sanctuary, *Akekchep*, at Sungai Tiang, RBSP. The Akekchep Fish Sanctuary is a co-management initiative to conserve river ecosystem while generating income through sustainable community-led ecotourism (TNB Research, 2024). The community has stopped commercial fishing in the upper reaches of the river since the project started in 2017. The community also explores other cultural and experiential tourism activities to offer more diverse options for visitors, including cultural demonstrations, recreational fishing, wildlife watching, rafting, and tubing. This initiative is an adaptation by local communities that shifts traditional extractive activities to new income opportunities by aligning with conservation and management goals (Idris, 2020).

The relationship between Indigenous peoples and ecotourism in BTFC is vital considering that the cultural and economic significance of the forest is increasingly harnessed for tourism, attracting researchers and visitors. The traditional villages of the Jahai tribe within the state park are major draws for tourists, who often purchase forest products collected by the Jahai, namely stingless bee honey, agarwood, and herbs. Moreover, the Jahai actively participate in sustainable tourism by performing traditional Sewang dances, demonstrating the use of blowpipes, cultivating medicinal herbs, and creating handicrafts (Awang et al., 2012; Ramli et al., 2024).

The Orang Asli are pivotal to conservation initiatives within the BTFC, specifically in land use, forest resource management, and ecotourism development. Their traditional knowledge and active involvement are essential for encouraging collaboration among stakeholders to protect the area. The rich biodiversity of the region has made seed-collection training advantageous for the Orang Asli, boosting their entrepreneurial skills, providing employment, and generating income. For example, the Tropical Rainforest Living Collection Banun, Amanjaya project, launched in

2013, which operates a one-hectare nursery within a 500-hectare area managed by the Tropical Rainforest Conservation and Research Centre (TRCTC). The project supports conservation and restoration efforts with the Orang Asli engaging in species selection, germination, nursery cultivation, and outplanting, playing a significant role in preserving endangered tropical rainforest species. Out of the 29,278 seeds collected, 60 were forest tree species, and 26 were listed as endangered on the IUCN Red List (see Figure 4.4). This initiative emphasises the critical role of Orang Asli in maintaining and restoring the forest ecosystem through conservation and sustainable practices (Likin et al., 2018; Idris, 2020).



Figure 4.4 : Seeds collected by the Jahai tribe include A. *Swintonia* sp. (family Anacardiaceae), B. *Hopea* sp., C. *Rubroshorea* sp.

The Orang Asli community is integral to conservation efforts in the BTFC through their extensive knowledge of the forest as patrollers. Several government agencies and non-governmental organisations have engaged the local Orang Asli in anti-poaching activities. For instance, the WWF-Malaysia initiated Project Stampede, hiring the Orang Asli as patrol units to combat poaching, covering over 7,500 kilometres between 2014 and 2017 and revealing numerous traps. These patrols comprised entirely of Orang Asli members from RPS Banun and RPS Kemar, who provide a stable income and benefits, while WWF-Malaysia supports their development with courses in tour guiding, business, and law. This partnership empowers the Orang Asli and strengthens conservation and ecotourism initiatives in the region (WWF-Malaysia, 2023).

The Perak State Parks Corporation, in collaboration with Rimau, established the Menraq Patrol Unit to involve the communities of Kampung Kejar. This patrol unit comprises 30 Jahai men trained to conduct routine patrols to monitor illegal activities and collect vital wildlife data. Furthermore, the Department of Wildlife and National Parks allocated funding to hire Community Rangers for Perak State Parks Corporation, WWF-Malaysia, and RIMAU to perform anti-poaching and conservation activities. As of 2024, approximately 200 Orang Asli in BTFC were recruited for monitoring and protection (Yayasan Sime Darby, 2022). These community patrolling initiatives provide sustainable livelihoods

for the Orang Asli communities by recognising and adapting the traditional knowledge for the benefit of protection while achieving conservation targets. In the long run, the patrols create a strong line of defence against illegal activities and instil a sense of ownership among the communities.

Community-based conservation programmes, such as **community forest management (CFM)**, **eco-tourism**, and **wildlife corridors**, could significantly enhance conservation efforts in BTFC. The CFM in Nepal aims to reduce forest degradation, with local communities managing their forests for personal use and benefits based on an operational plan approved by the divisional forest officer (Ghimire & Lamichhane, 2020). Under **CFM**, local communities are trained by officers and experts to monitor biodiversity through citizen science within an assigned forest plot. They could also be trained to use tools such as camera traps and mobile applications to track wildlife and forest health. This training includes tasks such as developing **wildlife corridors** to improve habitat connectivity across BTFC, with communities playing a key role in planting trees, maintaining buffer zones, and monitoring wildlife movement. This participatory approach would empower locals to collect vital data, report illegal activities, and engage in sustainable resource management.

In terms of **eco-tourism**, BTFC could promote indigenous culture by involving local communities as specialised **tour guides** for wildlife and nature tours, providing cultural education and economic opportunities. The Anangu guides at Uluru provide immersive tours that share their cultural heritage, including storytelling about the spiritual significance of the land, bush tucker walks, and art workshops on traditional dot painting. Locals could deepen their connection to the forest and support conservation initiatives by offering additional tourism roles, such as guiding. This holistic approach would foster greater local involvement, ensuring that conservation efforts benefit the environment and the surrounding communities.

Traditional Ethnobotanical Practices of The Orang Asli Community

Natural resources are essential for indigenous peoples who incorporate them into their daily routines and rely on them for sustainability and subsistence. Recent studies have explored how these natural resources are utilised, albeit overlooking the factors influencing their usage and the essential role these resources play in sustaining their lifestyle. Traditional knowledge, referred to as local ecological knowledge, encompasses a profound comprehension of the interactions between living things and their surroundings. Elders typically transmit this knowledge verbally, spanning centuries and including insights into forests, wildlife, and ecosystems. Indigenous peoples possess a detailed comprehension of plant and animal properties, ecosystem functions, and management techniques. Local species in rural communities of developing countries are vital for food, medicine, fuel, and building materials. Meanwhile, their environmental knowledge and cultural practices, such as songs and stories, are integral to their cultural identity and heritage (Bartholomew et al., 2017).

Aweng et al. (2020) explored the traditional vegetable practices of the Jahai tribe, focusing on seven primary species: wild eggplant (*Solanum torvum*), sweet potato (*Ipomoea batatas*), Indian mulberry (*Morinda citrifolia*), cassava (*Manihot esculenta*), pigweed (*Amaranthus viridis*), purple milletia (*Milletia atropurpurea*), and torch ginger (*Etlingera elatior*). The Jahai tribe cultivates *I. batatas*, *M. esculenta*, *E. elatior*, and *S. torvum*, with *M. esculenta* and *I. batatas* as staple foods. *Etlingera elatior* and *S. torvum*, originally wild, are cultivated and served with rice or cassava. In contrast, *M. atropurpurea*, *A. viridis*, and *M. citrifolia* are wild-grown and not widely eaten. The shift of several formerly wild plants to domesticated status emphasises the flexible agricultural methods of the tribe and their integration of these plants into their dietary practices.

Ayuni et al. (2015) provided a detailed ethnobotanical survey of the Jahai tribe in RBSP, identifying 104 plant species across 72 genera and 38 families, highlighting that 91 species are used medicinally. Most listed plants are prepared as decoctions, where leaves, roots, and other plant parts are boiled and consumed for numerous health purposes. For example, *Fissistigma* sp., *Saprosma glomerulata*, *Spondias pinnata*, and *Stachyphrynium spicatum* for fever; *Goniotalamus scortechinii* and *Thottea tricornis* for headaches; *Coptosapelta tomentosa* and *Glycosmis* sp. for worms infections; *Cinnamomum javanicum*, *Morinda elliptica*, and *Psychotria* sp. for body aches; and *Clerodendrum* sp., *Heritiera javanica*, and *Labisia pumila* for female fertility. Socially, plants such as *Artabotrys* sp., *Elettariopsis* sp., *Polyalthia cauliflora*, and *Saprosma* sp. are used in the Sewang ritual and for protection against ill omens. Additionally, eight species, namely *Baccaurea parviflora*, *Baccaurea* sp., *Barringtonia macrostachya*, *Daemonorops geniculata*, *Drynaria* sp., *Elateriospermum tapos*, *Garcinia malaccensis*, and *G. parvifolia* are consumed raw (Ayuni et al., 2015).

5. Ecotourism Activities Within Belum-Temengor Forest Complex

Ecotourism refers to travelling to peaceful natural areas to appreciate the environment and local culture while protecting nature and improving the livelihoods of nearby communities (Choo & Halim, 2022). The main objective is to minimise environmental damage while ensuring tourism benefits local populations. Jaini et al. (2012) explained that ecotourism promotes wildlife conservation and environmental protection while offering social and economic advantages, such as job creation and increased environmental awareness. Despite these benefits, several economists noted the challenge in assigning a precise economic value to preserving tropical forests (Adhikari & Baral, 2018).

Ecotourism also raises public awareness, where activities such as cultural exchanges, conferences, and interactive tourism experiences educate locals and visitors about environmental and cultural matters (Mudasir et al., 2020). Nevertheless, critics argue that ecotourism generates positive outcomes but not meet its intended goals due to various implementation challenges.

The diverse natural environment and supportive government policies in Malaysia provides a place conducive for ecotourism development (Mordal, 2014). Tourism has long been vital to the national economy, ranking as the third-largest contributor to national GDP after manufacturing and commodities (Nair & Thomas, 2013; Hirschmann, 2020). Langkawi Geopark was recognised by UNESCO as an ecotourism site and serves as a prime example of sustainable tourism in Southeast Asia, balancing environmental preservation with community benefits and tourist experiences (Mordal, 2014). Similarly, BTFC contributes to eco-friendly tourism by offering activities such as wildlife observation, forest trekking, and visits to indigenous villages. These initiatives create employment opportunities for local communities while highlighting the biodiversity of the area (Schwabe et al., 2015).

The National Ecotourism Plan emphasises the potential of BTFC as a major ecotourism destination, showcasing its indigenous culture, wildlife diversity, and natural attractions such as waterfalls and Rafflesia flowers (Nik Mohamad, 2013). Ecotourism has fostered a sustainable local economy by creating jobs in sectors, namely hospitality, guiding, and food services. Nonetheless, the distribution of financial benefits is not consistently equitable. Although local communities earn income through employment and the sale of local products, most of the revenue is taken by foreign operators, reducing the overall benefit for locals (Mudasir et al., 2020). Kennedy (2012) outlined that approximately one-third of tourists' spending remains within the host country, with the rest going to international airlines and travel agencies.

Ecotourism has several drawbacks despite its positive contributions. A key issue is low environmental awareness among Malaysians, despite efforts to include environmental topics in education (Daniel & Nadeson, 2006). Buckley (2004) cautioned that expanding tourism infrastructure could increase resource consumption and waste generation. Moreover, tourism activities could disturb wildlife and plant life, and tourists moving through forests may inadvertently spread invasive species and diseases.

In BTFC, repeated logging, road construction, illegal hunting, and insufficient boundary monitoring have caused habitat degradation and biodiversity loss, undermining conservation efforts (Schwabe et al., 2015; Gwee et al., 2019). These activities affect Orang Asli communities, who depend on forest resources for their livelihoods. Encroachment on their lands disrupts their cultural practices and diminishes their role in forest conservation (Rozainee Abdullah et al., 2013). Other external threats, including water pollution and forest fires, further endanger these ecosystems. For example, from 1992 to 1998, forest fires driven by natural factors and human activity significantly reduced forest cover in states such as Kedah, Kelantan, and Pahang (Diemont & Hillegers, 2002).

Another concern is the commercialisation of local cultures due to ecotourism. Tourists often expect indigenous communities to perform traditional rituals or pose for photographs, which alters authentic cultural practices and places excessive pressure on local identities (Mudasir et al., 2020). Kennedy (2012) denoted that

these expectations disrupt traditional social structures and reduce cultural heritage to mere commercial goods. Nonetheless, initiatives such as the establishment of RBSP in 2007 demonstrate that a balance between environmental preservation and socio-economic development is achievable. Adopting sustainable tourism strategies enables destinations such as BTFC and Langkawi Geopark to maximise their natural and cultural resources while safeguarding their ecosystems for future generations. A well-managed ecotourism could enhance economic growth, strengthen cultural identity, and foster environmental stewardship by involving local communities in decision-making processes.

6. Conclusion

The BTFC boasts a wealth of flora species, encompassing a broad spectrum of species across numerous genera and families. The varying conservation status of these species, as noted by the IUCN Red List, highlight the urgent need for ongoing data collection and research. Expeditions in this region are critical for acquiring the data necessary to inform conservation strategies and protect the unique biodiversity of the forest, which is vital to ecological balance. The rich diversity of flora in the BTFC significantly enhances its ecotourism appeal, attracting visitors globally who come to experience its botanical diversity, including the rare Rafflesia. The presence of lakes also enhances their appeal, providing opportunities for water-based activities that complement the ecotourism experience. This tourist influx raises awareness about the importance of preserving such habitats and contributes economically to the region, supporting local conservation efforts.

The Orang Asli community plays an integral role in the ecosystem of BTFC. Traditionally reliant on the forest for hunting and foraging, the Jahai have adapted to modern roles within the forest, serving as rangers and participating in aquaculture and reforestation projects. Their deep connection to the forest underscores the importance of their involvement in conservation and sustainable management.

Given the ecological significance of BTFC and its value to tourism and local communities, maintaining the natural habitats is critical. Efforts should focus on balancing the growth of ecotourism with rigorous conservation measures to protect the diverse flora and ensure the continued provision of vital ecosystem services. All plant species, including those overlooked, play essential roles in maintaining ecosystem health, such as preventing soil erosion and supporting future plant growth. Protecting the BTFC is vital to preserving its natural beauty and sustaining the livelihoods of the Orang Asli, including supporting the broader goals of conservation and sustainable development.

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Appendix A: List of Floral Diversity (Phylum: Ptrediophyta) Recorded in Belum-Temengor Forest Complex

Family name	Species name	Common Name	Global IUCN Red List Status	Habit	Location	References
Adiantaceae	<i>Adiantum latifolium</i>	Paku Sisik	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Haplopteris ensiformis</i>		NE	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Apleniaceae	<i>Asplenium longissimum</i>		NE	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Asplenium scortechinii</i>		NE	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Aspleniaceae	<i>Asplenium macrophyllum</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Asplenium nidus</i>	Paku Langsuyar	NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Asplenium pellucidum</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Asplenium</i> sp.		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Athryiaceae	<i>Diplazium accedens</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Diplazium crenatoserratum</i>	Paku Naga	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Diplazium tomentosum</i>	Paku Binet	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Diplazium</i> sp.		NE	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Blechnaceae	<i>Stenochlaena palustris</i>	Paku Miding	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Davalliaceae	<i>Davallia angustata</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Davallia repens</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Dennstaedtiaceae	<i>Microlepia speluncae</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Dryopteridaceae	<i>Bolbitis appendiculata</i>		LC	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Bolbitis heteroclita</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Bolbitis simplicifolia</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Bolbitis sinuata</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Hymenophyllaceae	<i>Hymenophyllum penangianum</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Lomariopsidaceae	<i>Cyclopeltis crenata</i>		NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015
Lycopodiaceae	<i>Huperzia phlegmaria</i> (L.)	Sri Gading	NE	Lycophytes	Royal Belum State Park	Maideen et al. (2015)

	<i>Palhinhaea cernua</i>	Paku Serani	LC	Lycophytes	Royal Belum State Park	Maideen et al. (2015)
	<i>Phlegmariurus phlegmaria</i>		NE	Lycophytes	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Lygodiaceae	<i>Lygodium flexuosum</i>	Ribu-Ribu Gajah	NE	Lycophytes	Royal Belum State Park	Maideen et al. (2015)
	<i>Lygodium microphyllum</i>	Akar Sidin Kecil	NE	Lycophytes	Royal Belum State Park	Maideen et al. (2015)
	<i>Lygodium salicifolium</i>	Ribu-Ribu Gajah	NE	Lycophytes	Royal Belum State Park	Maideen et al. (2015)
Marattiaceae	<i>Angiopteris elliptica</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Angiopteris evecta</i>	Paku Gajah	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Nephrolepidaceae	<i>Nephrolepis biserrata</i>	Paku Uban	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Nephrolepis falciformis</i>	Paku Uban	NE	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Oleandraceae	<i>Oleandra cumingii</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Ophioglossaceae	<i>Helminthostachys zeylanica</i>	Akar Tunjuk Langit	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Ophioglossum costatum</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Ophioglossum pedunculatum</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Polypodiaceae	<i>Colypsis</i> sp.		NE		Royal Belum State Park	Maideen et al. (2015)
	<i>Drynaria rigidula</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Drynaria sparsisora</i>		NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Lecanopteris crustacea</i>		NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Leptochilus macrophyllus</i> var. <i>pedunculatus</i>		NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Leptochilus</i> sp.		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Loxogramme subcostata</i>		NE	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Microsorium membranifolium</i>	Paku Chai	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Microsorium pteropus</i>		LC	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Platyserium ridleyi</i>	Tanduk Rusa	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
<i>Pyrrosia lanceolata</i>	Bulu Ayam	NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015	

Pteridaceae	<i>Antrophyum callifolium</i>	Akar Selempar	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Antrophyum latifolium</i>		NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Ceratopteris thalictroides</i>	Paku Roman	LC	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Pteris ensiformis</i>	Paku Mega	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Taenitis blechnoides</i>	Paku Pijai	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
Selaginellaceae	<i>Selaginella delicatula</i>		NE	Spike moss	Royal Belum State Park	Maideen et al. (2015)
	<i>Selaginella frondosa</i>		NE	Spike moss	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Selaginella mayeri</i>		NE	Spike moss	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Selaginella padangensis</i>		NE	Spike moss	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Selaginella plana</i>		NE	Spike moss	Royal Belum State Park	Maideen et al. (2015)
	<i>Selaginella roxburghii</i>		NE	Spike moss	Royal Belum State Park	Maideen et al. (2015)
	<i>Selaginella stipulata</i>		NE	Spike moss	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Selaginella wallichii</i>	Paku Merak	NE	Spike moss	Royal Belum State Park	Ummul-Nazrah et al., 2015
	<i>Selaginella willdenowii</i>	Paku Merak, Paku Lipan	NE	Spike moss	Royal Belum State Park	Ummul-Nazrah et al., 2015
Tectariaceae	<i>Pleocnemia conjugata</i>	Paku Gading	NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Tectaria brachiata</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Tectaria crenata</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Tectaria impressa</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Tectaria semipinnata</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Tectaria sp.</i>		NE	Fern	Royal Belum State Park	Ummul-Nazrah et al., 2015
Thelypteridaceae	<i>Pneumatopteris sp.</i>		NE	Fern	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Pneumatopteris truncate</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Pronephrium menisciicarpon</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Reholttumia truncata</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)

Vittariaceae	<i>Haplopteris angustifolia</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)
	<i>Haplopteris angustissima</i>		NE	Fern	Royal Belum State Park	Maideen et al. (2015)

*NE = Not Evaluated, LC = Least Concern

Appendix B: List of Floral Diversity (Phylum: Gymnosperm) Recorded in Belum-Temengor Forest Complex

Family name	Species name	Common Name	Global IUCN Red List Status	Habit	Location	References
Cycadaceae	<i>Cycas macrocarpa</i>	Bogak	VU	Palm-like	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Cyperus pilosus</i>	Rumput Para-Para	LC	Herb	Royal Belum State Park	Ismail et al. (2015)
	<i>Cyperus</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Cyperus</i> sp. 1			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Cyperus</i> sp. 2			Herb	Royal Belum State Park	Ghazalli et al. (2015)
Gnetaceae	<i>Gnetum gnemonoides</i>		LC	Liana	Royal Belum State Park	Rahmad et al. (2018)
	<i>Gnetum latifolium</i>	Akar Melinjau	LC	Liana	Royal Belum State Park	Rahmad et al. (2018)
	<i>Gnetum macrostachyum</i>		LC	Liana	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Gnetum microcarpum</i>		LC	Liana	Royal Belum State Park	Rahmad et al. (2018)
	<i>Gnetum</i> sp.			Liana	Royal Belum State Park	Ghazalli et al. (2015)
Podocarpaceae	<i>Podocarpus</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)

*LC = Least Concern, VU = Vulnerable

Appendix C: List of Floral Diversity (Phylum: Anthophyta) Recorded in Belum-Temengor Forest Complex

Family name	Species name	Common Name	Global IUCN Red List Status	Habit	Location	References
Achariaceae	<i>Hydnocarpus nana</i>	Setumpol	NT	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Hydnocarpus woodii</i>	Senumpul	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Pangium edule</i>	Kepayang	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017b)
Amaryllidaceae	<i>Crinum asiaticum</i>	Bakung Putih	NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
Anacardiaceae	<i>Bouea macrophylla</i>	Kundang Hutan	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Dracontomelon dao</i>	Sengkuang	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Mangifera microphylla</i>	Rawa	NE	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Mangifera quadrifida</i> var. <i>quadrifida</i>	Macang Hutan	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Melanochyla</i> sp.	Rengas		Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Spondias pinnata</i>	Kedondong	NE	Tree	Royal Belum State Park	Ghazalli et al. (2015)
Anisophylleaceae	<i>Anisophyllea corneri</i>	Delek	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Annonaceae	<i>Alphonsea elliptica</i>	Mempisang	LC	Tree	Royal Belum State Park	Chua et al. (2000)
	<i>Alphonsea lucida</i>	..	VU	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Alphonsea maingayi</i>	Pisang-Pisang Batu	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Anaxagorea javanica</i>	Akar Rarak	LC	Shrub/Tree	Royal Belum State Park	Ismail et al. (2015)
	<i>Desmos chinensis</i>	Akar Mempisang	NE	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Enicosanthum fuscum</i>		NT	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Fissistigma manubriatum</i>	Akar Larak	NE	Climber	Royal Belum State Park	Wan Rozali et al. (2015)
	<i>Friesodielsia</i> sp.			Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Goniothalamus curtisii</i>	Cagau	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Goniothalamus macrophyllus</i>	Lukai Kampong	NE	Tree	Royal Belum State Park	Chua et al. (2000)
	<i>Goniothalamus scortechinii</i>	Selayar Hitam	NE	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Goniothalamus</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Goniothalamus uvarioides</i>	Belindung	NE	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Mezzettia parviflora</i>	Mempisang	LC	Tree	Royal Belum State Park	Chua et al. (2000)
<i>Mezzettia</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)	
<i>Milium longipes</i>	Kayu Hamat Bawa	NE	Tree	Royal Belum State Park	Ismail et al. (2015)	

Apocynaceae	<i>Monocarpia maingayi</i>	Mempisang	NE	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Orophea cf. hirsuta</i>	Pialu	NE	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Orophea cuneiformis</i>		NE	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Orophea enterocarpa</i>		NE	Shrub	Royal Belum State Park	Ismail et al. (2015)
	<i>Polyalthia bullata</i>	Tongkat Ali Hitam	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Polyalthia cauliflora var. cauliflora</i>	Karai Larak Merah	LC	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Polyalthia clavigera</i>	Mempisang	NE	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Polyalthia sp.</i>			Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Polyalthia stenopetala</i>	Jambul Cicit	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Popowia fusca</i>		NE	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Rauvolfia verticillata</i>	Beras-Beras	LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Tabernaemontana corymbosa</i>	Jelutung Badak	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Aglaonema nitidum</i>	Keladi Hutan	NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Alocasia denudata</i>	Keladi Birah	NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
Araceae	<i>Amorphophallus campanulatus (Amorphophallus paeoniifolius)</i>	Lekir	LC	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Amorphophallus prainii</i>	..	NE	Herb	Royal Belum State Park	Ismail et al. (2015)
	<i>Arisaema laminatum</i>		NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Colocasia esculenta</i>	Keladi	LC	Herb	Royal Belum State Park	Ismail et al. (2015)
	<i>Epipremnum giganteum</i>	Akar Resdung	NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Homalomena humilis</i>	Keladi Hutan	NE	Aroid	Royal Belum State Park	Ismail et al. (2015)
	<i>Homalomena pontederiifolia</i>		NE	Aroid	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Homalomena sp.</i>			Aroid	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Licuala triphylla</i>		NE	Aroid	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Pinanga paradoxa</i>		NE	Aroid	Royal Belum State Park	Ghazalli et al. (2015)
Araliaceae	<i>Piptospatha perakensis</i>		NE	Aroid	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Schismatoglottis calyptrata</i>		NE	Aroid	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Trevesia burckii</i>	Jari hantu	LC	Tree	Banding Forest Reserve	Hazandy (2014)

Arecaceae	<i>Arenga hookeriana</i>	Miniature Sugar Palm	NE	Palm	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Calamus castaneus</i>	Rotan Cucur	NE	Rattan	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Licuala</i> sp.			Palm	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Pinanga disticha</i>	Pinang	NE	Palm	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Pinanga malaiana</i>	Lagong	NE	Palm	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Pinanga perakensis</i>		NE	Palm	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Aristolochiaceae	<i>Thottea parviflora</i>	Kemed Kawit	NE	Shrub	Royal Belum State Park	Ismail et al. (2015)
	<i>Thottea tomentosa</i>	Tapak Gajah	LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Asparagaceae	<i>Peliosanthes</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
Asteraceae	<i>Ageratum conyzoides</i>	Berenyol	NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Erechtites hieraciifolia</i>	Fireweed	NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Mikania micrantha</i>	Akar Lupang	NE	Herb	Royal Belum State Park	Ismail et al. (2015)
	<i>Vernonia arborea</i>	Medang Gambong	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
Begoniaceae	<i>Begonia</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Begonia wrayi</i>	Riang Batu	NT	Herb	Sg Kuak, Temengor Forest Reserve	Ummul-Nazrah et al., 2015
Burseraceae	<i>Canarium littorale</i>	Kedondong Bulan	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Canarium patentinervium</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Dacryodes costata</i>	Kedondong Bulu Costata	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Dacryodes laxa</i>	Kedondong Bulu Laxa	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Dacryodes puberula</i>	Kedondong	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Dacryodes rostrata</i>	Kedondong Kerut	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Dacryodes rugosa</i>	Kedondong Matahari	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Santiria apiculata</i>	Kedondong Kerantai	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Santiria laevigata</i>	Kedondong Kerantai Licin	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Santiria tomentosa</i>	Kedondong Kerantai Bulu	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Calophyllaceae	<i>Calophyllum inophyllum</i>	Bintangor Laut	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Mesua ferrea</i>	Lenggapus	NE	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
Cannabaceae	<i>Celtis rigescens</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)

	<i>Gironniera parvifolia</i>	Hampas Tebu	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
Chloranthaceae	<i>Chloranthus erectus</i>	Sambau Paya	NE	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Cleomaceae	<i>Cleome ruidosperma</i>		NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Garcinia atroviridis</i>	Asam Gelugor	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017b)
	<i>Garcinia bancana</i>	Tengkawan	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Garcinia cowa</i>	Kandis	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017b)
Clusiaceae	<i>Garcinia nervosa</i>	Kandis	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Garcinia prainiana</i>	Mencupu	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Garcinia sp.</i>			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Garcinia urophyll</i>	Kandis	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Amischotolype glabrata</i>	Segambut Merah	NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
Commelinaceae	<i>Pollia secundiflora</i>		NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Rhopalephora scaberrima</i>		NE	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Costaceae	<i>Costus globosus</i>		LC	Herb	Royal Belum State Park	Ghazalli et al. (2015)
Cucurbitaceae	<i>Gymnopetalum chinense</i>	Sipam	NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Dillenia ovata</i>	Simpoh Beludu	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
Dilleniaceae	<i>Dillenia reticulata</i>	Simpoh Gajah	LC	Tree	Royal Belum State Park	Ismail et al. (2015)
	<i>Tetracera indica</i>	Mempelas	NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
Dioscoreaceae	<i>Dioscorea bulbifera</i>		NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Anisoptera costata</i>	Mersawa kesat	EN	Tree	Royal Belum State Park	Zaki et al. (2014)
	<i>Anisoptera laevis</i>	Mersawa durian	VU	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Dipterocarpus acutangulus</i>	Keruing Merkah	EN	Tree	Royal Belum State Park	Zaki et al. (2014)
	<i>Dipterocarpus baudii</i>	Keruing Bulu	VU	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Dipterocarpus chartaceus</i>	Keruing Kertas	EN	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
Dipterocarpaceae	<i>Dipterocarpus costulatus</i>	Keruing Kipas	NT	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Dipterocarpus fagineus</i>	Keruing Pipit	VU	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Dipterocarpus gracilis</i>	Keruing Kesat	VU	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Dipterocarpus grandiflorus</i>	Keruing Belimbing	EN	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Dipterocarpus kunstleri</i>	Keruing Gombang Merah	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)

	<i>Hopea coriacea</i>	Giam Hantu	VU	Tree	Royal Belum State Park	Zaki et al. (2014)
	<i>Hopea latifolia</i>	Merawan Daun Bulat	DD	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Hopea pubescens</i>	Merawan Bunga	VU	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Hopea sangal</i>	Merawan Siput	VU	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Hopea sublanceolata</i>	Merawan Jeruai	VU	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Parashorea densiflora</i>	Meranti Pasir	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Parashorea stellata</i>	Gerutu Gerutu	VU	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Rubroshorea curtisii</i> ssp. <i>curtisii</i>	Meranti Seraya	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Rubroshorea macroptera</i>	Meranti Melantai	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Shorea bentongensis</i> (<i>Anthoshorea bentongensis</i>)	Meranti Mengkai	VU	Tree	Royal Belum State Park	Zaki et al. (2014)
	<i>Shorea dasyphylla</i> (<i>Rubroshorea dasyphylla</i>)	Meranti Batu	NT	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Shorea farinosa</i>	Temak Merah	EN	Tree	Royal Belum State Park	Chua et al. (2000)
	<i>Shorea guiso</i>	Balau Membatu	VU	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Shorea laevis</i>	Balau Kumus	VU	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Shorea lepidota</i> (<i>Rubroshorea lepidota</i>)	Meranti Langgang	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Shorea leprosula</i> (<i>Rubroshorea leprosula</i>)	Meranti Tembaga	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Shorea maxima</i> (<i>Richetia maxima</i>)	Damar Sengkawang Puteh	NT	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Shorea multiflora</i> (<i>Richetia multiflora</i>)	Damar Hitam Pipit	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Shorea ovata</i> (<i>Rubroshorea ovata</i>)	Meranti Sarang Punai	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Shorea parvifolia</i>	Meranti Sarang Punai	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Shorea pauciflora</i> (<i>Rubroshorea pauciflora</i>)	Meranti Nemesu	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Shorea platyclados</i> (<i>Rubroshorea platyclados</i>)	Meranti Bukit	NT	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Vatica bella</i>	Resak Keluangas	DD	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Vatica pauciflora</i>	Resak Laru	VU	Tree	Royal Belum State Park	Rahmad et al. (2018)
Ebenaceae	<i>Diospyros dictyoneura</i>		NE	Tree	Royal Belum State Park	Ghazalli et al. (2015)

Elaeocarpaceae	<i>Diospyros ridleyi</i>	Meribut	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Diospyros scortechinii</i>	Tembakar	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Diospyros singaporensis</i>	Meribut	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Diospyros</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Diospyros wallichii</i>	Tuba buah	LC	Tree	Royal Belum State Park	Chua et al. (2000)
	<i>Elaeocarpus nitidus</i>	Mendong	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Sloanea sigun</i>		LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Antidesma cuspidatum</i>	Bruni	LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Antidesma montanum</i>	Berunai	LC	Shrub	Royal Belum State Park	Chua et al. (2000)
	<i>Balakata baccata</i>	Ludai	NE	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Blumeodendron</i> sp.	Gaham Badak		Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Croton argyratus</i>	Hamba Raja	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
Euphorbiaceae	<i>Elateriospermum tapos</i>	Perah	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Endospermum diadenum</i>	Sesendok	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Macaranga conifera</i>	Mahang	LC	Tree	Banding Forest Reserve	Hazandy (2014)
	<i>Macaranga denticulata</i>	Mahang	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Macaranga hullettii</i>	Mahang	LC	Tree	Banding Forest Reserve	Hazandy (2014)
	<i>Macaranga hypoleuca</i>	Mahang Putih	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Macaranga triloba</i>	Mahang Merah	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Mallotus griffithianus</i>	..	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Mallotus muticus</i>	Mallotus Paya	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Paracroton pendulus</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Sapium baccatum</i>	Ludai	LC	Tree	Banding Forest Reserve	Hazandy (2014)
	<i>Archidendron bubalinum</i>	Kerdas	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017b)
Fabaceae	<i>Bauhinia acuminata</i>	Bunga Perak	LC	Climber	Royal Belum State Park	Rahmad et al. (2018)
	<i>Bauhinia bidentata</i>	Katup Katup	NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Desmodium heterocarpon</i>	Kacang Kayu Betina	NE	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Dialium indum</i>	KerANJI	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Dialium platysepalum</i>	KerANJI Kuning Besar	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)

	<i>Intsia palembanica</i>	Merbau	NT	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Koompassia malaccensis</i>	Kempas	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Mucuna pruriens</i>		NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Ormosia macrodisca</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Parkia speciosa</i>	Petai	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017b)
	<i>Saraca indica</i>	Ashoka tree	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Sindora coriacea</i>	Sepetir Licin	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Sindora</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Spatholobus gyrocarpus</i>		LC	Liana	Royal Belum State Park	Rahmad et al. (2018)
	<i>Uraria crinita</i>		NE	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Fagaceae	<i>Castanopsis argentea</i>		EN	Tree	Royal Belum State Park	Zaki et al. (2014)
	<i>Castanopsis curtisii</i>	Berangan Babi	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Lithocarpus wallichianus</i>	Mempening	NE	Tree	Royal Belum State Park	Chua et al. (2000)
Gesneriaceae	<i>Cyrtandra gimlettii</i>		NE	Herb	Royal Belum State Park	Ismail et al. (2015)
	<i>Epithema parvibracteatum</i>		NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Epithema saxatile</i>		NE	Herb	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Henckelia</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Stauranthera grandiflora</i>		NE	Herb	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Hanguanaceae	<i>Hanguana malayana</i>	Susum	LC	Herb	Royal Belum State Park	Ghazalli et al. (2015)
Hypericaceae	<i>Cratoxylum arborescens</i> var. <i>arborescens</i>	Geronggang Geronggang	LC	Tree	Royal Belum State Park	Ismail et al. (2015)
Irvingiaceae	<i>Irvingia malayana</i>	Pauh Kijang	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Lamiaceae	<i>Vitex vestita</i>	Leban Hutan	LC	Shrub	Royal Belum State Park	Siti Eryani et al. (2023)
Lauraceae	<i>Actinodaphne</i> sp.	Medang		Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Beilschmiedia dictyoneura</i>		VU	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Beilschmiedia insignis</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Beilschmiedia palembanica</i>	Medang	LC	Tree	Royal Belum State Park	Chua et al. (2000)
	<i>Beilschmiedia</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Cryptocarya infectoria</i>		NE	Tree	Royal Belum State Park	Chua et al. (2000)
	<i>Endiandra maingayi</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)

Lecythidaceae	<i>Litsea umbellata</i>	Medang	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Barringtonia macrostachya</i>	Putat Gajah	LC	Shrub/Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Barringtonia scortechinii</i>	Putat Gajah	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
Loganiaceae	<i>Strychnos ignatii</i>	Akar Ipuh	NE	Climber	Royal Belum State Park	Wan Rozali et al. (2015)
Lowiaceae	<i>Orchidantha longiflora</i>		NE	Herb	Royal Belum State Park	Syahida-Emiza et al. (2023)
Malvaceae	<i>Durio griffithii</i>	Durian Tupai	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Hibiscus floccosus</i>	Kangsar	NE	Shrub	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Hibiscus macrophyllus</i>	Tutur	NE	Shrub	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Microcos tomentosa</i>	Cenderai	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Neesia altissima</i>		NE	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Pentace perakensis</i>		VU	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Scaphium linearicarpum</i>	Kembang Semangkok	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Scaphium macropodum</i>	Kembang Semangkok Jantong	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Schoutenia kunstleri</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Urena lobata</i>	Pepulut	LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Melastomataceae	<i>Memecylon amplexicaule</i>		LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Memecylon</i> sp.			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Pternandra echinata</i>	Sial Menahun	NE	Tree	Banding Forest Reserve	Hazandy (2014)
Meliaceae	<i>Aglaiia eximia</i>	Bekak	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Aglaiia foveolata</i>	Bekak	NT	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Aglaiia korthalsii</i>	Bekak	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Aglaiia leucophylla</i>	Bekak Kedondong	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Aglaiia oligophylla</i>	Bekak	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Aglaiia palembanica</i>	Memberas	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Aglaiia rubiginosa</i>	Bekak	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Aglaiia squamulosa</i>	Bekak	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Azadirachta excelsa</i>	Sentang	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Chisocheton tomentosus</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Lansium domesticum</i>	Langsat	LC	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017b)

	<i>Sandoricum koetjape</i>	Sentul	VU	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Xylocarpus moluccensis</i>	Nyireh Batu	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Menispermaceae	<i>Cosciniium fenestratum</i>	Akar Mengkunyit	DD	Climber	Royal Belum State Park	Wan Rozali et al. (2015)
	<i>Artocarpus elasticus</i>	Terap Nasi	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
Moraceae	<i>Artocarpus gomezianus</i>	Keledang Tampang Hitam	NE	Tree	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
	<i>Artocarpus rigidus</i>	Temponek	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Ficus ischnopoda</i>		LC	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Endocomia canarioides</i>	Piangu Talang	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Horsfieldia polyspherula</i>	Penarahan	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Myristicaceae	<i>Horsfieldia sucosa</i>	Penarahan	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Knema conferta</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Myristica iners</i>	Penarahan Arang	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Myristica</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
Myrsinaceae	<i>Ardisia</i> sp.	Mata Pelanduk		Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Labisia pumila</i>	Kacip Fatimah	NE	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Myrtaceae	<i>Rhodamnia cinerea</i>	Mempoyan	NE	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Syzygium</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Erythralum scandens</i>	Akar Kulim	LC	Climber	Royal Belum State Park	Ghazalli et al. (2015)
Olacaceae	<i>Ochanostachys amentacea</i>	Petaling	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Scorodocarpus borneensis</i>	Kulim	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
Onagraceae	<i>Ludwigia hyssopifolia</i>	Inai Paya	LC	Weed	Royal Belum State Park	Ismail et al. (2015)
Orchidaceae	<i>Corymborkis veratrifolia</i>	Hencing Ali	NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Didymoplexiella ornata</i>		NE	Shrub	Royal Belum State Park	Ismail et al. (2015)
Pandaceae	<i>Galearia</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
Passifloraceae	<i>Adenia</i> sp.	Akar Lempedu Gajah		Herb/Vine	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Antidesma pendulum</i>	Berunai	LC	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
Phyllanthaceae	<i>Antidesma</i> sp.	Berunai		Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Aporosa</i> sp.	Sebasah	..	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Phyllanthus</i> sp.			Shrub	Royal Belum State Park	Ghazalli et al. (2015)

	<i>Piper</i> sp.			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Poaceae	<i>Gigantochloa scortechinii</i>	Buluh Galah	NE	Bamboo	Royal Belum State Park	Ghazalli et al. (2015)
Primulaceae	<i>Ardisia colorata</i>	Mata Pelanduk	LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Ardisia korthalsiana</i>	Mata Pelanduk	NE	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Rafflesiaceae	<i>Rafflesia azlanii</i>		NE	Parasite	Royal Belum State Park	Siti-Munirah et al. (2012)
	<i>Rafflesia cantleyi</i>		NE	Parasite	Royal Belum State Park	Wan Zakaria et al. (2016)
	<i>Rafflesia kerrii</i>	Pakma	NE	Parasite	Royal Belum State Park	Wan Zakaria et al. (2016)
Rhamnaceae	<i>Zizyphus</i> sp.			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Rosaceae	<i>Prunus arborea</i>	Pepijat	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Prunus grisea</i>	Pepijat	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Rubiaceae	<i>Argostemma</i> sp.		NE	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Canthium aciculatum</i>		NE	Tree	Royal Belum State Park	Ismail et al. (2015)
	<i>Chassalia chartacea</i>	Pengugur	NE	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Chassalia</i> sp.			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Diplospora malaccense</i>	..	NE	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Fagerlindia fasciculata</i>		NE	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Gardeniopsis longifolia</i>	..	LC	Shrub	Royal Belum State Park	Siti Eryani et al. (2023)
	<i>Ixora brunonis</i>		LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Ixora javanica</i> var. <i>javanica</i>	Jenjarum	LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Ixora nigricans</i>		LC	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Ixora</i> sp.			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Lasianthus montanus</i>		NE	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Lasianthus</i> sp.			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Lasianthus</i> sp. 1			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Lasianthus</i> sp. 2			Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Lasianthus</i> sp. 3			Tree	Royal Belum State Park	Ismail et al. (2015)
<i>Lasianthus stercorarius</i>		NE	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)	
<i>Neolamarckia cadamba</i>	Kelempayan	NE	Tree	Royal Belum State Park	Ismail et al. (2015)	
<i>Ophiorrhiza communis</i>		NE	Shrub	Royal Belum State Park	Ismail et al. (2015)	

	<i>Ophiorrhiza discolor</i>		NE	Shrub	Royal Belum State Park	Ismail et al. (2015)
	<i>Pavetta salicina</i>		NE	Shrub	Royal Belum State Park	Ismail et al. (2015)
	<i>Pavetta wallichiana</i>		NE	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Porterandia anisophylla</i>	Tinjau Belukar	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Prismatomeris</i> sp.			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Psychotria calocarpa</i>		NE	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Psychotria rhinocerotis</i>		LC	Shrub	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Psychotria</i> sp. 1			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Psychotria</i> sp. 2			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Psychotria</i> sp. 3			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Psychotria</i> sp. 4			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Saprosma distans</i>		NE	Shrub	Royal Belum State Park	Ismail et al. (2015)
	<i>Saprosma</i> sp. 1			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Saprosma</i> sp. 2			Shrub	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Timonius wallichianus</i>	Kaum Kopi	NE	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Urophyllum glabrum</i>	Melukut	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
Rutaceae	<i>Citrus halimii</i>	Limau Hutan	LC	Tree	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Murraya paniculata</i>	Kamuning	NE	Shrub	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
Salicaceae	<i>Flacourtia rukam</i>	Rukam	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Nephelium cuspidatum</i> var. <i>ophiodes</i>	Rambutan Hutan	LC	Tree	Royal Belum State Park	Chua et al. (2000)
Sapindaceae	<i>Paranephelium macrophyllum</i>	Gesiar	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Paranephelium xestophyllum</i>		LC	Tree	Royal Belum State Park	Chua et al. (2000)
	<i>Pometia pinnata</i>	Kasai	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Xerospermum noronhianum</i>	Rambutan Pacat	NE	Tree	Royal Belum State Park	Ghazalli et al. (2015)
Sapotaceae	<i>Palaquium hexandrum</i>	Nyatoh Jambak	NT	Tree	Royal Belum State Park	Rahmad et al. (2018)
	<i>Payena maingayi</i>	Nyatoh Durian	LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Stemonuraceae	<i>Gomphandra quadrifida</i>		LC	Shrub	Royal Belum State Park	Ghazalli et al. (2015)
Thymelaeaceae	<i>Gonystylus confusus</i>	Ramin	LC	Tree	Royal Belum State Park	Siti Eryani et al. (2023)
Torricelliaceae	<i>Aralidium pinnatifidum</i>	Sebalai	LC	Tree	Royal Belum State Park	Ghazalli et al. (2015)

Urticaceae	<i>Dendrocide stimulans</i>	Jelantang Gajah	LC	Shrub	Temengor Forest Reserve	Ahmad Fitri et al. (2017a)
Violaceae	<i>Rinorea horneri</i>		LC	Tree	Royal Belum State Park	Rahmad et al. (2018)
Vitaceae	<i>Cissus repens</i>		NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Cissus</i> sp.			Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Tetrastigma leucostaphylum</i>		NE	Climber	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Alpinia</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Amomum</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Boesenbergia jahaiana</i>		NE	Herb	Royal Belum State Park	Ismail et al. (2015)
	<i>Boesenbergia plicata</i>		LC	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Boesenbergia prainian</i>		LC	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Elettaria</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Elettariopsis</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
Zingiberaceae	<i>Globba curtisii</i>		NE	Herb	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Globba pendula</i>	Meroyan Tinggal	LC	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Globba</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Scaphochlamys</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Zingiber</i> cf. <i>kunstleri</i>		LC	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Zingiber griffithii</i>		NT	Herb	Royal Belum State Park	Ismail et al. (2015)
	<i>Zingiber puberulum</i>		NT	Herb	Royal Belum State Park	Ghazalli et al. (2015)
	<i>Zingiber raja</i>		EN	Herb	Temengor Forest Reserve	Siti-Munirah et al. (2013)
	<i>Zingiber</i> sp.			Herb	Royal Belum State Park	Ghazalli et al. (2015)

*NE = Not Evaluated, DD = Data Deficient, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered