



GAMUDA PARKS

A SUSTAINABLE LANDSCAPE INITIATIVE

BIODIVERSITY ASSESSMENT

FOR
PAYA INDAH
WETLANDS

01.2020

OWNERSHIP OF :

GAMUDA LAND

PREPARED BY :



PAYA INDAH WETLANDS BIODIVERSITY AUDIT AND ASSESSMENT

for
GAMUDA COVE
DENGKIL, SELANGOR

Findings Report



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& Assessment

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Section 1

INTRODUCTION

1.1 Introduction

This study is a biodiversity audit and assessment of Paya Indah Wetlands for Gamuda Cove township development in Dengkil, Selangor, commissioned by Gamuda Parks. The overall aim of this study is to construct a flora and fauna inventory, water quality assessment as well as to recommend mitigation actions to prevent habitat and environmental degradation, and to prescribe habitat enrichment options and recommendations to strengthen Paya Indah Wetlands as a biodiversity reservoir and a sustainable tourism destination - Discovery Wetlands. ERE Consulting Group was appointed to undertake this study, which was conducted over a period of three weeks in December 2019. This report presents the findings of the assessment.

1.2 Scope of Work

This assessment covers three major ecological aspects of Paya Indah Wetlands as follows:

- i. *Flora composition* – Assessment of the existing flora composition in Paya Indah Wetlands include a quick survey of the trees planted; measurements of DBH and height of trees, species of trees and plants in scientific and vernacular names as well as identifying species of trees that are of conservation interest.
- ii. *Fauna composition* – Assessment of the existing fauna composition include a rapid survey and camera trapping to document of the various types of wildlife in within Paya Indah Wetlands, which includes mammals, birds, herpetofauna (amphibians and reptiles), and insects.
- iii. *Water Quality of Lakes* – Assessment of existing lakes' water quality include physical measurement and chemical characteristics by water sample analysis from each of the eleven lakes present in Paya Indah Wetlands. Parameters measured include elevation, depth, biological oxygen demand, heavy metal contents and nutrient contents.

1.3 Study Area

Paya Indah Wetlands (PIW) is a 450.76 ha wetland area reserve and recreational park situated in the district of Dengkil, Selangor. There are 11 lakes within PIW namely;

- Tasik Driftwood
- Tasik Telipok
- Tasik Resam
- Tasik Sendayan
- Tasik Teratai
- Tasik Palma
- Tasik Kuning
- Tasik Rusiga
- Tasik Typha
- Crocodile Lake
- Hippo Lake

These lakes are made up of degraded tin-mining lakes, logged peat swamp forest and large open lakes. The remaining terrestrial area of PIW is dominated by a mixture of plant species that were mostly planted by the wetlands reserve management and corporate social responsibility initiatives to restore the wetlands.

PIW is divided into three main zones; Recreation, Education, and Conservation and Research zones (**Figure 1-1, 1-2**). Each zone is utilised for different purposes, therefore the Education and Conservation zones are with restricted access. The wetland reserve is currently managed by the Department of Wildlife and National Parks (PERHILITAN) and is inhabited by approximately 60 estuarine crocodiles, 3 Nile hippopotamuses, various resident and migratory birds, and other small mammals and herpetofauna.

Surrounding the wetland reserve is the Gamuda Cove development to the north, a housing estate to the east, and oil palm estates to the south and west. Gamuda Cove is collaborating with PIW as part of their corporate social responsibility initiatives to ensure the sustainability of its ecosystem function and role.



Plate 1-1: Aerial view of Rumah Melayu and jetty at Tasik Sendayan

1.4 Report Format

Apart from the introductory section, this report contains the following sections:

- Section 2: Survey Methodology** – This section describes the objectives of each assessment and briefly documents the methods used.
- Section 3: Survey Results** – This section presents the results from both flora and fauna survey, together with a brief description of results obtained and species occurrence in the study area, and a summary of the findings.
- Section 4: Way Forward** – This section summarises the assessment with some preliminary conclusions and recommendations to further enrich and strengthen the habitat presently available in Paya Indah Wetlands.

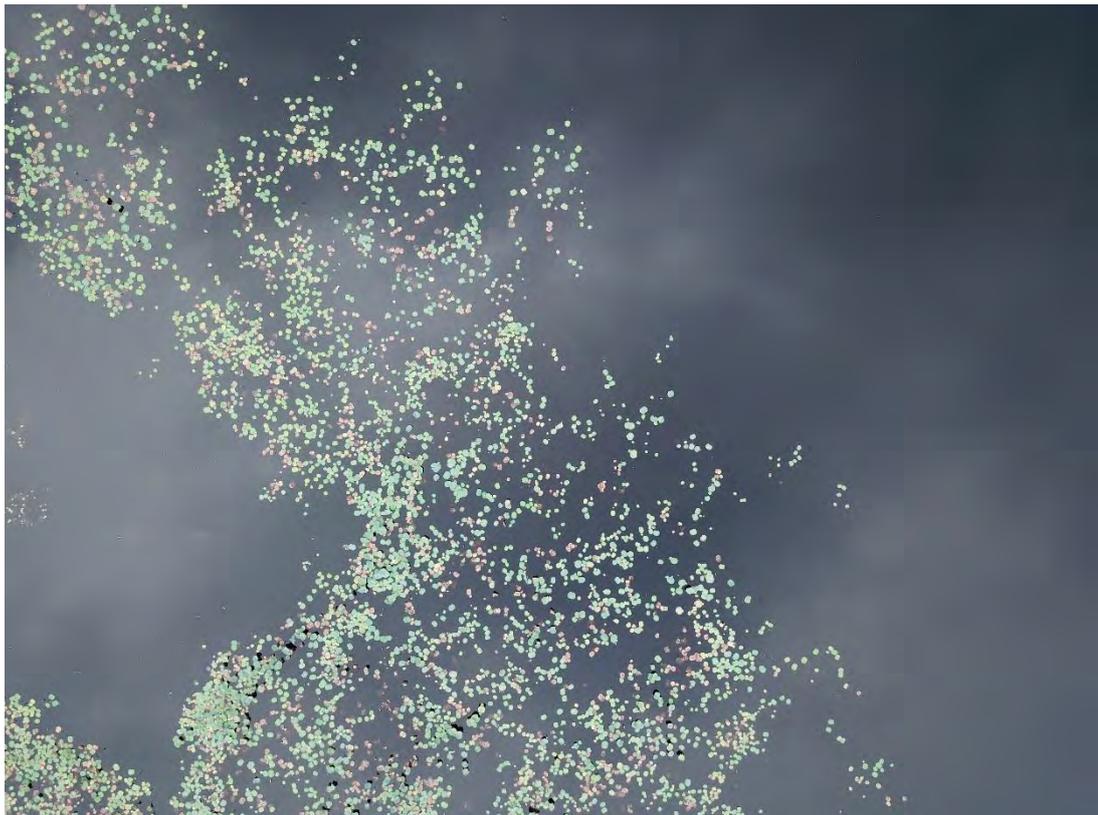
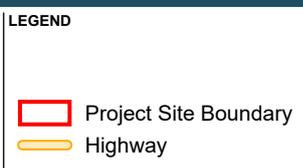
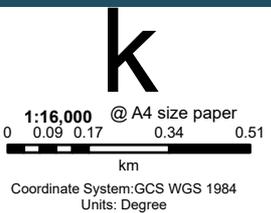
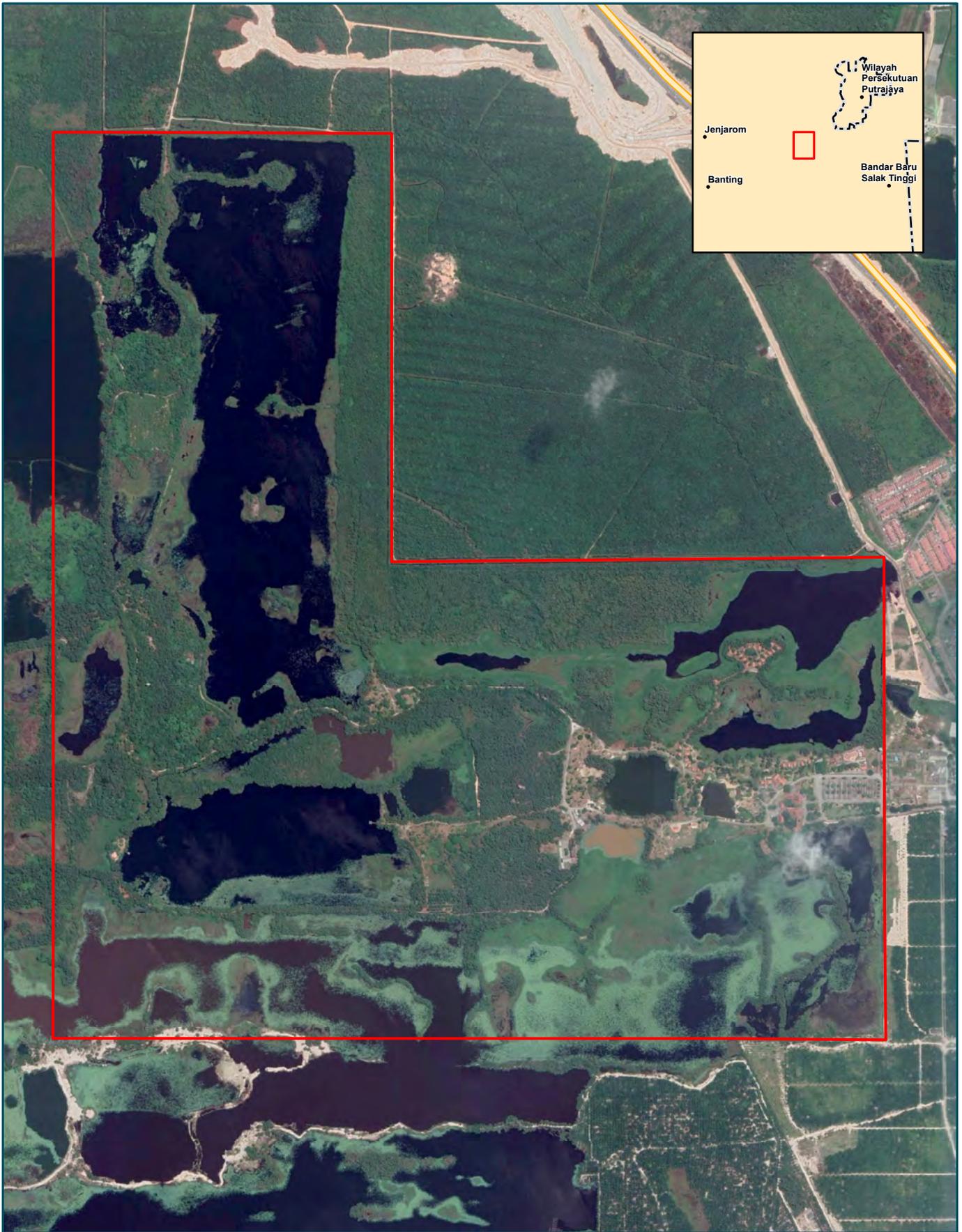


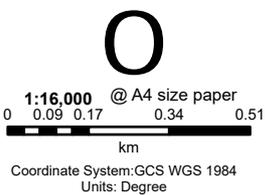
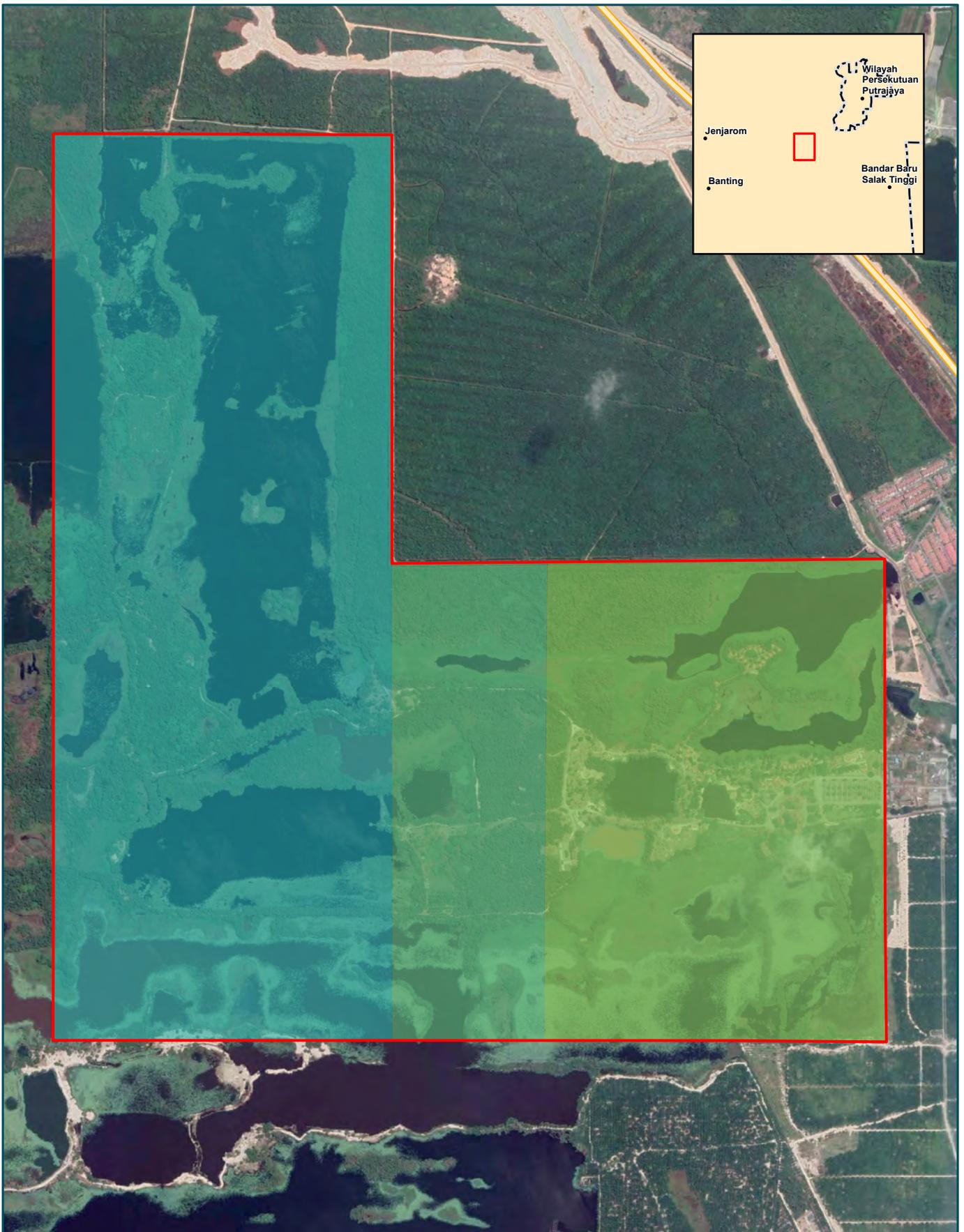
Plate 1-2: Aerial view of extensive water lotuses coverage across one of the lakes



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FIGURE 1-2

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**Zones in
Paya Indah
Wetland**

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FIGURE 1-2

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Section 2

METHODOLOGY

2.1 Introduction

The biodiversity audit and assessment were conducted on 20th, 21st, 26th and 27th of November, and 5th of December for flora and fauna surveys, and 3rd to 5th of December 2019 for water quality assessment and sampling. This assessment generally comprised of rapid surveys on the flora and wildlife components, and sampling of water at three different locations for each lake within Paya Indah Wetlands (PIW). This section briefly describes the approach and techniques used in the field.

2.2 Flora Survey

The objective of the flora survey is to assess the general composition of the planted trees and non-timber species in PIW. This is to determine areas where there are any important species of natural and planted flora that will need to be conserved and important habitats for wildlife i.e. wildlife hotspots. The assessment will indicate if specific mitigation measures are required to conserve these habitats, and recommendations to further enrich these habitats.



Plate 2-1: ERE staff during flora identification activity

2.2.1 Methodology

The flora survey was conducted using both randomised plot and line transect methods, allowing for both qualitative and quantitative assessment of trees in PIW. The survey included recces to determine areas of trees planted and measurement of the tree's dimensions (diameter at breast height, DBH and tree height, m) at selected locations.

Since the trees in PIW were previously planted by the previous custodian and are progressively planted by numerous corporate social responsibility (CSR) programmes carried out throughout the establishment of PIW (also supplemented by natural regrowth of several species), trees are distributed fairly systematically where there are patches of trees with the same species throughout PIW. Plots were established at each predetermined camera trap locations (**Figure 2-1**) to estimate

the number of trees and the average timber volume of trees at PIW. Identification of trees were done by the survey team accompanied by experienced flora surveyors.



Plate 2-2: One of the many lotus pads and flowers at Paya Indah Wetlands

Secondary data from published literature was also referred. Conservation status of each tree species was checked using online databanks such as the IUCN Red List, Global Biodiversity Information Facility (gbif.org) the Malaysia Biodiversity Information System (mybis.gov.my), and the Malaysian Red List for Plants of Peninsular Malaysia.

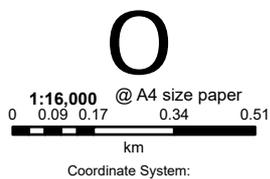
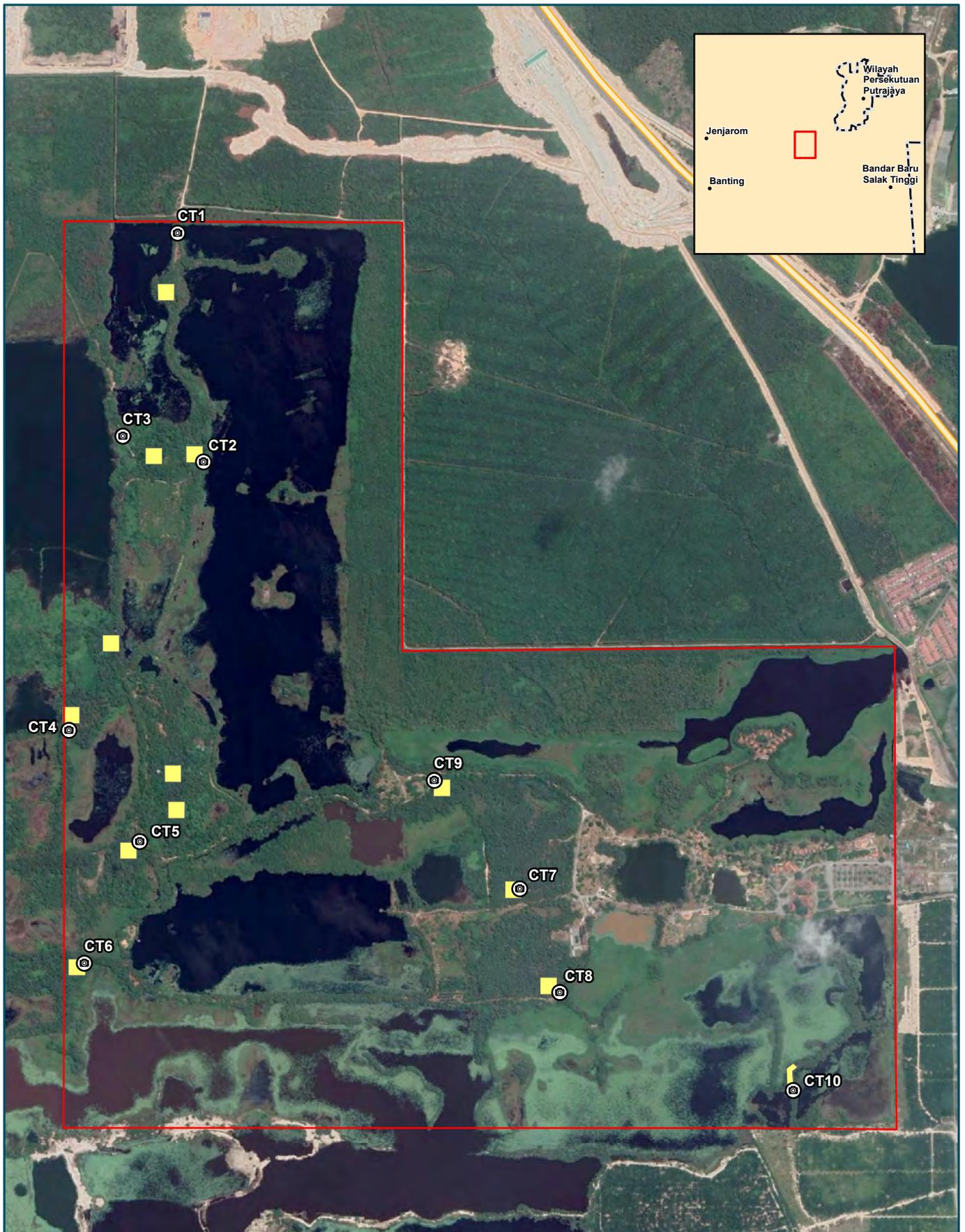
Results were then tabulated according to species and the spatial distribution of each species in PIW (**Figure 2-1**). Location of trees were georeferenced based on the GPS location of the survey plots, or the roads' names.

2.3 Wildlife Survey

The objective of the wildlife survey is to quickly document and assess the general composition and diversity of terrestrial wildlife within PIW. The findings from the survey would serve as a mean to determine the current presence of wildlife in the township area and if there are any sensitive species that may require specific conservation actions.

2.3.1 Methodology

The survey was conducted through direct and indirect assessments. Direct assessments involved trail walks with two sessions a day: 0700-1100hrs and 1900-2300hrs on the 20th, 21st, 26th and 27th of November, and 5th of December 2019. Direct assessment was supported by the set-up of 10 camera traps (**Table 2-1**) placed at strategic locations (**Plate 2-3**). Cameras were left in position for 16 days from 20th November to 5th December 2019.



- LEGEND**
- Camera Trap Locations
 - Flora Plots Locations
 - Project Site Boundary
 - Highway



**Camera Trap and
Flora Plots Location
in Paya Indah Wetlands**

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FIGURE 2-1

Table 2-1: GPS locations of camera traps deployed

Camera Trap	Location	Camera Trap	Location
CT1	2°52'38.15"N 101°36'55.18"E	CT6	2°51'29.48"N 101°36'45.74"E
CT2	2°52'16.34"N 101°36'55.22"E	CT7	2°51'36.77"N 101°37'24.83"E
CT3	2°52'21.49"N 101°36'47.92"E	CT8	2°51'25.38"N 101°37'31.40"E
CT4	2°51'53.09"N 101°36'44.78"E	CT9	2°51'46.64"N 101°37'22.71"E
CT5	2°51'39.71"N 101°36'44.59"E	CT10	2°51'17.24"N 101°37'53.01"E

Camera traps (**Plate 2-3**) were used for this survey instead of collapsible traps to capture a wider range of fauna species. Camera traps are a non-intrusive and affective method to document and identify as many species of wildlife as possible, as collapsible traps are more effective in targeting mainly medium-sized wildlife. More focus was given to birds as PIW is an established and popular bird-watching site with a large number of birds sighted and listed previously by the wetland’s management, researchers and birders alike.



Plate 2-3: ERE Staff installing a camera trap at one of the study points

Indirect methods included recognising noise and calls, nests, tracks, scratches, carcasses and droppings. This data as well as secondary data from published information in and around PIW were referred to enrich the list.

2.4 Water Quality Sampling

Water quality sampling is to document and create a baseline data for physical and chemical parameters of all lakes at PIW. Water levels are expected to continue decreasing given the developments in the surrounding areas. Determining a baseline of water quality conditions and lake storage capacity will help PIW to record the current conditions and act as a gauge of any further; degradation or alterations to the water quality as well as water storage. This is a key step in identifying risks to Paya Indah Wetlands in the near future and beyond.

2.4.1 Methodology

Lake storage volume was calculated from interpolation of surface area and measured lake depths. Data obtained from field observations and desktop studies were derived to obtain (Plate 2-4). Lake depth was determined by echo sounding, using a depth sounder or sonar gun. (Plate 2-5).

To obtain water quality samples, a single grab sample was taken at one (1) depth from the specified locations across the lakes. A Van Dorn Sampler (Plate 2-6) was used to take water samples taken to lab for further analysis. Water quality sampling and depth measurements were carried out from the 3rd to the 5th of December 2019 over 10-hour days. An officer from the management was present to ensure safety around the site, also a guide and to steer the boat. A total of 43 depth measurements and 16 water quality samples were taken across the 12 lakes in Paya Indah Wetlands.

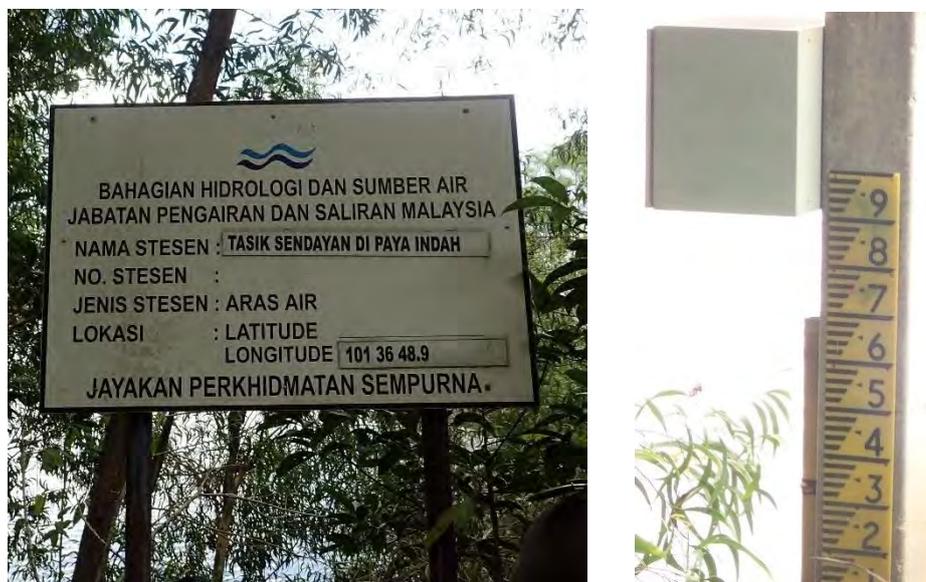


Plate 2-4: Department of Irrigation and Drainage's water elevation gauges



Plate 2-5: A depth sounder being used on a lake at Paya Indah Wetlands

2.5 Statistical Indices

Biodiversity indices were used to measure biodiversity in terms of richness and how well each species is represented. The findings from the aforementioned surveys, were used in the indices to measure species richness and evenness. The indices which were used are the Shannon-Wiener (H') and Simpson's (D) Diversity Index, as well as the Evenness Index (J').

2.5.1 Shannon-Wiener Index

The Shannon-Wiener Index (H') is a measure of biodiversity weighs the number of species present and the relative abundance of each species. The Shannon-Wiener Index gives a value of nil when only one species is represented in a community. When a community becomes more complex, H' values of up to 4 may be obtained. H' values are calculated using the formula below:

$$H' = - \sum_{i=1}^R p_i \ln p_i$$

2.5.2 Evenness Index

The Evenness Index (J') measures how equal all populations in a community are, i.e. how even is the distribution across all species present. If all populations present within a community are equal in terms of the number of individuals, the value of evenness is 1. As distribution becomes more uneven, the values of evenness increase. J' values are calculated using the formula below:

$$J' = \frac{H'}{H_{max}}$$

Statistical indices were not applied only for wildlife in this survey as all the wildlife recorded are through direct and indirect observations. Indices such as the Shannon's Diversity Index (H') and Evenness Index (J') requires individual counts for each species present in a sampling, therefore no calculations were performed due to insufficient data in terms of individual counts for each species observed.



Plate 2-6: A Van Dorn Sampler being used for lake water sampling



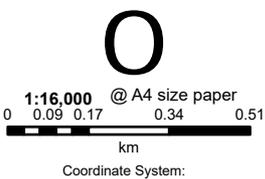
Plate 2-7: Typha Lake towards the south-eastern most lake obstructed by vegetation



Plate 2-8: Lab assistant with lake water sample in a Van Dorn sampler



Plate 2-9: Aerial view of observation tower at Aeon Woodlands



- LEGEND**
- Water Quality Sampling Points
 - Project Site Boundary
 - Highway



Water Quality Sampling Points at the lakes of Paya Indah Wetland

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FIGURE 2-2

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Section 3

SURVEY RESULTS

3.1 Survey Findings

In general, the vegetation composition throughout the study area is a mix of landscaped, regenerating, and planted trees from early replantation efforts, landscaping by former custodians and various corporate social responsibility tree-planting programmes. Tree species are a mix of fruiting and non-fruiting trees, with several species of dipterocarp trees identified throughout Paya Indah Wetlands (PIW). These species of trees coupled with a broad type of landscape provide food and habitat for wildlife. This is evident by the large number of bird species at 244 species that frequents and reside within PIW. Second to the birds are reptiles and amphibians (herpetofauna) at 20 species, followed by mammals at ten species. The following are details of the assessment findings.

3.2 Flora Composition

During the three days of flora surveys, a total of 120 species of trees and 40 plant species were identified in PIW from the eleven plots and 12 transects established.

All of the woody trees identified are categorised as Least Concerned (LC) under the IUCN Red List *except* for the balau pasir (*Shorea materialis*) tree which is identified as Critically Endangered (CR). This tree was identified at plot CT9 situated near the campsite. By distribution, *Acacia mangium* is the most common species



Plate 3-1: A mosaic of trees at the ridge leading to the helipad

that can be found throughout Paya Indah Wetlands. Second to the Acacia tree is the kelat paya (*Syzygium myrtifolium*) tree found at all areas except plot CT7 area, the Aeon Woodlands, followed by the tenggek burong (*Melicope lunu-akenda*) and balik angin (*Mallotus paniculatus*) tree, which were commonly found in the conservation and research zones. These trees are fast-growing trees that can be found virtually almost anywhere in Malaysia, favouring disturbed and open land and are usually the first species to grow when an area was cleared and left barren. The wide occurrence

of acacia trees at PIW may be due to seed dispersal by wind with seeds from the acacia plantation at Aeon Woodlands. Acacia trees are commonly planted primarily for site rehabilitation. Its quick growth and dense shade make it an effective tool in reforestation. Its ability to grow well on infertile soils, make it a favourite for rehabilitation of mine spoils and eroded sites. The balik angin (*Mallotus paniculatus*) tree leaves has been used traditionally to treat fever. The wood is very light and used for products such as matches and paper pulp.

Table 3-1: List of tree species identified in Paya Indah Wetlands

Family	Scientific name	Local name
Anacardiaceae	<i>Anacardium occidentale</i>	Gajus
	<i>Mangifera indica</i>	Mangga telur
	<i>Mangifera odorata</i>	Mangga kuini
	<i>Pentaspadon motleyi</i>	Pelong licin
Annonaceae	<i>Cananga odorata</i>	Kenanga
Apocynaceae	<i>Alstonia angustiloba</i>	Pulai
	<i>Alstonia pneumatophora</i>	Pulai basong
	<i>Alstonia scholaris</i>	Pulai
	<i>Dyera costulata</i>	Jelutong
Araliaceae	<i>Trevesia burckii</i>	Tapak hantu
Arecaceae	<i>Areca catechu</i>	Pinang kampung
	<i>Cocos nucifera</i>	Kelapa
	<i>Elaeis guineensis</i>	Kelapa sawit
Asparagaceae	<i>Dracaena marginata</i>	Dracaena
Bignoniaceae	<i>Tabebuia rosea</i>	Tecoma
Burseraceae	<i>Dacryodes rostrata</i>	Kedondong senggeh
Casuarinaceae	<i>Casuarina equisetifolia</i>	Ru pantai
Combretaceae	<i>Terminalia phellocarpa</i>	Jelawai mempelam babi
Cycadaceae	<i>Cycas Clivicola</i>	Bogak
Dilleniaceae	<i>Dillenia reticulata</i>	Simpoh gajah
	<i>Dillenia suffruticosa</i>	Simpoh air
Dipterocarpaceae	<i>Dipterocarpus oblongifolius</i>	Keruing neram
	<i>Dipterocarpus sp.</i>	Keruing
	<i>Dryobalanops aromatica</i>	Kapur
	<i>Hopea helferi</i>	Giam lintah bukit
	<i>Hopea odorata</i>	Merawan siput jantan
	<i>Shorea materialis</i>	Balau pasir
	<i>Shorea roxburghii</i>	Meranti temak nipis
	<i>Diospyros blancoi</i>	Mentega
Elaeocarpaceae	<i>Elaeocarpus floribundus</i>	Mendong
	<i>Elaeocarpus petiolatus</i>	Mendong
	<i>Elateriospermum tapos</i>	Perah
Euohorbiaceae	<i>Bridelia stipularis</i>	Kenidai
	<i>Croton argyratus</i>	Hujan panas
	<i>Endospermum diadenum</i>	Sesenduk
	<i>Macaranga gigantea</i>	Mahang gajah

	<i>Mallotus paniculatus</i>	Balik angin
	<i>Sapium discolor</i>	Ludai
	<i>Excoecaria cochinchinensis</i>	Bebuta
	<i>Acacia mangium</i>	Akasia
	<i>Archidendron jiringa</i>	Jering
	<i>Baphia nitida</i>	Baphia tree
	<i>Caesalpinia ferrea</i>	Leopard tree
	<i>Callerya artopurpurea</i>	Tulang daing
	<i>Cassia fistula</i>	Golden shower
	<i>Koompassia malaccensis</i>	Kempas
Fabaceae	<i>Peltophorum dasyrachis</i>	Jemerlang
	<i>Peltophorum pterocarpum</i>	Jemerlang
	<i>Pterocarpus indicus</i>	Angsana
	<i>Saraca asoca</i>	Ashoka tree
	<i>Saraca sp.</i>	Gapis
	<i>Sindora coriacea</i>	Sepetir licin
	<i>Tamarindus indica</i>	Asam jawa
	<i>Lithocarpus sp</i>	Mempening
Gentianaceae	<i>Fagraea crenulata</i>	Tembusu daun besar
Gleicheniaceae	<i>Dicranopteris linearis</i>	Resam
	<i>Calophyllum inophyllum</i>	Bintangor laut
	<i>Cratoxylum formosum</i>	Geronggang
Guttiferae	<i>Garcinia atroviridis</i>	Asam gelugur
	<i>Garcinia bancana</i>	Beruas
	<i>Garcinia sp.</i>	Kandis
Lauraceae	<i>Cinnamomum iners</i>	Medang teja
Lecythidaceae	<i>Barringtonia sp.</i>	Putat
Loganaceae	<i>Fagraea fragrans</i>	Tembusu padang
Lythraceae	<i>Lagerstroemia speciosa</i>	Bungor
	<i>Ceiba pentandra</i>	Kekabu
Malvaceae	<i>Heritiera javanica</i>	Mengkulang jari
	<i>Hibiscus macrophyllus</i>	Tutor
	<i>Hibiscus rosa-sinensis</i>	Bunga raya
Maranthaceae	<i>Phrynium parvum</i>	Lerek
Melastomataceae	<i>Pternandra echinata</i>	Sial menahun
	<i>Azadirachta excelsa</i>	Sentang
Meliaceae	<i>Khaya senegalensis</i>	Khaya
	<i>Sandoricum koetjape</i>	Sentul
	<i>Artocarpus heterophyllus</i>	Nangka
	<i>Artocarpus integer</i>	Cempedak
Moraceae	<i>Artocarpus lanceifolius</i>	Keledang-keledang
	<i>Ficus benjamina</i>	Ara waringin
	<i>Ficus chartacea</i>	Ara buah kuning
	<i>Ficus spp.</i>	Ara
Myrtaceae	<i>Callistemon viminalis</i>	Bottle brush

	<i>Eucalyptus sp.</i>	Eucalyptus
	<i>Melaleuca cajuputi</i>	Gelam
	<i>Rhodomyrtus tomentosa</i>	Kemunting
	<i>Syzygium aqua</i>	Jambu air
	<i>Syzygium filiforme</i>	Kelat
	<i>Syzygium grande</i>	Kelat jambu
	<i>Syzygium jambos</i>	Jambu mawar
	<i>Syzygium myrtifolium</i>	Kelat paya
	<i>Syzygium polyanthum</i>	Salam
	<i>Syzygium zeylanicum</i>	Kelat nenasi
	<i>Xanthostemon chrysanthus</i>	Kelat bunga kuning
Oxalidaceae	<i>Averrhoa bilimbi</i>	Belimbing buluh
	<i>Averrhoa carambola</i>	Belimbing besi
Palmae	<i>Bismarckia nobilis</i>	Bismarckia palm
	<i>Cryotas mitis</i>	Tukas
	<i>Licuala spinosa</i>	Palas
	<i>Livistona chinensis</i>	Serdang
Poaceae	<i>Bamboo sp.</i>	Buluh
	<i>Bamboo sp.</i>	Buluh pagar
	<i>Dendrocalamus asper</i>	Buluh betong
	<i>Thyrsostachys siamensis</i>	Buluh Siam
Primulaceae	<i>Ardisia elliptica</i>	Mata pelanduk
Rubiaceae	<i>Coffea arabica</i>	Pokok kopi
	<i>Ixora chinensis</i>	Siantan
	<i>Morinda elliptica</i>	Mengkudu
Rutaceae	<i>Citrus microcarpa</i>	Limau kasturi
	<i>Melicope lunu-akenda</i>	Tenggek burung
Salicaceae	<i>Salix babylonica</i>	Janda merana
Sapindaceae	<i>Eriglossum rubiginosum</i>	Mertajam
	<i>Nephelium lappaceum</i>	Rambutan
	<i>Nephelium sp.</i>	Rambutan hutan
	<i>Pomettia pinnata</i>	Kasai
Sapotaceae	<i>Manilkara zapota</i>	Ciku
	<i>Mimusops elengi</i>	Bunga tanjung
Simarubiaceae	<i>Eurycoma longifolia</i>	Tongkat ali
Sterculiaceae	<i>Sterculia parvifolia</i>	Kelumpang burung
Ulmaceae	<i>Trema angustifolia</i>	Mengkirai
	<i>Trema orientalis</i>	Menarong
Verbenaceae	<i>Vitex pinnata</i>	Leban

It is worth to note that PIW harbours seven dipterocarp tree species. Dipterocarp trees are forest trees that are able to grow more than 40 metres in height. The straight bark and very sturdy wood structure make this tree species prized for timber. However, because these species of trees are highly sought after, most of the dipterocarp forest are being cleared out for the timber industry. Therefore, dipterocarp

trees are sharply decreasing in numbers. The balau pasir (*Shorea materialis*) is identified as Critically Endangered (CR) under the IUCN Red List as this species has been extensively exploited for its high-quality timber, the 'red balau' wood used mainly in the construction industry especially furniture and flooring. The balau pasir (*Shorea materialis*) tree is able to grow up to 45 metres in height and DBH of 110cm. Given proper maintenance and monitoring, this tree may grow mature and may potentially be iconic to both Paya Indah and Discovery Wetlands.

There are 40 species of herbs, shrubs, and non-woody plants identified throughout PIW (Table 3-2). The resam ferns (*Dicranopteris linearis*) is the most common type of fern identified in PIW. Most of the ferns and other plant species are plants that grow naturally over time as the trees mature. Bamboos are planted throughout PIW and can be seen at trail sides leading to the helipad and Discovery Wetlands entrance. There are two planted bamboo forest – one is located by the old viewing tower between Tasik Driftwood and Tasik Telipuk, and another at a plot adjacent to Aeon Woodlands. The planted bamboo forest adjacent to Aeon Woodlands is being kept for food stock that is harvested and transferred to Zoo Negara for the giant pandas (*Ailuropoda melanoleuca*) housed in the zoo, according to the PIW management.

Table 3-2: List of plant species in Paya Indah Wetlands

Family	Scientific Name	Local name
Aspleniaceae	<i>Asplenium musifolium</i>	Paku langsung
Blechnaceae	<i>Stenochlaena palustris</i>	Paku miding
Compositae	<i>Chromolaena odorata</i>	Rumput kapalterbang
	<i>Mikania cordata</i>	Selaput tunggul
Cucurbitaceae	<i>Melothria pendula</i>	Akar timun
Cyperaceae	<i>Lepironia articulate</i>	Rumput keruncut
	<i>Scleria sumatrensis</i>	Rumput sendayan
Dennstaedtiaceae	<i>Acrostichum speciosum</i>	Piai
Dryopteridaceae	<i>Polystichum munitum</i>	Paku pedang
Gleicheniaceae	<i>Dicranopteris linearis</i>	Resam
Leguminosae	<i>Mimosa pudica</i>	Semalu renek
Lygodiaceae	<i>Lygodium microphyllum</i>	Climbing fern
Malvaceae	<i>Urena lobata</i>	Rumput pepulut
	<i>Clidemia hirta</i>	Senduduk bulu
Melastomataceae	<i>Lantana camara</i>	Bunga tahi ayam
	<i>Melastoma malabathricum</i>	Senduduk
Moraceae	<i>Ficus chartacea</i>	Ara buah kuning
Myrsinaceae	<i>Ardisia crenata</i>	Mata pelandok
Nymphaeaceae	<i>Nymphaea</i> spp.	Telipuk
Palmae	<i>Caryota mitis</i>	Tukas
Passifloraceae	<i>Passiflora foetida</i>	Akar letup-letup
Phyllanthaceae	<i>Phyllanthus amarus</i>	Dukung anak
Piperaceae	<i>Piper sarmentosum</i>	Pokok kaduk
Poaceae	<i>Bambusa</i> sp.	Buluh
	<i>Bambusa vulgaris</i>	Buluh minyak

	Gigantochloa albociliata	Buluh madu
	Gigantochloa ligulata	Buluh tumpat
	Gigantochloa wrayi	Buluh beting
	Ischaemum muticum	Rumput lipan pasir
	Pennisetum purpureum	Rumput gajah
	Thyrsostachys siamensis	Buluh siam
Polypodiaceae	Aglaomorpha quercifolia	Paku sakat
	Pyrrhosia longifolia	Paku jejari
	Pyrrhosia piloselloides	Paku sisik naga
Rubiaceae	Hedyotis verticillata	Rumput butang
	Oldenlandia auricularia	Rumput telur belangkas
	Uncaria cordata	Akar kekait
Salviniaceae	Salvinia molesta	Water plant
Solanaceae	Solanum torvum	Terong pipit
Verbenaceae	Stachytarpheta indica	Rumput ekor ular

3.2.1 Species Hotspot

The plot with the highest tree diversity is at plot CT9 (near the campsite) with 10 tree species recorded consisted of mainly of fruiting trees. The highest number of trees recorded is at plot CT7 (Aeon Woodlands) where the species composition is made up of entirely acacia trees (*Acacia mangium*). This place is named after Aeon Co. (M) Bhd. who conducted their tree planting activities in September 2004. The area was intended to be a reforestation plot to help rehabilitate an ex-mining ground. Plot CT6 (Rumah Melayu area) had the most matured trees with the highest average DBH of 30.98cm and timber volume of 0.612 m³, made up of mostly mature acacia (*Acacia mangium*) trees and oil palm (*Elaeis guineensis*) trees.

Table 3-3: Average DBH, height, and timber vol. of trees measured at the survey plots.

Plot	No. of trees	No. of species	Average DBH (cm)	Average height (m)	Average timber volume (m3)
CT1	20	2	17.18	4.89	0.166
CT2	22	7	14.84	5.07	0.088
CT3	24	3	19.95	6.92	0.216
CT4	20	4	19.66	6.58	0.200
CT5	21	5	17.43	8.62	0.206
CT6	13	2	30.98	8.12	0.612
CT7	38	1	14.58	8.25	0.138
CT8	33	2	19.71	6.79	0.207
CT9	20	10	23.65	11.60	0.510
CT10	27	2	19.28	6.44	0.188

The high diversity of tree species at plot CT9 is proven by the Shannon-Wiener Index value of $H' = 2.138$ (**Table 3-5**) – the highest value obtained for all the plots, indicating that the plot contains high number of species compared to the number of trees counted in the plot. Evenness Index number of $J' = 0.928$ shows that the number of

trees for each species is evenly distributed. Plot CT7 is with the lowest H' and J' values as the plot contains only acacia trees even though the plot has the highest number of trees among all the plots. Plot CT2 is with high $H' = 1.075$ but low $J' = 0.552$ due to the number of leban trees as compared to other species identified in the plot. The statistical analyses show that plots CT9 and CT5 is with the highest number of tree species with trees evenly distributed among species.

Table 3-4: Species richness and evenness throughout all ten flora survey plots

Species present	Tree count	H'	J'
Akasia	162	0.262	0.048
Asam gelugur	1	0.023	0.004
Balik angin	1	0.023	0.004
Eucalyptus	5	0.081	0.015
Gelam	19	0.202	0.037
Jelawai mempelam babi	1	0.023	0.004
Jemerlang	1	0.023	0.004
Kasai	2	0.040	0.007
Kelapa sawit	3	0.055	0.010
Keledang-keledang	1	0.023	0.004
Kelumpang burung	1	0.023	0.004
Kempas	2	0.040	0.007
Leban	16	0.181	0.033
Ludai	1	0.023	0.004
Meranti temak nipis	4	0.069	0.013
Mertajam	1	0.023	0.004
Pelong licin	1	0.023	0.004
Pulai	5	0.081	0.015
Salam	1	0.023	0.004
Simpoh air	1	0.023	0.004
Simpoh gajah	3	0.055	0.010
Tembusu padang	3	0.055	0.010
Tenggek burung	3	0.055	0.010
Total number of trees	238		
Shannon-Wiener Index, H'		1.430	
Evenness Index, J'			0.261

In terms of species, the acacia tree is the most counted trees in all the ten survey plots. There were 162 acacia trees identified, followed by gelam tree with 19 trees identified and leban tree with 16 trees identified. In overall, tree species is fairly rich, noted with a H' value of 1.430, but is not evenly distributed indicated by the low J' score of 0.261. This is evident by the number of acacia trees which make up 68% of total trees counted and identified in plots especially at plots CT1, CT3, CT4, CT7 and CT8 where the trees counted are mostly acacia trees. List of trees at individual plots is included in **Appendix A** for further reference.



Plate 3-2: Simpho air (*Dillenia suffruticosa*) leaves, bulbs and flower

Table 3-5: Species diversity and evenness index for tree species in each survey plot

	Shannon- Wiener Index, H'	Evenness Index, J'
CT1	0.423	0.610
CT2	1.075	0.552
CT3	0.456	0.415
CT4	0.588	0.424
CT5	1.420	0.882
CT6	0.429	0.619
CT7	0.000	0.000
CT8	0.136	0.196
CT9	2.138	0.928
CT10	0.692	0.999

3.3 Fauna Composition

The survey recorded a total of 275 known and one non-determined (*non det.*) species (identified up to its genus level) from 77 families and two orders comprising of mammals, birds, and herpetofauna (reptiles and amphibians).

3.3.1 Mammals

A total of twelve species of mammals were recorded based on the fauna surveys conducted in PIW and accounts by the management staff who have previously sighted these wildlife (**Table 3-5**). These listed mammal species are commonly sighted in secondary forests and near-urban and suburban settings due to their diets and adaptability to the environment stated. Out of twelve species listed, three are Totally Protected, six are Protected and two is not protected under the Malaysia Wildlife Conservation Act 2010 (WCA2010). Most of the species recorded are categorised as Least Concerned species under the IUCN Red List except for the dusky leaf langurs (*Trachypithecus obscurus*) which is listed as a Near-Threatened species and the Nile hippopotamus (*Hippopotamus amphibious*) as a Vulnerable species.

The common treeshrew (*Tupaia glis*) (**Plate 3-4**) and plantain squirrel (*Callosciurus notatus*) (**Plate 3-3**) can be seen frequenting trees and areas throughout Paya Indah Wetlands. The common palm civet (*Paradoxurus hermaphroditus*) was spotted on a tree (**Plate 3-6**) at the playground area in the Recreation Zone between Tasik Rusiga and the carpark. Bats were recorded by sightings in-flight and calls at the visitor complex at night. A leopard cat (*Prionailurus bengalensis*) and the Malayan porcupine (*Hystrix brachyura*) were recorded on camera trap at CT6 nearby Rumah Melayu. Sightings of smooth-coated otters are also at the CT6 area as accounted by the management staffs in PIW.



Plate 3-3: The Plantain squirrel (*Callosciurus notatus*) spotted frequenting trees

Wild boars (*Sus scrofa*) (**Plate 3-9**) was the dominate species in PIW captured by camera traps in large numbers, with reports of nearly 70 individuals of this species sighted by the management during routine ground survey at night. This species roams freely throughout PIW, with forage marks seen at most of the camera trap areas, and by the crocodile enclosure viewing platform. Two Nile hippopotamuses (*Hippopotamus amphibious*) (**Plate 3-5**) were a gift by the Botswana government upon PIW's launch in 2001, which produced an offspring about five years ago. These hippos are nocturnal animals that usually spend the day in the water, occasionally surfacing. At night it spends more time on land and can be heard making loud calls that can be heard clearly at the chalet areas. These hippos are fed with approximately 40kg of napier grass each, supplemented with fruits and other vegetables.



Plate 3-4: A common treeshrew (*Tupaia glis*) foraging the ground

Table 3-6: List of mammals observed in Paya Indah Wetlands

Family	Scientific Name	Common Name	Protection Status	
			WCA 2010	IUCN Red List
Unk. (Order: Chiroptera)	Unk.	Bats		
Cercopithecidae	<i>Macaca fascicularis</i>	Long-tail macaque	P	LC
	<i>Trachypithecus obscurus</i>	Dusky leaf langur	P	NT
Felidae	<i>Prionailurus bengalensis</i>	Leopard Cat	TP	LC
Hippopotamidae	<i>Hippopotamus amphibius</i>	Nile hippopotamus	P	VU
Hystriidae	<i>Hystrix brachyura</i>	Malayan Porcupine	P	LC
Mustelidae	<i>Lutrogale perspicillata</i>	Smooth-coated otter*	TP	LC
Sciuridae	<i>Callosciurus notatus</i>	Plantain squirrel	-	LC
Suidae	<i>Sus scrofa</i>	Wild boar	P	LC
Tragulidae	<i>Tragulus kanchil</i>	Lesser mouse-deer*	-	LC
Tupaiaidae	<i>Tupaia glis</i>	Common treeshrew	TP	LC
Viverridae	<i>Paradoxurus hermaphroditus</i>	Common palm civet	P	LC

Note: P – Protected, TP – Totally Protected, ‘-’ – Not listed; LC – Least Concerned, NT – Near-Threatened, VU – Vulnerable; Unk. – Unknown/Unidentified species

*Not observed. Obtained from PIW management staff

WCA2010: Malaysia Wildlife Conservation Act 2010

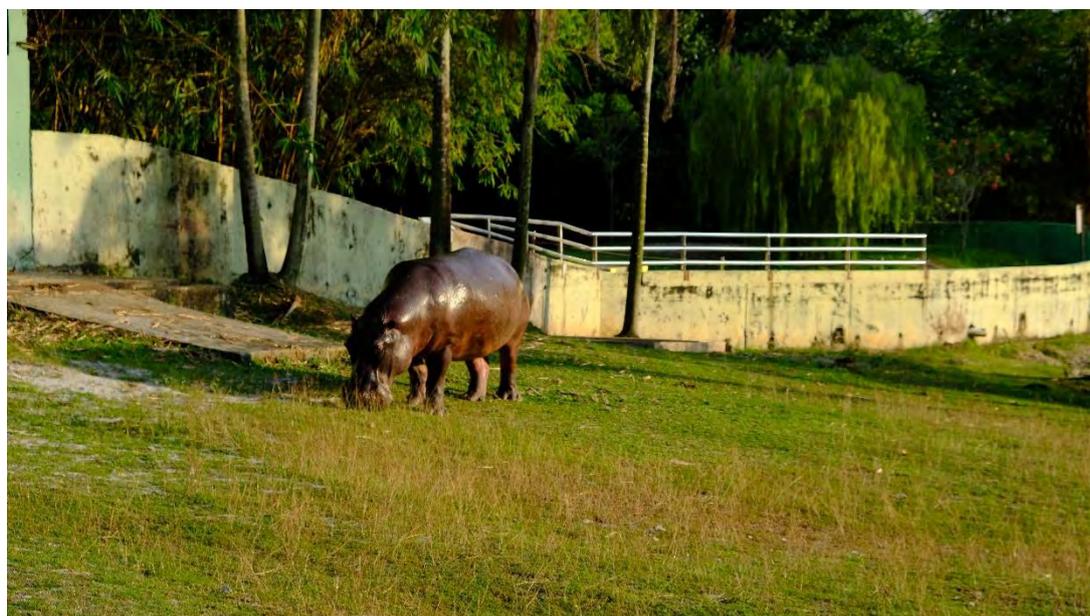


Plate 3-5: One of the Nile hippopotamuses (*Hippopotamus amphibius*) foraging the ground

Similar to the smooth-coated otters, the lesser mouse-deer (*Tragulus kanchil*) were not directly observed during the fauna survey done during survey activities in PIW, but the management confirmed its existence as and is has also been listed in their wildlife stock inventory.



Plate 3-6: Common palm civet (*Paradoxurus hermaphroditus*) seen atop a tree

There are two species of primates observed at PIW, the long-tail macaque (*Macaca fascicularis*) and the dusky leaf langurs (*Trachypitecus obscurus*). A group of long-tail macaques were sighted at the oil palm plot by Tasik Sendayan while a group of the dusky leaf langurs were spotted by the entrance near the crocodile enclosure on the trail leading to the campsite.



Plate 3-7: A leopard cat (*Prionailurus bengalensis*) roaming near Rumah Melayu (CT6) area



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Plate 3-8: Two malayan porcupines (*Hystrix brachyura*) roaming near Rumah Melayu (CT6) area



Plate 3-9: Wild boars (*Sus scrofa*) in large numbers foraging the grounds at CT4

3.3.2 Birds

Observations were carried out based on the 10 points which have been marked on the map (**Figure 2-1**) with additional trails such as Rintis Suara Burung Trail, Helipad and Palm Street. PIW have recorded a total of 244 bird species from a compilation of long-term bird sighting data around PIW.

During the 3 days period of observations, 137 species of birds from 44 families were directly observed. The most number of species spotted is from family Ardeidae, Columbidae, and Nectariniidae, with 11 species each. Ardeidae is the family name for herons, Columbidae is the family constituted of pigeons and doves, and Nectariniidae is the family constituted of sunbirds and spiderhunters. Other than that, birds which can be seen frequently at PIW are mainly mynas, starlings, and crows. There are huge number of egrets and black-crowned heron can be found roosting on the trees at the edge of the crocodile pond. There are also, several other species which can frequently be seen such as pacific egret, cinnamon bittern, little heron, cattle egret, purple heron, red-wattled lapwings, and white-throated kingfisher.



Plate 3-10: A red junglefowl (*Gallus gallus*) at point CT3



Plate 3-11: A zebra dove (*Geopelia striata*) on the ground at point CT1

Amongst of all selected points of areas for observation, point no. 10 (66 species) recorded the highest number of bird diversity followed by Palm Street (47 species) and point no.9 (41 species). There were several charismatic species such as purple swamphen, purple heron, cattle egrets, black and red broadbills, black hornbills, rhinoceros hornbill, oriental pied hornbill, black baza, crested serpent eagles, black thighed falconet, common moorhen, and common kingfisher.

Throughout PIW, a shift in active bird species from the day time to night time was observed. In the afternoon at point no. 10, the white-throated kingfisher (*Halcyon smyrnensis*)(**Plate 3-12**), oriental dwarf kingfisher (*Ceyx erythacus*), and rufescent prinia (*Prinia Rufescent*) were observed flying close to or along the ridge between Tasik Typha and Tasik Teratai, while the call of a crested serpent eagle (*Spilornis cheela*) was heard. In the evenings, various bird species were seen frequenting the grassy areas on the opposite bank of Tasik Typha (adjacent to the oil palm plantations). Amongst them are the purple swamphen (*Porphyrio porphyrio*), common moorhen (*Gallinula chloropus*) and the purple heron (*Ardea purpurea*). A flock of egrets was also seen flying over the lakes in the evening.



Plate 3-12: A White-throated kingfisher (*Halcyon smyrnensis*) on an Acacia tree by Lake Typha

Table 3-7: A collation of birds observed and previously recorded

	Family	Scientific name	Common name	Local name	WCA 2010	IUCN	Obs.	2 nd data
1	Accipitridae	<i>Spilornis cheela</i>	Crested Serpent-Eagle	Lang Berjambul	TP	LC	√	√
2	Accipitridae*	<i>Aviceda leuphotes</i>	Black Baza	Lang Baza Berjambul		LC	√	√
3	Accipitridae*	<i>Pernis ptilorhinchus</i>	Oriental Honey Buzzard	Lang Lebah		LC		√
4	Accipitridae	<i>Elanus caeruleus</i>	Black Shoulder Kite	Lang Bahu Hitam		LC		√
5	Accipitridae*	<i>Milvus migrans</i>	Black Kite	Lang Gelap		LC	√	√
6	Accipitridae	<i>Haliastur indus</i>	Brahminy Kite	Lang Merah		LC	√	√
7	Accipitridae	<i>Haliaeetus leucogaster</i>	White Bellied Sea-eagle	Lang Siput		LC	√	√
8	Accipitridae	<i>Ichthyophaga ichthyaetus</i>	Grey-headed Fish Eagle	Lang Kepala Kelabu		NT		√
9	Accipitridae*	<i>Circus aeroginosus</i>	Western Marsh Harrier	Lang Barat		LC		√
10	Accipitridae	<i>Accipiter trivargatus</i>	Crested Goshawk	Lang Sikap		LC		√
11	Accipitridae*	<i>Accipiter soloensis</i>	Chinese Goshawk	Lang Rajawali		LC		√
12	Accipitridae*	<i>Accipiter gularis</i>	Japanese sparrowhawk	Lang Sewah		LC		√
13	Accipitridae**	<i>Accipiter virgatus</i>	Besra	Lang Pipit		LC		√
14	Accipitridae*	<i>Butastur Indicus</i>	Grey Face Buzzard	Lang Rintik		LC		√
15	Aegithinidae	<i>Aegithina tiphia</i>	Common Iora	Kunyit Kacat		LC	√	√
16	Aegithinidae	<i>Aegithina viridissima</i>	Green Iora	Kunyit Bakau		LC	√	√
17	Alcedinidae	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Perkaka Dada Putih	TP	LC	√	√
18	Alcedinidae	<i>Ceyx erythacus</i>	Oriental dwarf-Kingfisher	Pekaka Kerdil	TP	LC		√
19	Alcedinidae*	<i>Alcedo atthis</i>	Common Kingfisher	Pekaka Cit-cit Kecil	TP		√	√
20	Alcedinidae	<i>Lacedo pulchello</i>	Banded Kingfisher	Pekaka Riang Rimba				√
21	Alcedinidae	<i>Pelargopsis capensis</i>	Stork-billed Kingfisher	Pekaka Paruh Besar				√

22	Alcedinidae	<i>Halcyon coromanda</i>	Ruddy Kingfisher	Pekaka Belacan			√	
23	Alcedinidae	<i>Halcyon pileata</i>	Black-capped Kingfisher	Pekaka Kopiah Hitam			√	
24	Alcedinidae	<i>Alcedo meninting</i>	Blue-eared Kingfisher	Pekaka Bintik-bintik			√	
25	Anatidae	<i>Dendrocygna javanica</i>	Lesser Whistling Duck	Belibis			√	√
26	Anatidae	<i>Nettapus coromandelianus</i>	Cotton Pygmy Goose	Itik Kapas			√	
27	Apodidae	<i>Aerodramus fuciphagus</i>	White-nest Swiftlet		TP	LC	√	√
28	Apodidae	<i>Aerodramus maximus</i>	Black-nest Swiftlet	Layang-layang Padi	TP	LC	√	√
29	Apodidae*	<i>Hirundapus giganteus</i>	Brown-backed Needletail	Layang-layang Besar	TP	LC	√	√
30	Apodidae	<i>Rhaphidura leucopygiais</i>	Silver-rumped Swift	Layang-Layang Kecil	TP	LC	√	√
31	Apodidae*	<i>Apus pacificus</i>	Fork-tailed Swift	Layang-layang Ekor Cabang	TP	LC	√	√
32	Apodidae	<i>Apus nipalensis</i>	House Swift	Layang-layang Rumah	TP	LC	√	√
33	Apodidae	<i>Cypsiurus balasiensis</i>	Asian Palm-Swift	Layang-layang Palma		LC	√	√
34	Apodidae	<i>Collocalia esculenta</i>	Glossy Swiftlet	Layang-layang Perut Putih				√
35	Ardeidae	<i>Ardea purpurea</i>	Purple Heron	Pucung Serandau			√	√
36	Ardeidae*	<i>Ixobrychus sinensis</i>	Yellow Bittern	Pucung Merah			√	√
37	Ardeidae*	<i>Ixobrychus eurhythmus</i>	Von Shrenck's Bittern	Pucung Gelam				√
38	Ardeidae*	<i>Ixobrychus cinnamomeus</i>	Cinnamon Bittern	Pucung Bendang			√	√
39	Ardeidae*	<i>Ixobrychus flavicollis</i>	Black Bittern	Pucung Hitam				√
40	Ardeidae*	<i>Butorides Striatus</i>	Little Heron	Pucung Keladi			√	√
41	Ardeidae	<i>Nycticorax nycticorax</i>	Black-crown Heron	Pucung Kuak			√	√
42	Ardeidae*	<i>Ardea cinerea</i>	Grey Heron	Pucung Seriap			√	√
43	Ardeidae*	<i>Ardeola bacchus</i>	Chinese Pond Heron	Pucung China			√	√

44	Ardeidae*	<i>Bulbucus ibis</i>	Cattle egret	Bangau Kendi			√	√
45	Ardeidae*	<i>Cosmerodius albus</i>	Great Egret	bangau Besar			√	√
46	Ardeidae*	<i>Mesophoyx intermedia</i>	Intermediate Egret	Bangau Kerbau			√	√
47	Ardeidae*	<i>Egretta Garzetta</i>	Little Egret	Bangau Kecil			√	√
48	Batrachostomidae	<i>Batrachotomus hodgsoni</i>	Hodgson's Frogmouth	Segan Api				√
49	Bucerotidae	<i>Anthracoceros malayanus</i>	Black Hornbill	Burung Kekek	TP	NT		√
50	Bucerotidae	<i>Anthracoceros albirostris</i>	Oriental Pied Hornbill	Burung Kelingking	TP	LC		√
51	Bucerotidae	<i>Buceros rhinoceros</i>	Rhinoceros Hornbill	Enggang	TP	NT		√
52	Campephagidae	<i>Tephrodornis gularis</i>	Large Wood-Shrike	Rembah Kayu Besar		LC		√
53	Campephagidae	<i>Pericrocotus igneus</i>	Fiery minivet	Burung Matahari Kecil	TP	NT	√	√
54	Campephagidae	<i>Coracina javensis</i>	Javan Cuckooshrike	Sewah Kelabu Gunung	TP			√
55	Campephagidae	<i>Coracina Striata</i>	Bar-bellied Cuckooshrike	Sewah Rimba	TP			√
56	Campephagidae	<i>Coracina fimbriata</i>	Lesser Cuckooshrike	Sewah Kecil	TP			√
57	Campephagidae	<i>Lalage nigra</i>	Pied Triller	Sewah Kapas	TP			√
58	Campephagidae	<i>Pericrocotus divaricatus</i>	Ashy Minivet	Mas Padang	TP			√
59	Campephagidae	<i>Hemipus hirundinaceus</i>	Black-winged Flycatcher Shrike	Rembah Batu	TP			√
60	Campephagidae	<i>Hemipus picatus</i>	Bar-winged Flycatcher Shrike	Samba-Tirjup Sayap Putih	TP	LC		√
61	Caprimulgidae	<i>Caprimulgus macrurus</i>	Large-tailed Nightjar	Tukang Kubur	TP	LC	√	√
62	Caprimulgidae	<i>Caprimulgus affinis</i>	Savanna Nightjar	Tukang Savanna	TP	LC	√	√
63	Centropodidae	<i>Centropus bengalensis</i>	Lesser Coucal	But-but Kecil		LC	√	√
64	Centropodidae	<i>Centropus sinensis</i>	Greater Coucal	But-but Carik Anak	TP		√	√
65	Charadriidae	<i>Vanellus indicus</i>	Red-wattled Lapwing	Rapang Duit	TP		√	√

66	Charadriidae*	<i>Pluvialis fulva</i>	Pacific Golden Plover	Rapang Kerinyut	TP		√	
67	Chloropseidae	<i>Chloropsis sonnerati</i>	Greater Green Leafbird	Burung Daun Besar	TP	LC	√	√
68	Chloropseidae	<i>Chloropsis cochinchinensis</i>	Blue-winged Leafbird	Burung Daun Sayap Biru	TP	LC	√	√
69	Chloropseidae	<i>Chloropsis hardwickii</i>	Orange-bellied Leafbird	Burung Daun Perut Oren	TP	LC	√	√
70	Ciconiidae	<i>Leptoptilos javanicus</i>	Lesser Adjutant	Botak Kecil	TP	VU		√
71	Cisticolidae	<i>Cisticola juncidis</i>	Zitting cisticola	Cekup Layang				√
72	Cisticolidae	<i>Prinia Rufescent</i>	Rufescent Prinia	Perenjak Sampah			√	√
73	Cisticolidae	<i>Prinia flaviventris</i>	Yellow Bellied Prinia	Perenjak Padi			√	√
74	Columbidae	<i>Ptilinopus jambu</i>	Jambu Fruit Dove	Punai Jambu	P(I)	NT	√	√
75	Columbidae	<i>Columba livia</i>	Rock Pigeon	Pergam Batu		LC	√	√
76	Columbidae	<i>Treron vernans</i>	Pink-necked Pigeon	Punai Gading			√	√
77	Columbidae	<i>Macropygia unchall</i>	Barred Cuckoo-Dove	Tekukur Api Gunung	P	LC	√	√
78	Columbidae	<i>Macropygia ruficeps</i>	Little Cuckoo-Dove	Terkukur Kecil	P	LC	√	√
79	Columbidae	<i>Treron olax</i>	Little Green Pigeon	Punai Daun			√	√
80	Columbidae	<i>Streptopelia chinensis</i>	Spotted Dove	Tekukur		LC	√	√
81	Columbidae	<i>Treron bicincta</i>	Orange-breasted Green Pigeon				√	√
82	Columbidae	<i>Geopelia striata</i>	Zebra Dove	Merbok Aman		LC	√	√
83	Columbidae	<i>Chalcophaps indica</i>	Green-winged Pigeon	Punai Tanah	P	LC	√	√
84	Columbidae	<i>Treron curvirostra</i>	Thick-billed Green Pigeon	Punai Lengguak			√	√
85	Columbidae	<i>Ducula aenea</i>	Green Imperial Pigeon	Pergam Besar				√
86	Coraciidae*	<i>Eurystomus orientalis</i>	Dollarbird (Broad-billed Roller)	Tiong Batu/ Tiong Belacan	TP	LC	√	√
87	Corvidae	<i>Platysmurus leucopterus</i>	Black Magpie	Gagak Kambing	TP	NT	√	√

88	Corvidae	<i>Corvus splendens</i>	House Crow	Gagak Rumah		LC	√	√
89	Corvidae	<i>Corvus enca</i>	Slender-billed Crow	Gagak Rimba		LC	√	√
90	Corvidae	<i>Corvus macrorhynchos</i>	Large-billed Crow	Gagak Paruh Besar		LC	√	√
91	Corvidae	<i>Urocissa erythrorhynchos</i>	Red-billed Blue Magpie					√
92	Cuculidae	<i>Phaenicophaeus sumatranus</i>	Chestnut-bellied Malkoha	Cenut Perut Coklat	TP	NT	√	√
93	Cuculidae	<i>Phaenicophaeus diardi</i>	Black-bellied Malkoha	Cenok Perut Hitam	TP	NT	√	√
94	Cuculidae	<i>Phaenicophaeus tristis</i>	Green-bellied Malkoha	Cenok Paruh Hijau	TP	LC	√	√
95	Cuculidae	<i>Phaenicophaeus chlorophaeus</i>	Raffles's Malkoha	Cenok Raffle	TP	LC	√	√
96	Cuculidae	<i>Phaenicophaeus curvirostris</i>	Chestnut-breasted Malkoha	Cenok Dada Coklat	TP	LC	√	√
97	Cuculidae	<i>Cuculus micropterus</i>	Indian Cuckoo	Sewah India	TP	LC		√
98	Cuculidae	<i>Cacomantis merulinus</i>	Plaintive Cuckoo	Sewah Mati Anak	TP	LC		√
99	Cuculidae	<i>Eudynamis scolopacea</i>	Common Koel	Sewah Tahu	TP		√	√
100	Cuculidae	<i>Clamator coromandus</i>	Chestnut-winged Cuckoo	Sewah Kepah Merah Berjambul	TP		√	√
101	Cuculidae	<i>Cocomantis sonneratii</i>	Banded Bay Cuckoo	Sewah Takuweh	TP			√
102	Cuculidae	<i>Cocomantis sepulcralis</i>	Brush Cuckoo	Sewah Gila	TP			√
103	Cuculidae	<i>Surniculus lugubris</i>	Drongo Cuckoo	Sewah Sawah	TP			√
104	Cuculidae	<i>Chrysococcyx minutillus</i>	Little Bronze Cuckoo	Sewah Daun	TP			√
105	Dicaeidae	<i>Prionochillus maculatus</i>	Yellow-breasted Flowerpecker	Sepah Puteri Raja	TP	LC	√	√
106	Dicaeidae	<i>Prionochillus percussus</i>	Crimsom Breasted Flowerpecker	Sepah Puteri Pekangi	TP	LC	√	√
107	Dicaeidae	<i>Dicaeum agile</i>	Thick-billed Flowerpecker	Sepah Puteri Kayangan		LC	√	√
108	Dicaeidae	<i>Dicaeum cruentatum</i>	Scarlet-backed Flowerpecker	Sepah Puteri Merah	TP	LC	√	√
109	Dicruridae*	<i>Dicrurus macrercus</i>	Black Drongo	Cecawi Rajawali	TP			√

110	Dicruridae*	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Cecawi Rantau	TP		√	
111	Dicruridae	<i>Dicrurus aeneus</i>	Bronzed Drongo	Cecawi Keladi	TP		√	
112	Dicruridae	<i>Dicrurus paradiseus</i>	Greater Racket-tailed Drongo	Cecawi Anting-anting	TP		√	√
113	Estrildidae	<i>Lonchura punctulata</i>	Scaly-breasted Munia	Pipit Pinang		LC	√	√
114	Estrildidae	<i>Lonchura malacca</i>	Black-headed Munia	Pipit Rawa		LC	√	√
115	Estrildidae	<i>Lonchura leucogastra</i>	White-bellied Munia	Pipit padi			√	√
116	Estrildidae	<i>Lonchura maja</i>	White-headed Munia	Pipit Uban				√
117	Eurylaimidae	<i>Cymbirhynchus macrorhynchos</i>	Black-and-Red Broadbill	Takau Rakit	TP	LC	√	√
118	Eurylaimidae	<i>Eurylaimus javanicus</i>	Banded Broadbill	Takau Rimba	TP			√
119	Heliornithidae*	<i>Heliopais personata</i>	Masked Finfoot	Pedandang	TP	EN		√
120	Hemiprocnidae	<i>Hemiprocne comata</i>	Whiskered Treeswift	Layang-layang Berjambul Kecil	TP	LC	√	√
121	Hemiprocnidae	<i>Hemiprocne longipennis</i>	Grey-rumped Treeswift	Layang-layang Jambul Kelabu				√
122	Hirundinidae*	<i>Hirundo rustica</i>	Barn Swallow	Layang-layang Hijrah	TP	LC	√	√
123	Hirundinidae	<i>Hirundo tahitica (javanica)</i>	Pacific Swallow	Layang-layang Pasifik	TP	LC	√	√
124	Jacaniidae	<i>Hydrophasianus chirurgus</i>	Pheasant-tailed Jacana	Teratai Ekor Panjang	TP	LC		√
125	Laniidae*	<i>Lanius tigrinus</i>	Tiger Shrike	Tirjup Api	TP	LC	√	√
126	Laniidae*	<i>Lanius cristatus</i>	Brown Shrike	Tirjup Tanah	TP		√	√
127	Laridae*	<i>Sterna albifrons</i>	Little Tern	Camar Kecil	TP			√
128	Megalaimidae	<i>Megalaima haemacephala</i>	Coppersmith's Barbet	Takut Tembaga	TP	LC		√
129	Megalaimidae	<i>Megalaima chrysopogon</i>	Gold-whiskered Barbet	Takur Pipi Kuning	TP	LC	√	√
130	Megalaimidae	<i>Megalaima rafflesii</i>	Red-crowned Barbet	Takur Kepala Merah	TP	NT	√	√
131	Megalaimidae	<i>Colorhamphus fuliginosus</i>	Brown Barbet	Takur Dahan	TP	LC	√	√

132	Megalaimidae	<i>Megalaima lineata</i>	Lineated Barbet	Takur Kukup	TP	LC	√	
133	Megalaimidae	<i>Megailama henriccii</i>	Yellow-crowned Barbet	Takut Mahkota Kuning	TP	LC	√	
134	Megalaimidae	<i>Megailama australis</i>	Blue-eared Barbet	Takur Tembaga	TP	LC	√	
135	Meropidae	<i>Merops viridis</i>	Blue-throated Bee-eater	Berek-berek Tadah Hujan	TP	LC	√	√
136	Meropidae*	<i>Merops philippinus</i>	Blue-tailed Bee-eater	Berek-berek Caik Dada	TP	LC	√	√
137	Motacillidae*	<i>Motacilla flava</i>	Yellow Wagtail	Kedidi Kuning	-	LC	√	√
138	Motacillidae	<i>Anthus rufulus</i>	Paddyfield Pipit	Ciak Padang	-	LC	√	√
139	Motacillidae**	<i>Anthus richardi</i>	Richard's Pipit	Ciak Tanah	-	LC	√	√
140	Monarchidae	<i>Tersiphone paradisi</i>	Asian Paradise Flycatcher	Sambar Ekor Panjang	TP			√
141	Muscicapidae*	<i>Ficedula zanthophygia</i>	Yellow-rumped Flycatcher	Sambar Tongkeng Kuning	TP	LC	√	√
142	Muscicapidae*	<i>Muscicapa dauurica</i>	Asian Brown Flycatcher	Sambar Coklat Asia	TP	LC		√
143	Nectariniidae	<i>Anthreptes simplex</i>	Plain Sunbird	Kelicap Kelabu	TP	LC	√	√
144	Nectariniidae	<i>Anthreptes melacensis</i>	Brown-throated Sunbird	Kelicap Mayang Kelabu	TP	LC	√	√
145	Nectariniidae	<i>Anthreptes singalensis</i>	Ruby-cheeked Sunbird	Kelicap Pipi Merah	TP	LC	√	√
146	Nectariniidae	<i>Hypogramma hypogrammicum</i>	Purple-naped Sunbird	Kelicap Rimba	TP	LC	√	√
147	Nectariniidae	<i>Aethopyga siparaja</i>	Crimson Sunbird	Kelicap Sepah Raja	TP	LC	√	√
148	Nectariniidae	<i>Hypogramma hypogrammicum</i>	Purple-naped Sunbird	Kelicap Rimba	TP			√
149	Nectariniidae	<i>Nectarinia jugularis</i>	Olive-backed Sunbird	Kelicap Bukit	TP			√
150	Nectariniidae	<i>Aethopyga temminckii</i>	Scarlet Sunbird	Kelicap Merah	TP	LC	√	√
151	Nectariniidae	<i>Arachnothera longirostra</i>	Little Spiderhunter	Kelicap Jantung Kecil	TP	LC	√	√
152	Nectariniidae	<i>Arachnothera flavigaster</i>	Spectacled Spiderhunter	Kelicap Jantung Besar	TP	LC	√	√
153	Nectariniidae	<i>Arachnothera magna</i>	Streaked Spiderhunter	Kelicap Jantung Gunung	TP	LC	√	√

154	Nectariniidae	<i>Arachnothera chrysogenys</i>	Yellow-eared Spiderhunter	Kelicap Jantung Telinga Kuning	TP	LC	√	√
155	Nectariniidae	<i>Arachnothera affinis</i>	Grey-breasted Spiderhunter	Kelicap Jantung Bukit	TP	LC	√	√
156	Nectarinarae	<i>Nectarinia sperata</i>	Purple-throated Sunbird	Kelicap leher ungu	TP	LC	√	√
157	Nectarinarae	<i>Aethopyga christinae</i>	Black-throated Sunbird	Kelicap Leher Hitam	TP	LC		√
158	Oriolidae*	<i>Oriolus chinensis</i>	Black-naped Oriole	Burung Kunyit Besar	TP	LC	√	√
159	Pandionidae *	<i>Pandion haliaetus</i> Osprey	Osprey	Lang Tiram	TP	LC		√
160	Pardalotidae	<i>Gerygone sulphurea</i>	Golden Bellied Gerygone	Cekup Perepat	TP	LC		√
161	Passeridae	<i>Passer montanus</i>	Eurasian Tree-Sparrow	Ciak Rumah	-	LC	√	√
162	Passeridae	<i>Passer flaveolus</i>	Plain-backed Sparrow	Ciak Arnab	-	LC	√	√
163	Ploceidae	<i>Ploceus philippinus</i>	Baya Weaver	Ciak Tempua	-	LC	√	√
164	Phasianidae	<i>Coturnix chinensis</i>	Blue-breasted Quail	Pikau	P	LC	√	√
165	Phasianidae	<i>Gallus gallus</i>	Red Junglefowl	Ayam Hutan Merah			√	√
166	Picidae	<i>Sasia abnormis</i>	Rufous Piculet	Belatuk Kerdil	TP	LC	√	√
167	Picidae	<i>Picus mentalis</i>	Chequer-throated Woodpecker	Belatuk Ranting	TP	LC	√	√
168	Picidae	<i>Meiglyptes tukki</i>	Buff-necked Woodpecker	Belatuk Leher Kuning	TP	NT		√
169	Picidae	<i>Gecinulus viridis (grantia)</i>	Bamboo Woodpecker	Belatuk Buluh	TP	LC		√
170	Picidae	<i>Dendrocopos canicapillus</i>	Grey-capped Woodpecker	Belatuk Belacan	TP	LC		√
171	Picidae	<i>Celeus brachyurus</i>	rufous Woodpecker	Belatuk Biji Nangka	TP	LC		√
172	Picidae	<i>Dryocopus javensis</i>	White-bellied Woodpecker	Belatuk Gajah	TP	LC		√
173	Picidae	<i>Picus miniaceus</i>	Banded Woodpecker	Belatuk Merah	TP	LC		√
174	Picidae	<i>Picus vittatus</i>	Laced Woodpecker	Belatuk Hijau/Bakau	TP	LC		√
175	Picidae	<i>Dinopium javensis</i>	Common Flameback	Belatuk Pinang Muda	TP	LC	√	√

176	Picidae	<i>Hemicircus concretus</i>	Grey and Buff Woodpecker	Belatok Punggoh	TP	LC	√	
177	Picidae	<i>Picumnus innominatus</i>	Speckled Piculet	Belatok Belang	TP	LC	√	√
178	Picidae	<i>Picus flavinucha</i>	Greater Yellow-nape	Belatok Besar Tengkok Kuning		LC	√	√
179	Podicipedidae	<i>Tachybaptus ruficollis</i>	Blue-breasted Quail	Pikau	TP	LC		√
180	Pycnonotidae	<i>Pycnonotus squamatus</i>	Scaly-breasted Bulbul	Merbah Bersisik	TP	NT	√	√
181	Pycnonotidae	<i>Pycnonotus plumosus</i>	Olive-winged Bulbul	Merbah Belukar	TP	LC	√	√
182	Pycnonotidae	<i>Pycnonotus blanfordi</i>	Streak-eared Bulbul	Merbah Telinga Luris	-	LC	√	√
183	Pycnonotidae	<i>Pycnonotus simplex</i>	Cream-vented Bulbul	Merbah Mata Putih	TP	LC	√	√
184	Pycnonotidae	<i>Pycnonotus brunneus</i>	Red-eyed Bulbul	Merbah Mata Merah	TP	LC	√	√
185	Pycnonotidae	<i>Pycnonotus goiavier</i>	Yellow-vented Bulbul	Merbah Tongkeng Kuning	-	LC	√	√
186	Pycnonotidae	<i>Alophoixus phaeocephalus</i>	Yellow-bellied Bulbul	Merbah Perut Kuning	TP	LC	√	√
187	Pycnonotidae	<i>Tricholestes criniger</i>	Hairy-backed Bulbul	Merbah Bulu Tengkok	TP	LC	√	√
188	Pycnonotidae	<i>Ixos malaccensis</i>	Streaked Bulbul	Merbah Lorek	TP	NT	√	√
189	Psittacidae	<i>Loriculus galgulus</i>	Blue-crowned Hanging Parrot	Bayan Serindit	TP	LC		√
190	Psittacidae	<i>Psittinus cyanurus</i>	Blue-rumped Parrot	Bayan Puling	TP	LC		√
191	Psittacidae	<i>Psittacula longicauda</i>	Long-tailed Parakeet	Bayan Nuri	TP	LC		√
192	Raillidae*	<i>Amauornis phoenicurus</i>	White-breasted Waterhen	Ruak-ruak	P	LC	√	√
193	Raillidae	<i>Rallina fasciata</i>	Red-legged Crake	Sintar Api	TP	LC		√
194	Raillidae	<i>Porzana cinerea</i>	White browed Crake	Sintar Dahi Putih	TP	LC		√
195	Raillidae	<i>Gallicrex cinerea</i>	Watercock	Ayam-ayam	TP	LC		√
196	Raillidae	<i>Porphyrio porphyrio</i>	Purple Swamphen	Panglin	TP	LC	√	√
197	Raillidae	<i>Gallinula chloropus</i>	Common Moorhen	Tiong Air	TP	LC	√	√

198	Rhipiduridae	<i>Rhipidura javanica</i>	Pied Fantail	Murai Gila Berbintik	TP	LC	√	√
199	Rostratulidae*	<i>Rostratula bengalensis</i>	Painted Snipe	Meragi	TP	LC		√
200	Rostratulidae*	<i>Gallinago stenura</i>	Pintail Snipe	Berkek Berbintik	TP	LC		√
201	Rostratulidae*	<i>Gallinago gallinago</i>	Common Snipe	Berkek Ekor Kapas	TP	LC		√
202	Rostratulidae*	<i>Tringa stagnatillis</i>	Marsh Sandpiper	Kedidi Paya	TP	LC		√
203	Rostratulidae*	<i>Tringa nebu;aria</i>	Common Greenshank	Kedidi Kaki Hijau	TP	LC		√
204	Rostratulidae*	<i>Tringa glareola</i>	Wood Sandpiper	Kedidi Kayu	TP	LC		√
205	Rostratulidae*	<i>Actitis hypoleucos</i>	Common Sandpiper	Kedidi Pasir	TP	LC		√
206	Sturnidae	<i>Aplonis panayensis</i>	Asian Glossy Starling	Perling Mata Merah	-	LC	√	√
207	Sturnidae	<i>Acridotheres tristis</i>	Common Myna	Tiong Gembala Kerbau	-	LC	√	√
208	Sturnidae	<i>Acridotheres fuscus (mahrattensis)</i>	Jungle Myna	Tiong Sawah	-	LC	√	√
209	Sturnidae	<i>Gracula religiosa (javana)</i>	Hill Myna	Tiong Emas	P(II)	LC	√	√
210	Sturnidae	<i>Acridotheres javanicus</i>	Javan Myna	Tiong Jawa	-	LC	√	√
211	Sturnidae*	<i>Sturnus sturninus</i>	Purple backed Starling	Perling Belakang Ungu	TP	LC		√
212	Sturnidae*	<i>Acrocephalus orientalis</i>	Oriental Reed Warbler	Cekup Paya Besar	TP	LC		√
213	Sylviidae	<i>Orthotomus sutorius</i>	Common Tailorbird	Perenjak Pisang	TP	LC	√	√
214	Sylviidae	<i>Orthotomus atrogularis</i>	Dark-necked Tailorbird	Perenjak Leher Hitam	TP	LC	√	√
215	Sylviidae	<i>Orthotomus sepium</i>	Ashy Tailorbird	Perenjak Kelabu	TP	LC	√	√
216	Sylviidae	<i>Orthotomus sericeus</i>	Rufous-tailed Tailorbird	Perenjak Ekor Merah	TP	LC	√	√
217	Sylviidae*	<i>Phylloscopus borealis</i>	Arctic Warbler	Cekup Daun Artik	-	LC	√	√
218	Sylviidae	<i>Locustella certhiola</i>	Rusty-rumped Warbler		TP	LC		√
219	Sylviidae	<i>Phylloscopus inornatus</i>	Inornate Warbler		TP	LC	√	√

220	Strigidae*	<i>Otus sunia</i>	Oriental Scops Owl	Hantu Kuang Kuik	TP	LC		√
221	Strigidae	<i>Otus bakkamoena</i>	Collared Scops Owl	Hantu Reban	TP	LC		√
222	Strigidae	<i>Bubo sumatranus</i>	Barred Eagle Owl	Hantu Bubu	TP	LC		√
223	Strigidae	<i>Ketupa ketupu</i>	Buffy Fish Owl	Hantu Kuning	TP	LC		√
224	Strigidae	<i>Strix seloputo</i>	Spotted Wood Owl	Hantu Carik Kafan	TP	LC		√
225	Strigidae	<i>Ninox scutulata</i>	Brown Hawk Owl	Hantu Bertamak	TP	LC		√
226	Threshkiornithidae*	<i>Plegadis falcinellus</i>	Glossy Ibis	Sekendi Kepala Hitam	TP	NT		√
227	Timaliidae	<i>Pellorneum capistratum</i>	Black-capped Babbler	Rimba Kepala Hitam	TP	LC	√	√
228	Timaliidae	<i>Malacopteron cinereum (rufifrons)</i>	Scaly-crowned Babbler	Rimba Tua Kecil	TP	LC		√
229	Timaliidae	<i>Malacopteron magnum</i>	Rufous-crowned Babbler	Rimba Tua Besar	TP	NT	√	√
230	Timaliidae	<i>Malacocincla malaccensis</i>	Short-tailed Babbler	Rimba Ekor Pendek	TP	NT	√	√
231	Timaliidae	<i>Trichostoma rostratum</i>	White Chested Babbler	Rimba Telunjuk	TP	NT		√
232	Timaliidae	<i>Trichostoma bicolor</i>	Rimba Sampah	Ferruginous Babbler	TP	LC		√
233	Timaliidae	<i>Malacocincla abbotti</i>	Abbott's Babbler	Rimba Riang	TP	LC		√
234	Timaliidae	<i>Malacocincla sepiaria</i>	Horsfield's Babbler	Rimba Hutan	TP	LC		√
235	Timaliidae	<i>Stachyris poliocephala</i>	Grey-headed Babbler	Rimba Kepala Kelabu	TP	LC		√
236	Timaliidae	<i>Stachyris maculata</i>	Chestnut-rumped Babbler	Rimba Rembah Besar	TP	LC		√
237	Timaliidae	<i>Stachyris erythroptera</i>	Chestnut-winged Babbler	Rimba Merbah Sampah	TP	LC		√
238	Timaliidae	<i>Macronous gularis</i>	Striped Tit-Babbler	Rimba Berjalur	TP	NT		√
239	Timaliidae	<i>Macronous ptilosus</i>	Fluffy-backed Tit-Babbler	Rimba Pong-pong	TP	LC		√
240	Turdidae	<i>Copsychus saularis</i>	Oriental Magpie Robin	Murai Kampung	P	LC	√	√
241	Turdidae*	<i>Copsychus malabaricus</i>	White Rumped Shama	Murai Batu	TP	LC		√

242	Turnicidae	<i>Turnix suscitator</i>	Barred Button Quail	Puyuh Tanah	TP	LC	√	√
243	Tytonidae	<i>Tyto alba</i>	Barn Owl	Jampok Kubur	TP	LC		√
244	Zosteropidae	<i>Zosterops everetti</i>	Everett's White-eye	Mata Putih Rimba	TP	LC	√	√

Note: P – Protected, TP – Totally Protected, LC – Least Concerned, NT – Near Threatened, VU – Vulnerable, EN – Endangered

*Migratory species

WCA2010: Malaysia Wildlife Conservation Act 2010

Meanwhile, various other bird species were observed along the stretch of Palm Street alongside the west bank of Tasik Sendayan. Species that were seen specifically in this area in the mornings includes the chestnut-bellied malkoha (*Phaenicophaeus sumatranus*), white-bellied munia (*Lonchura leucogastra*), and red-legged crake (*Rallina fasciata*). A flock of four red wattled lapwing (*Vanellus indicus*) (**Plate 3-16**) with its distinct loud calls was also observed around this area at different times during the day.

At point no. 9 which is along the road passing Dataran Serandau, four individuals of the black-and-red broadbill (*Cymbirhynchus macrorhynchos*) (**Plate 3-15**) were spotted in the afternoon. This species is known to be found in undisturbed forests, but may occasionally visit the fringes of the forest. Some bird species that were found throughout PIW include the white throated kingfisher (*Halcyon smyrnensis*), silver-rumped swift (*Rhaphidura leucopygia*), greater green leafbird (*Chloropsis sonnerati*), and white-breasted waterhen (*Amaurornis phoenicurus*). At night, the large-tailed nightjar (*Caprimulgus macrurus*) is commonly spotted throughout PIW.



Plate 3-13: A Black-capped kingfisher (*Halcyon pileate*) on a bamboo shoot



Plate 3-14: A yellow-vented bulbul spotted on a bamboo bush



Plate 3-15: A couple of black-and-red broadbill spotted near point CT9



Plate 3-16: Red-wattled lapwings on the ground nearby the crocodile enclosure

3.3.3 Herpetofauna

As for amphibians and reptiles, at least 20 species from eight families and one order inhabits PIW. Seven species from one order and two families were directly observed during the sampling period. Under the WCA2010, only the Asian water monitor lizard (*Varanus salvator*) is classified as a protected species, while the remaining six species are not protected. Under the IUCN Red List of Threatened species, all seven species observed are listed as Least Concerned.

From literature studies, PIW hosts 13 other herpetofauna species. The estuarine crocodile (*Crocodylus porosus*) and radiated tortoise (*Astrochelys radiata*) are Totally Protected under the WCA2010, nine are Protected species while other two are not listed. The pig-nosed turtle (*Carettochelys insculpta*), yellow-headed temple turtle (*Heosemys annandalii*), and Malaysian giant tortoise (*Orlitia borneensis*) are listed as Endangered, the other four species – the Ambonia box turtle (*Cuora amboinensis*), giant Asian pond turtle (*Heosemys grandis*), black marsh turtle (*Siebenrockiella crassicollis*), and red-footed tortoise (*Chelonoidis carbonarius*) are Vulnerable species. The other nine species are Least Concerned species.

The red-ear slider (*Trachemys scripta elegans*) – an introduced species also known as an invasive alien species, have also been recorded in PIW. This species must be given attention and properly controlled as it may pose a threat to the existing local species in the lakes.

Table 3-8: A list of reptiles and amphibians in Paya Indah Wetlands

Family	Scientific Name	Common Name	Protection Status	
			WCA 2010	IUCN Red List
Anura (order)	<i>Duttaphrynus melanostictus</i>	Asian common toad	-	LC
	<i>Fejervarya limnocharis</i>	Asian grass frog	-	LC
	<i>Hylarana erythraea</i>	Green paddy frog	-	LC
	<i>Polypedates leucomystax</i>	Common tree frog	-	LC
Crocodylidae	<i>Crocodylus porosus</i>	Estuarine crocodile*	TP	LC
Carettochelyidae	<i>Carettochelys insculpta</i>	Pig-nosed turtle*	P	EN
Gekkonidae	<i>Cnemaspis peninsularis</i>	Peninsular rock gecko	-	LC
	<i>Hemidactylus frenatus</i>	Common house gecko	-	LC
Geoemydidae	<i>Cuora amboinensis</i>	Ambonia box turtle*	P	VU
	<i>Heosemys annandalii</i>	Yellow-headed temple turtle*	P	EN
	<i>Heosemys grandis</i>	Giant Asian pond turtle*	P	VU
	<i>Orlitia borneensis</i>	Malaysian giant tortoise*	P	EN
	<i>Siebenrockiella crassicollis</i>	Black marsh turtle*	P	VU
Emydidae	<i>Trachemys scripta elegans</i>	Red-ear slider*	-	LC
	<i>Chelonoidis carbonarius</i>	Red-footed tortoise*	-	VU
Testudinidae	<i>Manouria emys</i>	Asian forest tortoise*	P	CR
	<i>Indotestudo elongata</i>	Yellow-headed tortoise*	P	CR
	<i>Astrochelys radiata</i>	Radiated tortoise*	TP	CR
Trionychidae	<i>Rafetus swinhoei</i>	Yangtze giant softshell turtle*	P	CR
Varanidae	<i>Varanus salvator</i>	Asian water monitor lizard	P	LC

Note: P – Protected, TP – Totally Protected; LC – Least Concerned, VU – Vulnerable, EN – Endangered, CR – Critically Endangered, ‘-’ – Not Listed

*Not observed. Collated from PIW’s wildlife stock sheet and interviews for year 2019
WCA2010: Malaysia Wildlife Conservation Act 2010

All four species anurans recorded during the study period were observed around the recreational area along the banks of the Arapaima pond situated near the current visitor entry into Paya Indah Wetlands. On-foot surveys for anurans were not carried out within the Conservation and Research zones due to safety concerns. However, unidentified frog calls were heard along the banks of the lakes throughout the Conservation and Research zones. Furthermore, through direct observations, the Asian water monitor lizard (*Varanus salvator*) was seen to favour Jalan Rumah Melayu (five individuals observed), Palm Street, and the road leading to the proposed hot air balloon platform (as captured on CT1) (figure 3-17).



Plate 3-17: An Asian water monitor lizard (*Varanus salvator*) passing by camera at point CT1

From previous crocodile monitoring activities carried out by PERHILITAN between the months of May till October 2019, there are currently more than 60 estuarine crocodiles in the Crocodile Lake. Wild crocodiles were also recorded in Tasik Typha, Tasik Sendayan, and Tasik Teratai, and Tasik Telipok through direct observations by PERHILITAN staff and from reports from local fishermen. More than three individual wild crocodiles are predicted to reside in these lakes.



Plate 3-18: A common Asian toad (*Duttaphrynus melanostictus*) spotted at the Arapaima Pond



Plate 3-19: A green paddy frog (*Hylarana erythraea*) spotted at Arapaima Pond



Plate 3-20: A rock gecko (*Cnemaspis peninsularis*) spotted by Arapaima pond

3.3.4 Water Quality

From initial observations, the lake waters were generally a light tea to dark tea colour. (**Plate 2-6, 2-8**). The lakes are covered with lush vegetation of water lotus (**Plate 2-7**). On average, the lakes are with warm waters with a median temperature of 31.37°C. Average depth of 5 metres with fairly flat bottoms indicates that the lakes are considerably deep and are suitable for boats to sail across. The lakes' depths are due to the fact that these lakes were mining pits before it was left abandoned and filled with water.

The lakes' waters average pH level of 9.29 shows that the lakes are rather alkaline. Alkaline lakes are lakes with pH reading (between 9-12), with waters containing high calcic, sodic and carbonic contents. An alkaline lake is formed when the lakes lack an outlet that retain the waters in. The continual cycle of evaporation and charging of the lakes through rain give rise to concentration of the minerals. Carbonate minerals gives out carbon dioxide (CO₂) gas that then enriches the lakes with this gas, making the lakes a hard environment for aquatic life. Despite the hard condition, high concentration of CO₂ gas promotes primary production (photosynthesis) that uses CO₂ as food. This is evident by the extensive coverage of water lotuses and other aquatic plants, with patches of algal blooms (permanent or seasonal) seen on the surface of several lakes.

According to the management staffs, PIW occasionally recharge fish stocks in Tasik Typha with species such as the giant snakehead (*Channa micropeltes*). The management informed that they own a small fish cage where fish fries are nurtured to size required before releasing into Tasik Typha.

Table 3-9: Physical parameters of the lakes at Paya Indah Wetlands

Lake	Temp. (°C)	Depth	pH	Location	
				Lat	Long
Teratai	32.53	5.61	9.37	N 2 52' 10.43"	E 101 36' 48.16"
Typha	30.40	4.38	9.20	N 2 51' 31"	E 101 37' 55"
Sendayan	32.10	5.80	8.63	N 2 51' 35"	E 101 37' 5"
Hippo	30.20	4.00	9.65	N 2 51' 35"	E 101 37' 46"
Crocodile		-		N 2 51' 36"	E 101 37' 57"
Telipok	32.07	5.54	9.20	N 2 52' 14"	E 101 37' 1"
Rusiga	28.80	7.40	9.65	N 2 51' 43"	E 101 37' 57"
Kuning	33.00	6.07	8.96	N 2 51' 32"	E 101 37' 30"
Resam	32.10	4.87	9.88	N 2 51' 41.38"	E 101 37' 10.61"
Driftwood	29.10	5.27	9.66	N 2 52' 33"	E 101 36' 49"
Palma	32.20	4.80	8.62	N 2 51' 37.73"	E 101 37' 19.70"
Lake 1		1.25		N 2 52' 10.43"	E 101 36' 48.16"

Chemical components analysis of water samples will provide an accurate situation of the mineral contents in the lakes that gives the high pH value. Chemical parameters of water at each lake pending laboratory results.

3.3.5 Wildlife Hotspots

Based on the wildlife surveys conducted, there are five areas (**Figure 3-1**) that can be considered as wildlife hotspots identified in Paya Indah Wetlands. These are:

Palm Street

There are at least two species of mammals, 47 species of birds, and one species of reptile – the Asian water monitor lizard (*Varanus salvator*) that frequents Palm Street. The large number of species recorded at this area indicates that Palm Street, especially the stretch along the east of Tasik Sendayan, is a habitat for wildlife. The blue-throated bee-eater (*Merops viridis*) and brown-throated bee-eater were observed perched at the top of leaf-less branches at this site. A barrel of long-tailed macaques (*Macaca fascicularis*) was also observed in this area.

Tasik Typha

This area is a notable bird hotspot with at least 66 species of birds recorded during the five days of survey. At least two species of mammals were also observed at this area namely the common tree shrew (*Tupaia glis*) through direct observation, and the leopard cat (*Prionailurus bengalensis*) which was caught on a camera trap previously installed by PERHILITAN. Observations of estuarine crocodiles (*Crocodylus porosus*) in the lake by ERE staff, PERHILITAN staff, and civilian bird watchers were also noted at this area.

Road passing Dataran Serandau

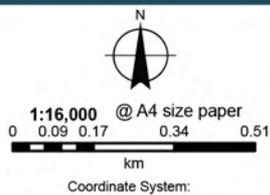
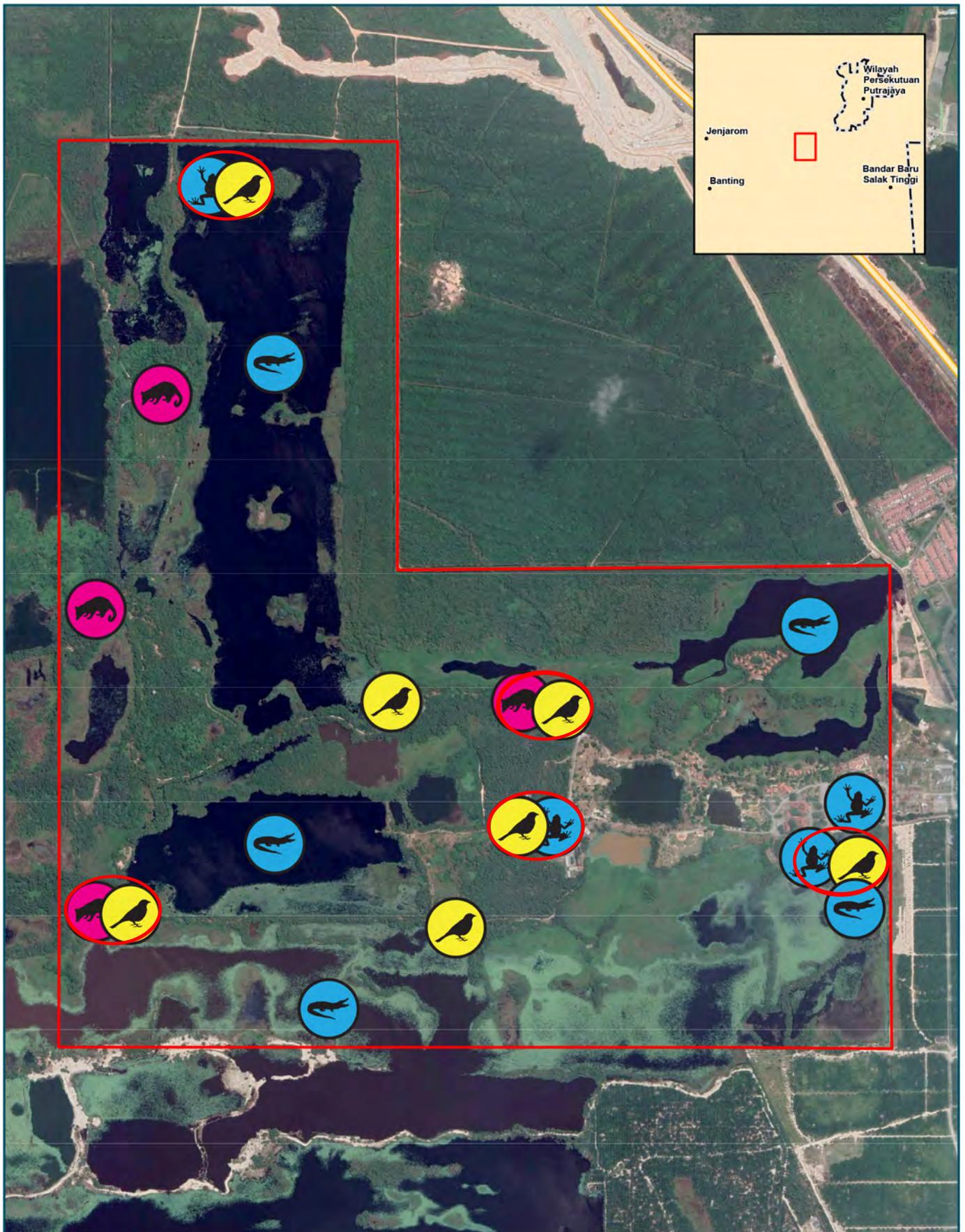
The stretch of road from the recreational area, passing Dataran Serandau, up till CT5 is also a notable wildlife hotspot. Here, a barrel of the dusky leaf monkey (*Trachypithecus obscurus*) were seen swining between tree branches. At least 41 species of birds are also known to occur along this stretch. This includes the Barred Button Quail (*Turnix suscitator*), Common Flameback Woodpecker (*Dinopium javensis*), and Purple-throated Sunbird (*Nectarinia sperata*).

Road leading towards proposed Hot Air Balloon Platform

At least 37 species of birds are present at this location. They include the Lesser Whistling Duck (*Dendrocygna javanica*), Crested Serpent-Eagle (*Spilornis cheela*), and Silver-rumped Swift (*Rhaphidura leucopygia*). Besides that, at least two species of reptiles – the Asian water monitor lizard (*Varanus salvator*) and estuarine crocodile (*Crocodylus porosus*) are also known to occur at in this area.

Rumah Melayu area (CT6 location).

Two species of small mammals were spotted here, the Malayan porcupine (*Hystrix brachyura*) and the leopard cat (*Prionailurus bengalensis*). PIW management staffs noted that they have spotted a group of smooth-coated otters at this area with this group frequently present in the area. A white-throated kingfisher (*Halcyon smyrnensis*) was spotted atop a tree by the Rumah Melayu, and the Rumah Melayu is noted to house the resident barn owl (*Tyto alba*) that can be seen in the vicinity.



- LEGEND**
- Mammals hotspot
 - Birds hotspot
 - Herpetofauna hotspot
 - Crocodiles sighting



**Wildlife Hotspots
in Paya Indah
Wetlands**

Date	17-12-2019
Project No	EJ 675
Produced by	HMZ
Revision	A

FIGURE 3-1

Section 4

WAY FORWARD

All in all, Paya Indah Wetlands (PIW) is a healthy, densely foliated reforested ex-mining area with a large number of tree species, some identified as species requiring conservation, complemented by a fair number of plants species mainly shrubs and bushes. Most of the trees planted are fairly mature, the quality of these trees is good with some having potential to grow into more mature trees over time. Most of the trees identified is the acacia (*Acacia mangium*) tree with patches of flowering trees which bear fruits that attracts wildlife, especially birds to feed on. With large numbers of these trees planted, it is certain that PIW will attract wildlife to feed and reside in the area.

Table 4-1: Summary of flora results obtained from survey

Type	No. of species	IUCN	
Trees	120	LC	119
		NT	0
		VU	1
		CR	0
Plant	40		

- Highest number of trees in plot: CT7 (Aeon Woodlands)
- Highest number of tree species in plot: Plot CT9, 10 species
 - Most common tree species in PIW: *Acacia mangium*
 - Plot with widest trees: Plot CT6, 30.98 cm DBH
 - Plot with tallest trees: Plot CT9, 11.60 m
 - Plot with largest timber volume: Plot CT6, 0.612m³

PIW at present is being frequented by a considerably large number of wildlife species (mainly birds) mostly deemed as resident such as the purple heron (*Ardea purpurea*), the Chinese egret (*Egretta eulophotes*) and the nightjars (*Caprimulgus affinis* and *Caprimulgus macrurus*) identified in the area, although nesting sites for these birds are yet to be identified. This is inferred based on the frequency of sightings of these bird species recorded from the fauna surveys.

Table 4-2: Summary of wildlife observed during field survey

Type	No. of species	WCA2010		IUCN Red List	
Mammals	9	TP	2	LC	7
		P	6	NT	1
		NP	1	VU	1
Birds	138	TP	79	LC	101
		P	7	NT	10
		NP	52	NL	27
Herpetofauna	7	TP	0	LC	7
		P	1		
		NP	6		

Note: TP – Totally Protected, P – Protected, NP – Not Protected; LC – Least Concerned, NT – Near-Threatened, VU – Vulnerable, NL – Not Listed

WCA2010: Malaysia Wildlife Conservation Act 2010

Table 4-3: Summary of all recorded wildlife in Paya Indah Wetlands

Type	No. of species	WCA2010		IUCN Red List	
Mammals	12	TP	3	LC	9
		P	6	NT	1
		NP	2	VU	1
Birds	244	TP	160	LC	164
		P	7	NT	17
		NP	77	VU	1
				EN	1
Herpetofauna	20	TP	2	LC	9
		P	10	VU	4
		NP	8	EN	3
				CR	4

Note: TP – Totally Protected, P – Protected, NP – Not Protected; LC – Least Concerned, NT – Near-Threatened, VU – Vulnerable, EN – Endangered, CR – Critically Endangered

WCA2010: Malaysia Wildlife Conservation Act 2010

The lake waters in PIW are generally alkalic, with average pH value of 9.29 across all lakes. Average temperature of the lakes is 31.37 °C, which is considerably warm. These metrics are typical of lakes with still waters, as the lakes in PIW lack an outlet that allows outflow and cycling of waters. Average depth of 5 metres is expected as these lakes of former mining pits. The deepest lake is Tasik Rusiga with average depth of 7.4 metres located north of the visitor carpark.

- Average depth of lakes: **5 m**
- Average pH of lakes: **pH 9.29**
- Average water temperature: **31.37 °C**

To retain the integrity of PIW as a wildlife sanctuary while developing tourism in the area, several cautions and mitigation actions must be considered. Preliminary mitigation actions are as follows:

1. It is important for the Discovery Wetlands to maintain the quality and condition of the habitats and wildlife hotspots identified throughout PIW to retain the current wildlife species that reside and frequents the area, and possibly attract more species into PIW. Attention should be given at specific areas when

construction is being carried out for the Safari tour tracks from the Discovery Wetlands entrance towards the PIW visitor complex to mitigate habitat disturbance from human activities. As the track passes through two wildlife hotspots (**Figure 3-21**), it is best to not clear or disturb any trees especially fruiting trees to avoid cutting off fruiting branches that may cut food supplies to wildlife that feeds on the fruits.

2. It should be underlined that there is a population of estuarine crocodiles that live outside of the crocodile enclosure around PIW. Currently the management have installed warning signs of the possibility of crocodile encounters (**Figure 4-1**) at areas where crocodiles were sighted before from their monitoring activities. Therefore, the Discovery Wetlands may add on to this effort by continuing the activity by installing camera traps at sightings area for continuous monitoring of crocodile movements around the lakes. Evidences of sightings may be used as education materials as well as it helps the management for movement data that can be used to ensure visitor safety.



Plate 4-1: Crocodile warning sign installed by the Chalet A area

3. The hot air balloon take-off area is identified as a wildlife hotspot with focus on birds' sightings for the number of species identified frequenting this area. Therefore, Discovery Wetlands may benefit from replanting this area with native fruiting trees to further diversify tree species composition currently exist at this area. As fruiting trees give flowers, this will also help further improving the aesthetics of the hot-air balloon take-off zone area.
4. The Aeon Woodlands is a hill area of *Acacia mangium* trees that were closely planted during its establishment, producing a lush coverage of trees after years of growth. There is an observation tower located at the top of the hill, but is currently closed. This forested area may benefit from clean-ups to make

the forest accessible by visitors for an immersive experience of being surrounded by forest. The observation tower, on the other hand, may benefit from some refurbishments and upgrading in terms of security for added tourism experience where visitors may view Discovery Wetlands at a different perspective to supplement the hot-air balloon experience.

5. The Tasik Sendayan area is a photogenic spot in PIW. Rumah Melayu area is with a jetty that overlooks the whole of Tasik Sendayan with a good view. This area is adjacent to point CT6 where a number of wildlife were sighted. Rumah Melayu is a spectacular display of traditional Malay workmanship. Visitors may also view remarkable landscapes along Jalan Rumah Melayu. However, crocodiles were sighted crossing this area to access Tasik Sendayan from Tasik Teratai and vice-versa. Therefore, efforts mentioned in (4) will help mitigate human-wildlife conflict when this area is open for visitors. Adding on, the Rumah Melayu area, wildlife hotspot at the east end of Tasik Sendayan, and the eastern Tasik Sendayan jetty may further benefit from upgrade and maintenance to boost tourism satisfaction as much as it helps restore and maintain habitat and infrastructure integrity.

APPENDIX A

STUDY SITE : Point CT1 (Kawasan Tepi Tasik)

- Kawasan resam, di penuhi pokok Akasia dan Gelam
- Tidak banyak pokok-pokok bersaiz besar

Senarai pokok-pokok yang di banci di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT1	1	Acacia mangium	Akasia	Fabaceae	13.5	5	TREE	LC
CT1	2	Acacia mangium	Akasia	Fabaceae	16.1	6	TREE	LC
CT1	3	Acacia mangium	Akasia	Fabaceae	17.8	7	TREE	LC
CT1	4	Melaleuca cajuputi	Gelam	Myrtaceae	16.1	5	TREE	LC
CT1	5	Acacia mangium	Akasia	Fabaceae	16.7	7	TREE	LC
CT1	6	Acacia mangium	Akasia	Fabaceae	22.8	4	TREE	LC
CT1	7	Acacia mangium	Akasia	Fabaceae	22.6	2.5	TREE	LC
CT1	8	Acacia mangium	Akasia	Fabaceae	16.3	2	TREE	LC
CT1	9	Melaleuca cajuputi	Gelam	Myrtaceae	10.0	5	TREE	LC
CT1	10	Melaleuca cajuputi	Gelam	Myrtaceae	12.1	7	TREE	LC
CT1	11	Acacia mangium	Akasia	Fabaceae	14.7	4	TREE	LC
CT1	12	Acacia mangium	Akasia	Fabaceae	16.8	8	TREE	LC
CT1	13	Acacia mangium	Akasia	Fabaceae	10.1	1.8	TREE	LC
CT1	14	Acacia mangium	Akasia	Fabaceae	17.4	8.5	TREE	LC
CT1	15	Acacia mangium	Akasia	Fabaceae	41.2	3.5	TREE	LC
CT1	16	Acacia mangium	Akasia	Fabaceae	11.7	4.5	TREE	LC
CT1	17	Acacia mangium	Akasia	Fabaceae	24.2	2.5	TREE	LC
CT1	18	Acacia mangium	Akasia	Fabaceae	14.5	7	TREE	LC
CT1	19	Acacia mangium	Akasia	Fabaceae	17.4	5	TREE	LC
CT1	20	Acacia mangium	Akasia	Fabaceae	11.6	2.5	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT1	1	<i>Dicranopteris linearis</i>	Resam	Gleicheniaceae	Ferns
CT1	2	<i>Ischaemum muticum</i>	Rumput lipan pasir	Poaceae	Herbs
CT1	3	<i>Scleria sumatrensis</i>	Rumput sendayan	Cyperaceae	Herbs
CT1	4	<i>Mimosa pudica</i>	Semalu renek	Leguminosae	Herbs
CT1	5	<i>Nymphaea spp.</i>	Telipuk	Nymphaeaceae	Herbs
CT1	6	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT1	7	<i>Lygodium microphyllum</i>	Climbing fern	Lygodiaceae	Ferns
CT1	8	<i>Salvinia molesta</i>	Water plant	Salviniaceae	Herbs

CT1	9	<i>Scleria sumatrensis</i>	Rumput sendayan	Cyperaceae	Herbs
CT1	10	<i>Elaeis guineensis</i>	Kelapa sawit	Arecaceae	Palm
CT1	11	<i>Solanum torvum</i>	Terong pipit	Solanaceae	Herbs
CT1	12	<i>Phyllanthus amarus</i>	Dukung anak	Phyllanthaceae	Herbs
CT1	13	<i>Oldenlandia auricularia</i>	Rumput telur	Rubiaceae	Herbs
CT1	14	<i>Chromolaena odorata</i>	Rumput kapal terbang	Compositae	Herbs
CT1	15	<i>Melastoma</i>	Senduduk	Melastomataceae	Herbs
CT1	16	<i>Thyrsostachys siamensis</i>	Buluh siam	Poaceae	Bamboo

Senarai spesies lain yang di jumpai di kawasan ini.

PT	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED
CT1	1	<i>Dillenia reticulata</i>	Simpoh gajah	Dilleniaceae	Tree	LC
CT1	2	<i>Vitex pinnata</i>	Leban	Verbenaceae	Tree	LC
CT1	3	<i>Melicope lunu-akenda</i>	Tenggek burung	Rutaceae	Tree	LC
CT1	4	<i>Fagraea fragrans</i>	Tembusu padang	Loganiaceae	Tree	LC
CT1	5	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	Tree	LC
CT1	6	<i>Mallotus paniculatus</i>	Balik angin	Euohorbiaceae	Tree	LC
CT1	7	<i>Pternandra echinata</i>	Sial menahun	Melastomataceae	Tree	LC
CT1	8	<i>Azadirachta excelsa</i>	Sentang	Meliaceae	Tree	LC
CT1	9	<i>Shorea roxburghi</i>	Meranti temak	Dipterocarpaceae	Tree	LC
CT1	10	<i>Hopea helferi</i>	Giam lintah bukit	Dipterocarpaceae	Tree	LC
CT1	11	<i>Cinnamomum iners</i>	Medang teja	Lauraceae	Tree	LC
CT1	12	<i>Syzygium polyanthum</i>	Salam	Myrtaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT1

	
<p>Kawasan tepian tasik</p>	<p>Pokok Gelam & Simpoh air</p>
	
<p>Pokok Tembusu</p>	<p>Aquatic plant (<i>Salvinia molesta</i>)</p>

STUDY SITE : Point CT2

- Kawasan pamah berpasir di domansi Pokok Leban & Tenggek burung
- Terdapat tumbuhan resam disekitar kawasan

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT2	1	<i>Vitex pinnata</i>	Leban	Verbenaceae	18.1	5	TREE	LC
CT2	2	<i>Melicope lunakenda</i>	Tenggek burung	Rutaceae	12.2	2.5	TREE	LC
CT2	3	<i>Vitex pinnata</i>	Leban	Verbenaceae	21.5	2.5	TREE	LC
CT2	4	<i>Vitex pinnata</i>	Leban	Verbenaceae	17.8	5	TREE	LC
CT2	5	<i>Vitex pinnata</i>	Leban	Verbenaceae	12.6	6	TREE	LC
CT2	6	<i>Syzygium polyanthum</i>	Salam	Myrtaceae	18.2	8	TREE	LC
CT2	7	<i>Vitex pinnata</i>	Leban	Verbenaceae	14.2	5	TREE	LC
CT2	8	<i>Vitex pinnata</i>	Leban	Verbenaceae	11.4	6	TREE	LC
CT2	9	<i>Vitex pinnata</i>	Leban	Verbenaceae	13.4	6.5	TREE	LC
CT2	10	<i>Acacia mangium</i>	Akasia	Fabaceae	43.2	8	TREE	LC
CT2	11	<i>Vitex pinnata</i>	Leban	Verbenaceae	10.8	6	TREE	LC
CT2	12	<i>Dillenia suffruticosa</i>	Simpoh air	Dilleniaceae	10.0	2.5	TREE	LC
CT2	13	<i>Vitex pinnata</i>	Leban	Verbenaceae	14.1	5	TREE	LC
CT2	14	<i>Vitex pinnata</i>	Leban	Verbenaceae	10.5	7	TREE	LC
CT2	15	<i>Vitex pinnata</i>	Leban	Verbenaceae	10.1	3	TREE	LC
CT2	16	<i>Vitex pinnata</i>	Leban	Verbenaceae	12.6	5	TREE	LC
CT2	17	<i>Vitex pinnata</i>	Leban	Verbenaceae	10.0	3	TREE	LC
CT2	18	<i>Vitex pinnata</i>	Leban	Verbenaceae	14.2	1.5	TREE	LC
CT2	19	<i>Fagraea fragrans</i>	Tembusu padang	Loganiaceae	13.5	6	TREE	LC
CT2	20	<i>Vitex pinnata</i>	Leban	Verbenaceae	14.5	6	TREE	LC
CT2	21	<i>Vitex pinnata</i>	Leban	Verbenaceae	13.6	5	TREE	LC
CT2	22	<i>Sapium discolor</i>	Ludai	Euphorbiaceae	10.0	7	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT2	1	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT2	2	<i>Scleria sumatrensis</i>	Rumput sendayan	Cyperaceae	Herbs
CT2	3	<i>Passiflora foetida</i>	Akar letupetup	Passifloraceae	Climbers
CT2	4	<i>Urena lobata</i>	Rumput pepulut	Malvaceae	Herbs
CT2	5	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT2	6	<i>Lygodium microphyllum</i>	Climbing fern	Lygodiaceae	Ferns
CT2	7	<i>Melastoma malabathricum</i>	Senduduk	Melastomataceae	Herbs
CT2	8	<i>Ischaemum mutuum</i>	Rumput lipan pasir	Poaceae	Herbs
CT2	9	<i>Mikania cordata</i>	Selaput tunggul	Compositae	Herbs
CT2	10	<i>Uncaria cordata</i>	Akar kekait	Rubiaceae	Climbers
CT2	11	<i>Oldenlandia auricularia</i>	Rumput telur belangkas	Rubiaceae	Herbs
CT2	12	<i>Chromolaena odorata</i>	Rumput kalterbang	Compositae	Herbs
CT2	13	<i>Bambusa vulgaris</i>	Buluh minyak	Poaceae	Bamboo

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIS
CT2	1	<i>Mallotus paniculatus</i>	Balik angin	Euohorbiaceae	Tree	LC
CT2	2	<i>Trema angustifolia</i>	Mengkirai	Ulmaceae	Tree	LC
CT2	3	<i>Syzygium polyanthum</i>	Salam	Myrtaceae	Tree	LC
CT2	4	<i>Alstonia scholaris</i>	Pulai	Apocynaceae	Tree	LC
CT2	5	<i>Azadirachta excelsa</i>	Sentang	Meliaceae	Tree	LC
CT2	6	<i>Bridelia stipularis</i>	Kenidai	Euohorbiaceae	Tree	LC
CT2	7	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	Tree	LC
CT2	8	<i>Melicope lunakenda</i>	Tenggek burung	Rutaceae	Tree	LC
CT2	9	<i>Casuarina equisetifolia</i>	Ru pantai	Casuarinaceae	Tree	LC
CT2	10	<i>Ficus chartacea</i>	Ara buah kuning	Moraceae	Tree	LC
CT2	11	<i>Terminalia phellocarpa</i>	Jelawai mepelan	Combretaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT2



Kawasan pamah berpasir



Kawasan berpasir yang dipenuhi resam



Rumput pepulut



Rumput lipan pasir

STUDY SITE : Point CT3 (Kawasan Tepi Tasik)

- Kawasan berpasir di penuh pokok Akasia
- Tidak banyak pokok-pokok bersaiz besar

Senarai pokok-pokok yang di banci di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT3	1	Acaciamangium	Akasia	Fabaceae	22.5	10	TREE	LC
CT3	2	Fagraea fragrans	Tembusu padang	Loganaceae	12.2	5	TREE	LC
CT3	3	Acacia mangium	Akasia	Fabaceae	16.9	7	TREE	LC
CT3	4	Acacia mangium	Akasia	Fabaceae	17.8	12	TREE	LC
CT3	5	Acacia mangium	Akasia	Fabaceae	14.7	7	TREE	LC
CT3	6	Acacia mangium	Akasia	Fabaceae	15.4	9	TREE	LC
CT3	7	Fagraea fragrans	Tembusu padang	Loganaceae	15.5	7	TREE	LC
CT3	8	Acacia mangium	Akasia	Fabaceae	21.4	15	TREE	LC
CT3	9	Acacia mangium	Akasia	Fabaceae	20.2	6	TREE	LC
CT3	10	Acacia mangium	Akasia	Fabaceae	27.2	7	TREE	LC
CT3	11	Acacia mangium	Akasia	Fabaceae	15.8	5	TREE	LC
CT3	12	Acacia mangium	Akasia	Fabaceae	16.1	3	TREE	LC
CT3	13	Acacia mangium	Akasia	Fabaceae	44.1	6	TREE	LC
CT3	14	Acacia mangium	Akasia	Fabaceae	10.1	5	TREE	LC
CT3	15	Acacia mangium	Akasia	Fabaceae	11.8	6	TREE	LC
CT3	16	Acacia mangium	Akasia	Fabaceae	11.7	6	TREE	LC
CT3	17	Acacia mangium	Akasia	Fabaceae	24.2	5	TREE	LC
CT3	18	Acacia mangium	Akasia	Fabaceae	29.5	6	TREE	LC
CT3	19	Acacia mangium	Akasia	Fabaceae	18.8	7	TREE	LC
CT3	20	Acacia mangium	Akasia	Fabaceae	20.0	5	TREE	LC
CT3	21	Acacia mangium	Akasia	Fabaceae	18.5	5	TREE	LC
CT3	22	Acacia mangium	Akasia	Fabaceae	41.8	6	TREE	LC
CT3	23	Melicope lunakenda	Tenggek burung	Rutaceae	10.0	5	TREE	LC
CT3	24	Acacia mangium	Akasia	Fabaceae	22.7	11	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT3	1	Dicranopteris linearis	Resam	Gleicheniaceae	Ferns
CT3	2	Scleria sumatrensis	Rumput sendayan	Cyperaceae	Herbs
CT3	3	Melastoma malabathricum	Senduduk	Melastomataceae	Herbs
CT3	4	Stenochlaena palustris	Paku miding	Blechnaceae	Ferns
CT3	5	Lygodium microphyllum	Climbing fern	Lygodiaceae	Ferns

CT3	6	<i>Ischaemum muticum</i>	Rumput lipan pasir	Poaceae	Herbs
CT3	7	<i>Clidemia hirta</i>	Senduduk bulu	Melastomataceae	Herbs
CT3	8	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT3	9	<i>Bambusa sp.</i>	Buluh	Poaceae	Bamboo

Senarai spesies lain yang di jumpai di kawasan ini.

PT	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED
CT3	1	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	Tree	LC
CT3	2	<i>Dillenia suffruticosa</i>	Simpoh air	Dilleniaceae	Tree	LC
CT3	3	<i>Ficus chartacea</i>	Ara buah kuning	Moraceae	Tree	LC
CT3	4	<i>Mallotus paniculatus</i>	Balik angin	Euohorbiaceae	Tree	LC
CT3	5	<i>Trema orientalis</i>	Menarong	Ulmaceae	Tree	LC
CT3	6	<i>Melicope lunu-akenda</i>	Tenggek burung	Rutaceae	Tree	LC
CT3	7	<i>Ficus benjamina</i>	Ara waringin	Moraceae	Tree	LC
CT3	8	<i>Calophyllum</i>	Bintangor laut	Guttiferae	Tree	LC
CT3	9	<i>Casuarina equisetifolia</i>	Ru pantai	Casuarinaceae	Tree	LC
CT3	10	<i>Hopea odorata</i>	Merawan siput	Dipterocarpaceae	Tree	LC
CT3	11	<i>Nephelium lappaceum</i>	Rambutan	Sapindaceae	Tree	LC
CT3	12	<i>Endospermum</i>	Sesenduk	Euphorbiaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT3 (Kawasan pamah berpasir)



Kawasan belukar di bekas teres getah



Kawasan belukar



Kawasan belukar



Kawasan belukar

STUDY SITE : Point CT4

Kawasan pamah berpasir berhampiran tasik
Kawasan ini di penuhi Pokok Akasia

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT4	1	Mallotus paniculatus	Balik angin	Euphorbiaceae	12.1	4	TREE	LC
CT4	2	Melicope lunakenda	Tenggek burung	Rutaceae	16.5	6	TREE	LC
CT4	3	Acacia mangium	Akasia	Fabaceae	24.8	12	TREE	LC
CT4	4	Acacia mangium	Akasia	Fabaceae	16.5	8	TREE	LC
CT4	5	Peltophorum pterocarpum	Jemerlang	Fabaceae	11.0	5	TREE	LC
CT4	6	Acacia mangium	Akasia	Fabaceae	11.5	3	TREE	LC
CT4	7	Acacia mangium	Akasia	Fabaceae	10.0	2.5	TREE	LC
CT4	8	Acacia mangium	Akasia	Fabaceae	18.6	8	TREE	LC
CT4	9	Acacia mangium	Akasia	Fabaceae	20.1	3	TREE	LC
CT4	10	Acacia mangium	Akasia	Fabaceae	44.2	8	TREE	LC
CT4	11	Acacia mangium	Akasia	Fabaceae	21.1	8	TREE	LC
CT4	12	Acacia mangium	Akasia	Fabaceae	19.4	9	TREE	LC
CT4	13	Acacia mangium	Akasia	Fabaceae	10.5	4	TREE	LC
CT4	14	Acacia mangium	Akasia	Fabaceae	21.2	12	TREE	LC
CT4	15	Acacia mangium	Akasia	Fabaceae	22.2	8	TREE	LC
CT4	16	Acacia mangium	Akasia	Fabaceae	33.5	6	TREE	LC
CT4	17	Acacia mangium	Akasia	Fabaceae	16.6	5	TREE	LC
CT4	18	Acacia mangium	Akasia	Fabaceae	29.9	6	TREE	LC
CT4	19	Acacia mangium	Akasia	Fabaceae	12.3	6	TREE	LC
CT4	20	Acacia mangium	Akasia	Fabaceae	21.1	8	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT4	1	Pyrrosia piloselloides	Paku ribūribu	Polypodiaceae	Ferns
CT4	2	Stenochlaena palustris	Paku miding	Blechnaceae	Ferns
CT4	3	Solanum torvum	Terong pipit	Solanaceae	Herbs
CT4	4	Mikania cordata	Selaput tunggul	Compositae	Herbs
CT4	5	Oldenlandia auricularia	Rumputtelur belangkas	Rubiaceae	Herbs
CT4	6	Chromolaena odorata	Rumput kapalterbang	Compositae	Herbs
CT4	7	Melastoma malabathricum	Senduduk	Melastomataceae	Herbs

CT4	8	Hedyotis verticillata	Rumput butang	Rubiaceae	Herbs
CT4	9	Phyllanthus amarus	Dukung anak	Phyllanthaceae	Herbs
CT4	10	Dicranopteris linearis	Resam	Gleicheniaceae	Ferns
CT4	11	Mimosa pudica	Semalu renek	Leguminosae	Herbs
CT4	12	Lantana camara	Bunga tahi ayam	Melastomataceae	Herbs
CT4	13	Passiflora foetida	Akar letupetup	Passifloraceae	Climbers
CT4	14	Asplenium musifolium	Paku langsuir	Aspleniaceae	Ferns
CT4	15	Piper sarmentosum	Pokok kaduk	Piperaceae	Herbs

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIS
CT4	1	Syzygium myrtillifolium	Kelat paya	Myrtaceae	Tree	LC
CT4	2	Melicope lunakenda	Tenggek burung	Rutaceae	Tree	LC
CT4	3	Vitex pinnata	Leban	Verbenaceae	Tree	LC
CT4	4	Dillenia suffruticosa	Simpoh air	Dilleniaceae	Tree	LC
CT4	5	Mallotus paniculatus	Balik angin	Euohorbiaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT 4



Kawasan pamah berpasir

Bunga Tahi ayam



Kawasan denai buluh berhampiran

Pokok Kadok

STUDY SITE : Point CT5

- Kawasan pamah berpasir
- Kawasan di tambak tanah untuk tanaman pilihan

Senarai pokok-pokok yang di banci di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT5	1	Acacia mangium	Akasia	Fabaceae	32.2	10	TREE	LC
CT5	2	Eucalyptus sp.	Eucalyptus	Myrtaceae	20.0	21	TREE	LC
CT5	3	Eucalyptus sp.	Eucalyptus	Myrtaceae	11.2	7	TREE	LC
CT5	4	Alstonia angustiloba	Pulai	Apocynaceae	13.0	5	TREE	LC
CT5	5	Acacia mangium	Akasia	Fabaceae	27.2	8	TREE	LC
CT5	6	Acacia mangium	Akasia	Fabaceae	16.2	4	TREE	LC
CT5	7	Acacia mangium	Akasia	Fabaceae	17.8	7	TREE	LC
CT5	8	Acacia mangium	Akasia	Fabaceae	25.4	18	TREE	LC
CT5	9	Eriglossum rubiginosum	Mertajam	Sapindaceae	11.3	2.5	TREE	LC
CT5	10	Acacia mangium	Akasia	Fabaceae	35.4	7	TREE	LC
CT5	11	Acacia mangium	Akasia	Fabaceae	23.8	6	TREE	LC
CT5	12	Eucalyptus sp.	Eucalyptus	Myrtaceae	13.2	13	TREE	LC
CT5	13	Alstonia angustiloba	Pulai	Apocynaceae	11.5	4.5	TREE	LC
CT5	14	Acacia mangium	Akasia	Fabaceae	10.1	7	TREE	LC
CT5	15	Alstonia angustiloba	Pulai	Apocynaceae	10.5	5	TREE	LC
CT5	16	Alstonia angustiloba	Pulai	Apocynaceae	10.2	5	TREE	LC
CT5	17	Eucalyptus sp.	Eucalyptus	Myrtaceae	17.5	13	TREE	LC
CT5	18	Melaleuca cajuputi	Gelam	Myrtaceae	14.4	6	TREE	LC
CT5	19	Alstonia angustiloba	Pulai	Apocynaceae	15.6	6	TREE	LC
CT5	20	Eucalyptus sp.	Eucalyptus	Myrtaceae	18.3	18	TREE	LC
CT5	21	Melaleuca cajuputi	Gelam	Myrtaceae	11.2	8	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT5	1	Phyllanthus amarus	Dukung anak	Phyllanthaceae	Herbs
CT5	2	Chromolaena odorata	Rumput kapalterbang	Compositae	Herbs
CT5	3	Polystichum munitum	Paku pedang	Dryopteridaceae	Ferns
CT5	4	Solanum torvum	Terong pipit	Solanaceae	Herbs
CT5	5	Clidemia hirta	Senduduk bulu	Melastomataceae	Herbs
CT5	6	Aglaomorpha quercifolia	Paku sakat	Polypodiaceae	Ferns
CT5	7	Pyrrosia piloselloides	Paku riburibu	Polypodiaceae	Ferns

CT5	8	<i>Passiflora foetida</i>	Akar letupetup	Passifloraceae	Climbers
CT5	9	<i>Ischaemum muticum</i>	Rumput lipan pasir	Poaceae	Herbs
CT5	10	<i>Hedyotis verticillata</i>	Rumput butang	Rubiaceae	Herbs
CT5	11	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT5	12	<i>Oldenlandia auricularia</i>	Rumput telur belangka	Rubiaceae	Herbs

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIS
CT5	1	<i>Averrhoa carambola</i>	Belimbing besi	Oxalidaceae	Tree	LC
CT5	2	<i>Azadirachtæxcelsa</i>	Sentang	Meliaceae	Tree	LC
CT5	3	<i>Hopea odorata</i>	Merawan siput	Dipterocarpaceae	Tree	LC
CT5	4	<i>Mallotus paniculatus</i>	Balik angin	Euohorbiaceae	Tree	LC
CT5	5	<i>Vitex pinnata</i>	Leban	Verbenaceae	Tree	LC
CT5	6	<i>Cinnamomum iners</i>	Medang teja	Lauraceae	Tree	LC
CT5	7	<i>Peltophorum</i>	Jemerlang	Fabaceae	Tree	LC
CT5	8	<i>Eriglossum</i>	Mertajam	Sapindaceae	Tree	LC
CT5	9	<i>Dillenia suffruticosa</i>	Simpoh air	Dilleniaceae	Tree	LC
CT5	10	<i>Melicope lunakenda</i>	Tenggek burung	Rutaceae	Tree	LC
CT5	11	<i>Hibiscus macrophyllus</i>	Tutor	Malvaceae	Tree	LC
CT5	12	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	Tree	LC
CT5	13	<i>Endospermum</i>	Sesenduk	Euphorbiaceae	Tree	LC
CT5	14	<i>Eurycoma longifolia</i>	Tongkat ali	Simarubiaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT5



Kawasan tambakan tanah



Pokok Eucalyptus



Pokok Tongkat Ali



Kawasan pokok buah-buahan

STUDY SITE : Point CT6

Kawasan pamah berpasir di tumbuh di pokok Akasia
Kawasan Kebun kelapa sawit lama

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT6	1	Acacia mangium	Akasia	Fabaceae	18.1	9	TREE	LC
CT6	2	Acacia mangium	Akasia	Fabaceae	39.1	11	TREE	LC
CT6	3	Acacia mangium	Akasia	Fabaceae	23.5	6	TREE	LC
CT6	4	Acacia mangium	Akasia	Fabaceae	23.2	2.5	TREE	LC
CT6	5	Acacia mangium	Akasia	Fabaceae	30.8	10	TREE	LC
CT6	6	Elaeis guineensis	Kelapa sawit	Arecaceae	39.5	7	TREE	LC
CT6	7	Acacia mangium	Akasia	Fabaceae	36.3	11	TREE	LC
CT6	8	Acacia mangium	Akasia	Fabaceae	46.7	12	TREE	LC
CT6	9	Acacia mangium	Akasia	Fabaceae	29.6	12	TREE	LC
CT6	10	Acacia mangium	Akasia	Fabaceae	20.0	7	TREE	LC
CT6	11	Elaeis guineensis	Kelapa sawit	Arecaceae	41.2	5	TREE	LC
CT6	12	Acacia mangium	Akasia	Fabaceae	41.6	6	TREE	LC
CT6	13	Acacia mangium	Akasia	Fabaceae	13.2	7	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT6	1	Dicranopteris linearis	Resam	Gleicheniaceae	Ferns
CT6	2	Lygodium microphyllum	Climbing fern	Lygodiaceae	Ferns
CT6	3	Oldenlandia auricularia	Rumput telur belangkap	Rubiaceae	Herbs
CT6	4	Stenochlaena palustris	Paku midng	Blechnaceae	Ferns
CT6	5	Clidemia hirta	Senduduk bulu	Melastomataceae	Herbs
CT6	6	Scleria sumatrensis	Rumput sendayan	Cyperaceae	Herbs
CT6	7	Solanum torvum	Terong pipit	Solanaceae	Herbs
CT6	8	Chromolaena odorata	Rumput kapal terbang	Compositae	Herbs
CT6	9	Passiflora foetida	Akar letup letup	Passifloraceae	Climbers
CT6	10	Melothria pendula	Akar timun	Cucurbitaceae	Climbers

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIS
CT6	1	<i>Alstonia scholaris</i>	Pulai	Apocynaceae	Tree	LC
CT6	2	<i>Peltoporum</i>	Jemerlang	Fabaceae	Tree	LC
CT6	3	<i>Melicope lunakenda</i>	Tenggek burung	Rutaceae	Tree	LC
CT6	4	<i>Mallotus paniculatus</i>	Balik angin	Euohorbiaceae	Tree	LC
CT6	5	<i>Fagraea fragrans</i>	Tembusupadang	Loganaceae	Tree	LC
CT6	6	<i>Vitex pinnata</i>	Leban	Verbenaceae	Tree	LC
CT6	7	<i>Alstonia</i>	Pulai basong	Apocynaceae	Tree	LC
CT6	8	<i>Lagerstroemia speciosa</i>	Bungor	Lythraceae	Tree	LC
CT6	9	<i>Cinnamomum iners</i>	Medang teja	Lauraceae	Tree	LC
CT6	10	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	Tree	LC
CT6	11	<i>Dillenia suffruticosa</i>	Simpoh air	Dilleniaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT6



Kawasan Kebun sawit lama



Dirian pokok Akasia



STUDY SITE : Point CT7

- Kawasan pamah berpasir berumput
- Kawasan di dominasi oleh Pokok Akasia

Senarai pokok-pokok yang di banci di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT7	1	Acacia mangium	Akasia	Fabaceae	10.1	8	TREE	LC
CT7	2	Acacia mangium	Akasia	Fabaceae	13.8	9	TREE	LC
CT7	3	Acacia mangium	Akasia	Fabaceae	11.2	7	TREE	LC
CT7	4	Acacia mangium	Akasia	Fabaceae	21.0	10	TREE	LC
CT7	5	Acacia mangium	Akasia	Fabaceae	12.2	2.5	TREE	LC
CT7	6	Acacia mangium	Akasia	Fabaceae	12.9	6	TREE	LC
CT7	7	Acacia mangium	Akasia	Fabaceae	12.0	7	TREE	LC
CT7	8	Acacia mangium	Akasia	Fabaceae	10.2	8	TREE	LC
CT7	9	Acacia mangium	Akasia	Fabaceae	13.5	3	TREE	LC
CT7	10	Acacia mangium	Akasia	Fabaceae	11.4	5	TREE	LC
CT7	11	Acacia mangium	Akasia	Fabaceae	18.8	8	TREE	LC
CT7	12	Acacia mangium	Akasia	Fabaceae	16.7	6	TREE	LC
CT7	13	Acacia mangium	Akasia	Fabaceae	11.8	7	TREE	LC
CT7	14	Acacia mangium	Akasia	Fabaceae	15.8	12	TREE	LC
CT7	15	Acacia mangium	Akasia	Fabaceae	22.5	16	TREE	LC
CT7	16	Acacia mangium	Akasia	Fabaceae	13.9	8	TREE	LC
CT7	17	Acacia mangium	Akasia	Fabaceae	15.5	12	TREE	LC
CT7	18	Acacia mangium	Akasia	Fabaceae	11.4	3	TREE	LC
CT7	19	Acacia mangium	Akasia	Fabaceae	11.5	8	TREE	LC
CT7	20	Acacia mangium	Akasia	Fabaceae	20.4	10	TREE	LC
CT7	21	Acacia mangium	Akasia	Fabaceae	10.3	6	TREE	LC
CT7	22	Acacia mangium	Akasia	Fabaceae	18.2	7	TREE	LC
CT7	23	Acacia mangium	Akasia	Fabaceae	14.2	10	TREE	LC
CT7	24	Acacia mangium	Akasia	Fabaceae	16.2	8	TREE	LC
CT7	25	Acacia mangium	Akasia	Fabaceae	25.5	12	TREE	LC
CT7	26	Acacia mangium	Akasia	Fabaceae	11.1	8	TREE	LC
CT7	27	Acacia mangium	Akasia	Fabaceae	27.0	15	TREE	LC
CT7	28	Acacia mangium	Akasia	Fabaceae	12.8	8	TREE	LC
CT7	29	Acacia mangium	Akasia	Fabaceae	15.2	10	TREE	LC
CT7	30	Acaciamangium	Akasia	Fabaceae	11.1	8	TREE	LC
CT7	31	Acacia mangium	Akasia	Fabaceae	14.9	12	TREE	LC
CT7	32	Acacia mangium	Akasia	Fabaceae	11.4	6	TREE	LC
CT7	33	Acacia mangium	Akasia	Fabaceae	13.0	8	TREE	LC
CT7	34	Acacia mangium	Akasia	Fabaceae	10.8	6	TREE	LC

CT7	35	Acacia mangium	Akasia	Fabaceae	11.7	8	TREE	LC
CT7	36	Acacia mangium	Akasia	Fabaceae	10.5	8	TREE	LC
CT7	37	Acacia mangium	Akasia	Fabaceae	16.4	8	TREE	LC
CT7	38	Acacia mangium	Akasia	Fabaceae	17.0	10	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT7	1	Stachytarpheta indica	rumput ekor ular	Verbenaceae	Herbs
CT7	2	Dicranopteris linearis	Resam	Gleicheniaceae	Ferns
CT7	3	Chromolaena odorata	Rumput kapal terbang	Compositae	Herbs
CT7	4	Ardisia crenata	Mata pelandok	Myrsinaceae	Herbs
CT7	5	Stenochlaena palustris	Paku miding	Blechnaceae	Ferns
CT7	6	Pyrrosia piloselloides	Paku sisik naga	Polypodiaceae	Ferns
CT7	7	Melothria pendula	Akar timun	Cucurbitaceae	Climbers
CT7	8	Ficus chartacea	Ara buah kuning	Moraceae	Herbs
CT7	9	Solanum torvum	Terong pipit	Solanaceae	Herbs
CT7	10	Hedyotis verticillata	Rumput butang	Rubiaceae	Herbs
CT7	11	Mimosa pudica	Semalu renek	Leguminosae	Herbs
CT7	12	Hedyotis verticillata	Rumput butang	Rubiaceae	Herbs
CT7	13	Melastoma malabathricum	Senduduk	Melastomataceae	Herbs
CT7	14	Ischaemum muticum	Rumput lipan pasir	Poaceae	Herbs

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
CT7	1	Melicope lunakenda	Tenggek burung	Rutaceae	Tree	LC
CT7	2	Macaranga gigantea	Mahang gajah	Euphorbiaceae	Tree	LC
CT7	3	Mallotus paniculatus	Balik angin	Euphorbiaceae	Tree	LC
CT7	4	Ficus spp.	Ara	Moraceae	Tree	LC
CT7	5	Alstonia scholaris	Pulai	Apocynaceae	Tree	LC
CT7	6	Vitex pinnata	Leban	Verbenaceae	Tree	LC
CT7	7	Dillenia suffruticosa	Simpoh air	Dilleniaceae	Tree	LC
CT7	8	Trema angustifolia	Mengkirai	Ulmaceae	Tree	LC
CT7	9	Syzygium myrtifolium	Kelat paya	Myrtaceae	Tree	LC
CT7	10	Syzygium filiforme	Kelat 2	Myrtaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT7



Kawasan pamah berpasir



Pokok Akasia



Pokok Mata pelandok



Kawasan ditutupi (*Ischaemum muticum*) Rumput

STUDY SITE : Point CT8

Kawasan pamah berpasir di tumbuh di pokok Akasia
Kawasan Kebun kelapa sawit lama

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT8	1	Acacia mangium	Akasia	Fabaceae	12.2	4	TREE	LC
CT8	2	Acacia mangium	Akasia	Fabaceae	25.4	12	TREE	LC
CT8	3	Acacia mangium	Akasia	Fabaceae	15.3	7	TREE	LC
CT8	4	Acacia mangium	Akasia	Fabaceae	18.2	8	TREE	LC
CT8	5	Acacia mangium	Akasia	Fabaceae	27.7	4	TREE	LC
CT8	6	Acacia mangium	Akasia	Fabaceae	12.2	7	TREE	LC
CT8	7	Acacia mangium	Akasia	Fabaceae	20.2	4	TREE	LC
CT8	8	Acacia mangium	Akasia	Fabaceae	20.3	8	TREE	LC
CT8	9	Acacia mangium	Akasia	Fabaceae	15.4	2	TREE	LC
CT8	10	Acacia mangium	Akasia	Fabaceae	15.2	2	TREE	LC
CT8	11	Acacia mangium	Akasia	Fabaceae	30.1	18	TREE	LC
CT8	12	Acacia mangium	Akasia	Fabaceae	24.4	5	TREE	LC
CT8	13	Acacia mangium	Akasia	Fabaceae	13.2	5	TREE	LC
CT8	14	Acacia mangium	Akasia	Fabaceae	26.2	7	TREE	LC
CT8	15	Acacia mangium	Akasia	Fabaceae	20.0	12	TREE	LC
CT8	16	Acacia mangium	Akasia	Fabaceae	21.2	12	TREE	LC
CT8	17	Acacia mangium	Akasia	Fabaceae	16.1	7	TREE	LC
CT8	18	Acacia mangium	Akasia	Fabaceae	24.4	8	TREE	LC
CT8	19	Acacia mangium	Akasia	Fabaceae	12.2	5	TREE	LC
CT8	20	Acacia mangium	Akasia	Fabaceae	12.4	5	TREE	LC
CT8	21	Acacia mangium	Akasia	Fabaceae	26.3	12	TREE	LC
CT8	22	Acacia mangium	Akasia	Fabaceae	14.9	3	TREE	LC
CT8	23	Acacia mangium	Akasia	Fabaceae	17.1	2	TREE	LC
CT8	24	Acacia mangium	Akasia	Fabaceae	16.5	8	TREE	LC
CT8	25	Acacia mangium	Akasia	Fabaceae	13.2	8	TREE	LC
CT8	26	Acacia mangium	Akasia	Fabaceae	20.8	2	TREE	LC
CT8	27	Acacia mangium	Akasia	Fabaceae	11.9	5	TREE	LC
CT8	28	Acacia mangium	Akasia	Fabaceae	21.5	6	TREE	LC
CT8	29	Acacia mangium	Akasia	Fabaceae	16.8	12	TREE	LC
CT8	30	Acacia mangium	Akasia	Fabaceae	13.4	7	TREE	LC
CT8	31	Acacia mangium	Akasia	Fabaceae	11.5	3	TREE	LC
CT8	32	Elaeis guineensis	Kelapasawit	Arecaceae	44.2	6	TREE	LC
CT8	33	Acacia mangium	Akasia	Fabaceae	40.0	8	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT8	1	<i>Chromolaena odorata</i>	Rumput kapalterbang	Compositae	Herbs
CT8	2	<i>Oldenlandia auricularia</i>	Rumput telur belangkas	Rubiaceae	Herbs
CT8	3	<i>Mimosa pudica</i>	Semalu renek	Leguminosae	Herbs
CT8	4	<i>Stachytarpheta indica</i>	Rumput ekor ular	Verbenaceae	Herbs
CT8	5	<i>Hedyotis verticillata</i>	Rumput butang	Rubiaceae	Herbs
CT8	6	<i>Solanum torvum</i>	Terong pipit	Solanaceae	Herbs
CT8	7	<i>Acrostichum speciosum</i>	Piai	Dennstaedtiaceae	Ferns
CT8	8	<i>Hedyotis verticillata</i>	Rumput butang	Rubiaceae	Herbs
CT8	9	<i>Scleria sumatrensis</i>	Rumput sendayan	Cyperaceae	Herbs
CT8	10	<i>Polystichum munitum</i>	Paku pedang	Dryopteridaceae	Ferns
CT8	11	<i>Melothria pendula</i>	Akar timun	Cucurbitaceae	Climbers
CT8	12	<i>Pyrrosia piloselloides</i>	Paku sisik naga	Polypodiaceae	Ferns
CT8	13	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT8	14	<i>Lantana camara</i>	Bunga tahi ayam	Melastomataceae	Herbs
CT8	15	<i>Passiflora foetida</i>	Akar letupetup	Passifloraceae	Climbers
CT8	16	<i>Mikania cordata</i>	Selaput tunggul	Compositae	Climbers
CT8	17	<i>Pyrrosia longifolia</i>	Paku jejari	Polypodiaceae	Ferns
CT8	18	<i>Pennisetum purpureum</i>	Rumput gajah	Poaceae	Herbs

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
CT8	1	<i>Melicope lunakenda</i>	Tenggek burung	Rutaceae	Tree	LC
CT8	2	<i>Mallotus paniculatus</i>	Balik angin	Euohorbiaceae	Tree	LC
CT8	3	<i>Fagraea fragans</i>	Tembusu padang	Loganiaceae	Tree	LC
CT8	4	<i>Cinnamomum iners</i>	Medang teja	Lauraceae	Tree	LC
CT8	5	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	Tree	LC
CT8	6	<i>Trema angustifolia</i>	Mengkirai	Ulmaceae	Tree	LC
CT8	7	<i>Syzygium filiforme</i>	Kelat 2	Myrtaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT8



Kawasan pamah berpasir



Dirian pokok Akasia



Bamboo



Rumput ekor ular

STUDY SITE : Point CT9

- Kawasan pamah berhampiran jalan
- Kawasan ditanami species komersial

Senarai pokok-pokok yang di banci di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT9	1	Pomettia pinnata	Kasai	Sapindaceae	16.6	6	TREE	LC
CT9	2	Garcinia atroviridis	Asam gelugur	Guttiferae	21.2	11	TREE	LC
CT9	3	Shorea roxburghii	Meranti temak nipis	Dipterocarpaceae	13.8	14	TREE	LC
CT9	4	Dillenia reticulata	Simpoh gajah	Dilleniaceae	21.5	16	TREE	LC
CT9	5	Pentaspadon motleyi	Pelonglicin	Anacardiaceae	25.8	12	TREE	LC
CT9	6	Artocarpus lanceifolius	Keledang keledang	Moraceae	26.7	10	TREE	LC
CT9	7	Shorea roxburghii	Meranti temak nipis	Dipterocarpaceae	17.8	12	TREE	LC
CT9	8	Shorea roxburghii	Meranti temak nipis	Dipterocarpaceae	25.8	12	TREE	LC
CT9	9	Koompassia malaccens	Kempas	Fabaceae	20.8	8	TREE	LC
CT9	10	Koompassia malaccens	Kempas	Fabaceae	20.7	10	TREE	LC
CT9	11	Dillenia reticulata	Simpoh gajah	Dilleniaceae	30.3	22	TREE	LC
CT9	12	Shorea roxburghii	Meranti temak nipis	Dipterocarpaceae	25.8	15	TREE	LC
CT9	13	Terminalia phellocarpa	Jelawai mempelam babi	Combretaceae	52.4	16	TREE	LC
CT9	14	Sterculia parvifolia	Kelumpang burung	Sterculiaceae	27.0	8	TREE	LC
CT9	15	Pomettia pinnata	Kasai	Sapindaceae	21.7	8	TREE	LC
CT9	16	Dillenia reticulata	Simpoh gajah	Dilleniaceae	28.5	18	TREE	LC
CT9	17	Acacia mangium	Akasia	Fabaceae	20.7	8	TREE	LC
CT9	18	Acacia mangium	Akasia	Fabaceae	24.2	10	TREE	LC
CT9	19	Acacia mangium	Akasia	Fabaceae	13.2	8	TREE	LC
CT9	20	Acacia mangium	Akasia	Fabaceae	18.5	8	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT9	1	Stenochlaena palustris	Paku miding	Blechnaceae	Ferns
CT9	2	Scleria sumatrensis	Rumput sendayan	Cyperaceae	Herbs
CT9	3	Oldenlandia auricularia	Rumput telur belangka	Rubiaceae	Herbs

CT9	4	Clidemia hirta	Senduduk bulu	Melastomataceae	Herbs
CT9	5	Solanum torvum	Terong pipit	Solanaceae	Herbs
CT9	6	Pyrrosia piloselloides	Paku sisik naga	Polypodiaceae	Ferns

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
CT9	1	Vitex pinnata	Leban	Verbenaceae	Tree	LC
CT9	2	Melicope lunakenda	Tenggek burung	Rutaceae	Tree	LC
CT9	3	Syzygium grande	Kelat jambu	Myrtaceae	Tree	LC
CT9	4	Sindora coriacea	Sepetir licin	Fabaceae	Tree	LC
CT9	5	Sindora coriacea	Sepetir licin	Fabaceae	Tree	LC
CT9	6	Mallotus paniculatus	Balik angin	Euohorbiaceae	Tree	LC
CT9	7	Cinnamomum iners	Medang teja	Lauraceae	Tree	LC
CT9	8	Ficus benjamina	Ara waringin	Moraceae	Tree	LC
CT9	9	Shorea materialis	Balau pasir	Dipterocarpaceae	Tree	VU
CT9	10	Peltophorum	Jemerlang	Fabaceae	Tree	LC
CT9	11	Syzygium polyanthum	Salam	Myrtaceae	Tree	LC
CT9	12	Syzygium myrtifolium	Kelat paya	Myrtaceae	Tree	LC
CT9	13	Syzygium filiforme	Kelat	Myrtaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT9



Pokok-pokok komersial yang baru ditanam

Pokok Pulai



Anak pokok Pelong licin

STUDY SITE : Point CT10

Kawasan pamah berpasir di tumbuh di pokok Akasia
Berhampiran tasik

PT NO	NO	SPECIES	LOCALNAME	FAMILY	DBH	HT	REMARKS	ICUN RED LIST
CT10	1	Acacia mangium	Akasia	Fabaceae	13.2	8	TREE	LC
CT10	2	Acacia mangium	Akasia	Fabaceae	20.8	8	TREE	LC
CT10	3	Acacia mangium	Akasia	Fabaceae	19.0	8	TREE	LC
CT10	4	Acacia mangium	Akasia	Fabaceae	28.2	8	TREE	LC
CT10	5	Melaleuca cajuputi	Gelam	Myrtaceae	14.1	8	TREE	LC
CT10	6	Melaleuca cajuputi	Gelam	Myrtaceae	24.5	12	TREE	LC
CT10	7	Melaleuca cajuputi	Gelam	Myrtaceae	16.2	3	TREE	LC
CT10	8	Acacia mangium	Akasia	Fabaceae	29.3	8	TREE	LC
CT10	9	Melaleuca cajuputi	Gelam	Myrtaceae	16.3	5	TREE	LC
CT10	10	Acacia mangium	Akasia	Fabaceae	12.3	3	TREE	LC
CT10	11	Melaleuca cajuputi	Gelam	Myrtaceae	26.2	5	TREE	LC
CT10	12	Melaleuca cajuputi	Gelam	Myrtaceae	22.4	8	TREE	LC
CT10	13	Acacia mangium	Akasia	Fabaceae	14.3	6	TREE	LC
CT10	14	Melaleuca cajuputi	Gelam	Myrtaceae	26.5	8	TREE	LC
CT10	15	Melaleuca cajuputi	Gelam	Myrtaceae	25.5	8	TREE	LC
CT10	16	Acacia mangium	Akasia	Fabaceae	16.9	5	TREE	LC
CT10	17	Acacia mangium	Akasia	Fabaceae	11.8	5	TREE	LC
CT10	18	Acacia mangium	Akasia	Fabaceae	23.3	7	TREE	LC
CT10	19	Acacia mangium	Akasia	Fabaceae	18.2	6	TREE	LC
CT10	20	Melaleuca cajuputi	Gelam	Myrtaceae	17.1	2	TREE	LC
CT10	21	Melaleuca cajuputi	Gelam	Myrtaceae	13.6	2	TREE	LC
CT10	22	Acacia mangium	Akasia	Fabaceae	10.8	1.8	TREE	LC
CT10	23	Melaleuca cajuputi	Gelam	Myrtaceae	18.5	9	TREE	LC
CT10	24	Melaleuca cajuputi	Gelam	Myrtaceae	21.0	10	TREE	LC
CT10	25	Melaleuca cajuputi	Gelam	Myrtaceae	18.0	8	TREE	LC
CT10	26	Acacia mangium	Akasia	Fabaceae	20.2	7	TREE	LC
CT10	27	Melaleuca cajuputi	Gelam	Myrtaceae	22.3	5	TREE	LC

Senarai spesies non-timber yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS
CT10	1	<i>Chromolaena odorata</i>	Rumput kapalterbang	Compositae	Herbs
CT10	2	<i>Caryota mitis</i>	Tukas	Palmae	Palm
CT10	3	<i>Melothria pendula</i>	Akar timun	Cucurbitaceae	Climbers
CT10	4	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT10	5	<i>Pyrrosia piloselloides</i>	Paku sisik naga	Polypodiaceae	Ferns
CT10	6	<i>Scleria sumatrensis</i>	Rumput sendayan	Cyperaceae	Herbs
CT10	7	<i>Stenochlaena palustris</i>	Paku miding	Blechnaceae	Ferns
CT10	8	<i>Lepironia articulate</i>	Rumput keruncut	Cyperaceae	Herbs

Senarai spesies lain yang di jumpai di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
CT10	1	<i>Vitex pinnata</i>	Leban	Verbenaceae	Tree	LC
CT10	2	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	Tree	LC

- Pemandangan dalam kawasan kajian
- Point CT8



Kawasan pamah berpasir



Dirian pokok Gelam



Pokok gelam di tengah tasik



Dirian Gelam & Akasia

STUDY SITE : AEON HILL

- Kawasan pamah berhampiran jalan
- Kawasan ditanam pelbagai species komersial

Senarai pokok-pokok yang di ditemui di kawasan ini.

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
AEON HILL	1	<i>Citrus microcarpa</i>	Limau kasturi	Rutaceae	TREE	LC
AEON HILL	2	<i>Averrhoa carambola</i>	Belimbing besi	Oxalidaceae	TREE	LC
AEON HILL	3	<i>Diospyros blancoi</i>	Mentega	Ebenaceae	TREE	LC
AEON HILL	4	<i>Mangifera indica</i>	Mangga	Anacardiaceae	TREE	LC
AEON HILL	5	<i>Manilkara zapota</i>	Ciku	Sapotaceae	TREE	LC
AEON HILL	6	<i>Mangifera odorata</i>	Mangga kuini	Anacardiaceae	TREE	LC
AEON HILL	7	<i>Artocarpus integer</i>	Cempedak	Moraceae	TREE	LC
AEON HILL	8	<i>Coffea arabica</i>	Pokok kopi	Rubiaceae	TREE	LC
AEON HILL	9	<i>Mangifera indica</i>	Mangga telur	Anacardiaceae	TREE	LC
AEON HILL	10	<i>Nephelium lappaceum</i>	Rambutan	Sapindaceae	TREE	LC
AEON HILL	11	<i>Syzygium aqua</i>	Jambu air	Myrtaceae	TREE	LC
AEON HILL	12	<i>Lagerstroemia speciosa</i>	Bungor	Lythraceae	TREE	LC
AEON HILL	13	<i>Tamarindus indica</i>	Asam jawa	Fabaceae	TREE	LC
AEON HILL	14	<i>Acacia mangium</i>	Akasia	Fabaceae	TREE	LC
AEON HILL	15	<i>Cratogeomys formosum</i>	Geronggang	Guttiferae	TREE	LC
AEON HILL	16	<i>Azadirachta excelsa</i>	Sentang	Meliaceae	TREE	LC
AEON HILL	17	<i>Melaleuca cajuputi</i>	Gelam	Myrtaceae	TREE	LC
AEON HILL	18	<i>Mimusops elengi</i>	Bunga tanjung	Sapotaceae	TREE	LC
AEON HILL	19	<i>Calophyllum inophyllum</i>	Bintangor laut	Guttiferae	TREE	LC
AEON HILL	20	<i>Peltoporum pterocarpum</i>	Jemerlang	Fabaceae	TREE	LC
AEON HILL	21	<i>Melicope lunu-akenda</i>	Tenggek burung	Rutaceae	TREE	LC
AEON HILL	22	<i>Eurycoma longifolia</i>	Tongkat ali	Simarubiaceae	TREE	LC
AEON HILL	23	<i>Ardisia elliptica</i>	Mata pelanduk	Primulaceae	TREE	LC
AEON HILL	24	<i>Eucalyptus sp.</i>	Eucalyptus	Myrtaceae	TREE	LC
AEON HILL	25	<i>Syzygium grande</i>	Kelat jambu	Myrtaceae	TREE	LC
AEON HILL	26	<i>Eriglossum rubiginosum</i>	Mertajam	Sapindaceae	TREE	LC
AEON HILL	27	<i>Nephelium sp.</i>	Rambutan hutan	Sapindaceae	TREE	LC
AEON HILL	28	<i>Morinda elliptica</i>	Mengkudu	Rubiaceae	TREE	LC
AEON HILL	29	<i>Pterocarpus indicus</i>	Angsana	Fabaceae	TREE	LC
AEON HILL	30	<i>Licuala spinosa</i>	Palas	Palmae	TREE	LC
AEON HILL	31	<i>Dipterocarpus sp.</i>	Keruing	Dipterocarpaceae	TREE	LC
AEON HILL	32	<i>Sandoricum koetjape</i>	Sentul	Meliaceae	TREE	LC
AEON HILL	33	<i>Anacardium occidentale</i>	Gajus	Anacardiaceae	TREE	LC
AEON HILL	34	<i>Averrhoa bilimbi</i>	Belimbing buluh	Oxalidaceae	TREE	LC

AEON HILL	35	<i>Saraca sp.</i>	Gapis	Fabaceae	TREE	LC
AEON HILL	36	<i>Xanthostemon chrysanthus</i>	Kelat bunga kunin	Myrtaceae	TREE	LC

STUDY SITE : TTC

- Kawasan tanaman di sepanjang jalan

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
TTC	1	<i>Peltophorum pterocarpum</i>	Jemerlang	Fabaceae	TREE	LC
TTC	2	<i>Pentaspadon motleyi</i>	Pelong licin	Anacardiaceae	TREE	LC
TTC	3	<i>Cinnamomum iners</i>	Medang teja	Lauraceae	TREE	LC
TTC	4	<i>Croton argyratus</i>	Hujan panas	Euohorbiaceae	TREE	LC
TTC	5	<i>Sterculia parvifolia</i>	Kelumpang burung	Sterculiaceae	TREE	LC
TTC	6	<i>Garcinia bancana</i>	Beruas	Guttiferae	TREE	LC
TTC	7	<i>Vitex pinnata</i>	Leban	Verbenaceae	TREE	LC
TTC	8	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	TREE	LC
TTC	9	<i>Ficus benjamina</i>	Ara waringin	Moraceae	TREE	LC
TTC	10	<i>Mangifera indica</i>	Mangga	Anacardiaceae	TREE	LC
TTC	11	<i>Heritiera javanica</i>	Mengkulang jari	Malvaceae	TREE	LC
TTC	12	<i>Dillenia reticulata</i>	Simpoh gajah	Dilleniaceae	TREE	LC
TTC	13	<i>Syzygium grande</i>	Kelat jambu	Myrtaceae	TREE	LC
TTC	14	<i>Syzygium jambos</i>	Jambu mawar	Myrtaceae	TREE	LC
TTC	15	<i>Mimusops elengi</i>	Bunga tanjung	Sapotaceae	TREE	LC
TTC	16	<i>Eriglossum rubiginosum</i>	Mertajam	Sapindaceae	TREE	LC
TTC	17	<i>Sindora coriacea</i>	Sepetir daun licin	Fabaceae	TREE	LC
TTC	18	<i>Dryobalanops aromatica</i>	Kapur	Dipterocarpaceae	TREE	LC
TTC	19	<i>Lithocarpus sp</i>	Mempening	Fagaceae	TREE	LC
TTC	20	<i>Garcinia atroviridis</i>	Asam gelugur	Guttiferae	TREE	LC
TTC	21	<i>Shorea roxburghii</i>	Meranti temak nipis	Dipterocarpaceae	TREE	LC
TTC	22	<i>Nephelium lappaceum</i>	Rambutan	Sapindaceae	TREE	LC
TTC	23	<i>Syzygium polyanthum</i>	Salam	Myrtaceae	TREE	LC
TTC	24	<i>Elaeocarpus petiolatus</i>	Mendong	Elaeocarpaceae	TREE	LC
TTC	25	<i>Elateriospermum tapos</i>	Perah	Elaeocarpaceae	TREE	LC
TTC	26	<i>Dipterocarpus sp.</i>	Keruing	Dipterocarpaceae	TREE	LC
TTC	27	<i>Cratoxylum formosum</i>	Geronggang	Guttiferae	TREE	LC
TTC	28	<i>Dacryodes rostrata</i>	Kedondong senggeh	Burseraceae	TREE	LC
TTC	29	<i>Pomettia pinnata</i>	Kasai	Sapindaceae	TREE	LC
TTC	30	<i>Koompassia malaccensis</i>	Kempas	Fabaceae	TREE	LC
TTC	31	<i>Dillenia suffruticosa</i>	Simpoh air	Dilleniaceae	TREE	LC

TTC	32	<i>Barringtonia sp.</i>	Putat	Lecythidaceae	TREE	LC
TTC	33	<i>Callerya artopurpurea</i>	Tulang daing	Fabaceae	TREE	LC
TTC	34	<i>Elaeocarpus floribundus</i>	Mendong	Elaeocarpaceae	TREE	LC
TTC	35	<i>Nephelium sp.</i>	Rambutan hutan	Sapindaceae	TREE	LC
TTC	36	<i>Hopea odorta</i>	Merawan siput jantan	Dipterocarpaceae	TREE	LC
TTC	37	<i>Alstonia scholaris</i>	Pulai	Apocynaceae	TREE	LC
TTC	38	<i>Cananga odorata</i>	Kenanga	Annonaceae	TREE	LC
TTC	39	<i>Ardisia elliptica</i>	Mata pelanduk	Primulaceae	TREE	LC
TTC	40	<i>Dyera costulata</i>	Jelutong	Apocynaceae	TREE	LC
TTC	41	<i>Trevesia burckii</i>	Tapak hantu	Araliaceae	TREE	LC
TTC	42	<i>Melaleuca cajuputi</i>	Gelam	Myrtaceae	TREE	LC
TTC	43	<i>Fagraea crenulata</i>	Tembusu daun besar	Gentianaceae	TREE	LC
TTC	44	<i>Archidendron jiringa</i>	Jering	Fabaceae	TREE	LC
TTC	45	<i>Artocarpus heterophyllus</i>	Nangka	Moraceae	TREE	LC
TTC	46	<i>dipterocarpus oblongifolius</i>	Keruing neram	Dipterocarpaceae	TREE	LC
TTC	47	<i>Tabebuia rosea</i>	Tecoma	Bignoniaceae	TREE	LC
TTC	48	<i>Fagraea fragrans</i>	Tembusu padang	Loganiaceae	TREE	LC
TTC	49	<i>Terminalia phellocarpa</i>	Jelawai mempelam babi	Combretaceae	TREE	LC
TTC	50	<i>Ceiba pentandra</i>	Kekabu	Malvaceae	TREE	LC
TTC	51	<i>Bridelia stipularis</i>	Kenidai	Euohorbiaceae	TREE	LC

- Pemandangan dalam kawasan kajian
- Point TTC



	
Pelbagai spesies yang ditanam	Pemandangan tepi jalan

STUDY SITE : PALM STREET

Senarai pokok-pokok yang di temui

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
PALM STREET	1	<i>Bismarckia nobilis</i>	Bismarckia palm	Palmae	TREE	LC
PALM STREET	2	<i>Mallotus paniculatus</i>	Balik angin	Euphorbiaceae	TREE	LC
PALM STREET	3	<i>Macaranga gigantea</i>	Mahang gajah	Euphorbiaceae	TREE	LC
PALM STREET	4	<i>Licuala spinosa</i>	Palas	Palmae	TREE	LC
PALM STREET	5	<i>Melicope lunu-akenda</i>	Tenggek burung	Rutaceae	TREE	LC
PALM STREET	6	<i>Acacia mangium</i>	Akasia	Fabaceae	TREE	LC
PALM STREET	7	<i>Dicranopteris linearis</i>	Resam	Gleicheniaceae	TREE	LC
PALM STREET	8	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	TREE	LC
PALM STREET	9	<i>Cryotas mitis</i>	Tukas	Palmae	TREE	LC
PALM STREET	10	<i>Gigantochloa ligulata</i>	Buluh tumpat	Poaceae	TREE	LC
PALM STREET	11	<i>Gigantohhloa wrayi</i>	Buluh beting	Poaceae	TREE	LC
PALM STREET	12	<i>Dendrocalamus asper</i>	Buluh betong	Poaceae	TREE	LC
PALM STREET	13	<i>Bamboo sp.</i>	Buluh pagar	Poaceae	TREE	LC
PALM STREET	14	<i>Thyrsostachys siamensis</i>	Buluh Siam	Poaceae	TREE	LC
PALM STREET	15	<i>Livistona chinensis</i>	Serdang	Palmae	TREE	LC
PALM STREET	16	<i>Gigantochloa albociliata</i>	Buluh madu	Poaceae	TREE	LC
PALM STREET	17	<i>Cocos nucifera</i>	Kelapa	Arecaceae	TREE	LC
PALM STREET	18	<i>Cycas Clivicola</i>	Bogak	Cycadaceae	TREE	LC
PALM STREET	19	<i>Elaeis guineensis</i>	Kelapa sawit	Arecaceae	TREE	LC

- Pemandangan dalam kawasan kajian
- Point PALM STREET



Bismarckia nobilis



Thyrsochloa siamensis



Gigantohloa wrayi Buluh Beting



STUDY SITE : ARAPAIMA LAKE

- Senarai pokok-pokok disekeliling Tasik Arapaima

PT NO	NO	SPECIES	LOCALNAME	FAMILY	REMARKS	ICUN RED LIST
ARAPAIMA LAKE	1	<i>Croton argyratus</i>	Hujan panas	Euohorbiaceae	TREE	LC
ARAPAIMA LAKE	2	<i>Callistemon viminalis</i>	Bottle brush	Myrtaceae	TREE	LC
ARAPAIMA LAKE	3	<i>Xanthostemon chrysanthus</i>	Kelat buga kuning	Myrtaceae	TREE	LC
ARAPAIMA LAKE	4	<i>Cassia fistula</i>	Golden shower	Fabaceae	TREE	LC
ARAPAIMA LAKE	5	<i>Barringtonia sp.</i>	Putat	Lecythidaceae	TREE	LC
ARAPAIMA LAKE	6	<i>Salix babylonica</i>	Janda merana	Salicaceae	TREE	LC
ARAPAIMA LAKE	7	<i>Bamboo sp.</i>	Buluh	Poaceae	TREE	LC
ARAPAIMA LAKE	8	<i>Hibiscus rosa-sinensis</i>	Bunga raya	Malvaceae	TREE	LC
ARAPAIMA LAKE	9	<i>Caesalpinia ferrea</i>	Leopard tree	Fabaceae	TREE	LC
ARAPAIMA LAKE	10	<i>Thyrsostachys siamensis</i>	Buluh siam	Poaceae	TREE	LC
ARAPAIMA LAKE	11	<i>Melaleuca cajuputi</i>	Gelam	Myrtaceae	TREE	LC
ARAPAIMA LAKE	12	<i>Areca catechu</i>	Pinang kampung	Arecaceae	TREE	LC
ARAPAIMA LAKE	13	<i>Dillenia suffruticosa</i>	Simpoh air	Dilleniaceae	TREE	LC
ARAPAIMA LAKE	14	<i>Dracaena marginata</i>	Dracaena	Asparagaceae	TREE	LC
ARAPAIMA LAKE	15	<i>Syzygium myrtifolium</i>	Kelat paya	Myrtaceae	TREE	LC
ARAPAIMA LAKE	16	<i>Syzygium zeylanicum</i>	Kelat nenasi	Myrtaceae	TREE	LC
ARAPAIMA LAKE	17	<i>Saraca sp.</i>	Gapis	Fabaceae	TREE	LC
ARAPAIMA LAKE	18	<i>Sterculia parvifolia</i>	Kelumpang burung	Sterculiaceae	TREE	LC
ARAPAIMA LAKE	19	<i>Rhodomyrtus tomentosa</i>	Kemunting	Myrtaceae	TREE	LC
ARAPAIMA LAKE	20	<i>Fagraea fragrans</i>	Tembusu padang	Loganiaceae	TREE	LC
ARAPAIMA LAKE	21	<i>Vitex pinnata</i>	Leban	Verbenaceae	TREE	LC
ARAPAIMA LAKE	22	<i>Acacia mangium</i>	Akasia	Fabaceae	TREE	LC
ARAPAIMA LAKE	23	<i>Ixora chinensis</i>	Siantan	Rubiaceae	TREE	LC
ARAPAIMA LAKE	24	<i>Lagerstroemia speciosa</i>	Bungor	Lythraceae	TREE	LC
ARAPAIMA LAKE	25	<i>Ficus benjamina</i>	Ara waringin	Moraceae	TREE	LC
ARAPAIMA LAKE	26	<i>Garcinia sp.</i>	Kandis	Guttiferae	TREE	LC
ARAPAIMA LAKE	27	<i>Khaya senegalensis</i>	Khaya	Meliaceae	TREE	LC
ARAPAIMA LAKE	28	<i>Baphia nitida</i>	Baphia tree	Fabaceae	TREE	LC
ARAPAIMA LAKE	29	<i>Saraca asoca</i>	Ashoka tree	Fabaceae	TREE	LC
ARAPAIMA LAKE	30	<i>Phrynium parvum</i>	Lerek	Maranthaceae	TREE	LC
ARAPAIMA LAKE	31	<i>Excoecaria cochinchinensis</i>	Bebuta	Euphorbiaceae	TREE	LC

Tree species distribution in PIW

Index	Family	Species	CT1	CT2	CT3	CT4	CT5	CT6	CT7	CT8	CT9	CT10	AEON	PALM	TTC	POND
1	Fabaceae	<i>Acacia mangium</i>	x	x	x	x	x	x	x	x	x	x	x	x		x
2	Apocynaceae	<i>Alstonia angustiloba</i>					x									
3	Apocynaceae	<i>Alstonia pneumatophora</i>						x								
4	Apocynaceae	<i>Alstonia scholaris</i>		x				x	x						x	
5	Anacardiaceae	<i>Anacardium occidentale</i>											x			
6	Fabaceae	<i>Archidendron jiringa</i>													x	
7	Primulaceae	<i>Ardisia elliptica</i>											x		x	
8	Arecaceae	<i>Areca catechu</i>														x
9	Moraceae	<i>Artocarpus heterophyllus</i>													x	
10	Moraceae	<i>Artocarpus integer</i>											x			
11	Moraceae	<i>Artocarpus lanceifolius</i>									x					
12	Oxalidaceae	<i>Averrhoa bilimbi</i>											x			
13	Oxalidaceae	<i>Averrhoa carambola</i>					x						x			
14	Meliaceae	<i>Azadirachta excelsa</i>	x	x			x						x			
15	Poaceae	<i>Bamboo sp.</i>												x		x
16	Fabaceae	<i>Baphia nitida</i>														x
17	Lecythidaceae	<i>Barringtonia sp.</i>													x	x
18	Palmae	<i>Bismarckia nobilis</i>												x		
19	Euhorbiaceae	<i>Bridelia stipularis</i>		x											x	
20	Fabaceae	<i>Caesalpinia ferrea</i>														x
21	Fabaceae	<i>Callerya artopurpurea</i>													x	
22	Myrtaceae	<i>Callistemon viminalis</i>														x
23	Guttiferae	<i>Calophyllum inophyllum</i>			x								x			
24	Annonaceae	<i>Cananga odorata</i>													x	
25	Fabaceae	<i>Cassia fistula</i>														x
26	Casuarinaceae	<i>Casuarina equisetifolia</i>		x	x											
27	Malvaceae	<i>Ceiba pentandra</i>													x	
28	Lauraceae	<i>Cinnamomum iners</i>	x				x	x		x	x				x	
29	Rutaceae	<i>Citrus microcarpa</i>											x			
30	Arecaceae	<i>Cocos nucifera</i>												x		
31	Rubiaceae	<i>Coffea arabica</i>											x			

