Flora Bakau MALAYSIA

MANGROVE FLORA OF MALAYSIA

SISTEM MAKLUMAT KEPELBAGAIAN BIOLOGI MALAYSIA (MYBIS)

MALAYSIA BIODIVERSITY INFORMATION SYSTEM (MYBIS)

Wan Juliana Wan Ahmad
Norhayati Ahmad
Abdul Latiff Mohamed

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KANDUNGAN
CONTENTS

7 **KATA PENGANTAR**
Foreword

9 **PRAKATA**
Preface

11 **BAB 1: HUTAN BAKAU DI MALAYSIA**
Chapter 1: Mangove Forests in Malaysia

17 **BAB2: FLORA BAKAU**
Chapter 2: Mangrove Flora

91 **BAB 3: PEMULIHARAAN HUTAN BAKAU**
Chapter 3: Conservation of Mangrove Forests

95 **BIBLIOGRAFI**
Bibliography

97 **INDEKS**
Index

99 **KUMPULAN PENGURUSAN PROJEK**
Project Management Team

“Hutan bakau adalah antara jenis hutan yang paling penting di negara kita ”

“Mangrove forests are among the most important types of forest in Malaysia”

YB. DR. XAVIER JAYAKUMAR
Menteri Air, Tanah dan Sumber Asli
Minister of Water, Land and Natural Resources

KATA PENGANTAR

FOREWORD

Jumlah liputan hutan bakau di seluruh dunia adalah 15.62 juta hektar, 3.7% atau 577,940 hektar daripada jumlah ini terletak di Malaysia. Walaupun peratusannya kecil, hutan bakau adalah antara jenis hutan yang paling penting di negara kita. Malaysia mempunyai 104 spesies bakau iaitu 38 spesies bakau eksklusif, 57 spesies bakau bukan eksklusif dan 9 spesies sekutu bakau.

Penerbitan 'Flora Bakau Malaysia' adalah salah satu usaha Kementerian untuk mendokumenkan spesies tumbuhan bakau yang ditemui di Malaysia. Buku ini juga merupakan sebahagian daripada usaha kementerian untuk meningkatkan kesedaran awam tentang kepentingan hutan bakau, sebagai pertahanan pertama pantai terhadap badai, gelombang dan pasang surut, serta tsunami. Keunikan ekosistem hutan bakau boleh menarik ramai orang untuk tujuan pendidikan, rekreasi dan ekopelancongan.

Di samping itu, buku ini mempromosikan Malaysia Biodiversity Information System (MyBIS) sebagai pusat repositori setempat untuk kekayaan spesies flora dan fauna di negara ini. Saya yakin bahawa buku ini akan menjadi satu sumber maklumat dan rujukan mengenai flora bakau kepada pelajar, penyelidik, peminat alam dan pembuat dasar.

Akhir sekali, saya ingin merakamkan setinggi-tinggi penghargaan kepada semua yang terlibat dalam menjayakan penerbitan buku ini.

YB. Dr. Xavier Jayakumar,
Menteri Air, Tanah dan Sumber Asli

The total number of mangrove forest coverage worldwide is 15.62 million hectares, of which 3.7% (577,940 hectares) is located in Malaysia. Although, the percentage is small, mangrove forests are among the most important types of forest in Malaysia. Malaysia has 104 species mangrove out of which 38 are exclusive mangrove species, 57 are non-exclusive species and 9 are mangrove associate species.

The publication of 'Mangrove Flora of Malaysia' is one of the efforts by the Ministry to document the mangrove plant species found in Malaysia. It is also a part of the ministry's effort to increase public awareness on the importance of mangrove forests, as the coastline's first defence against storms, strong waves and tides, as well as tsunami. The uniqueness of mangrove forest ecosystems can attract many people for education, recreation and ecotourism purposes as well.

Additionally, this book promotes the Malaysia Biodiversity Information System (MyBIS) as a one-stop repository centre for biodiversity in this country. I am confident that this book will provide information and reference on the mangrove flora to students, researchers, nature-lovers and policy makers.

Finally, I would like to express my appreciation to all parties involved in the successful publication of this book.

YB. Dr. Xavier Jayakumar,
Minister of Water, Land and Natural Resources

PRAKATA

PREFACE

Buku mengenai kekayaan spesies flora bakau di Malaysia ini ialah santapan yang sesuai bagi segenap lapisan masyarakat tempatan dan luar negara. Hutan bakau ialah salah satu jenis hutan hujan tropika yang sangat produktif dan amat penting kepada kelestarian kehidupan semua organisma. Namun demikian, tidak ramai yang tahu sebenarnya fungsi dan kegunaan hutan bakau. Oleh itu, buku ini diterbitkan untuk meningkatkan kesedaran awam tentang keindahan dan kepentingan hutan bakau kita.

Buku ini mengandungi maklumat terkini mengenai spesies flora bakau terpilih di Malaysia yang dipersembahkan dengan cara yang menarik. Sesuai dengan tajuk buku ini, gambar-gambar yang terbaik telah dipilih untuk menyerikan halaman buku, dan dilengkapi dengan kod QR. Pembaca boleh mendapatkan maklumat yang lebih terperinci bagi setiap spesies di dalam pangkalan data MyBIS melalui QR kod ini di laman sesawang yang boleh diakses dengan percuma secara atas talian.

Hasil yang terkandung dalam buku ini sebenarnya mengambil masa penyelidikan dan kerja fotografi yang sangat lama. Ramai orang yang telah membantu dalam usaha kami menjalankan kajian dan kerja lapangan dan tidak mungkin dapat diberikan penghargaan yang secukupnya. Namun demikian, bagi penerbitan buku ini kami ingin mengucapkan ribuan terima kasih kepada YB. Dr. Xavier Jayakumar, Menteri Air, Tanah dan Sumber Asli, (KATS); YBhg. Dato' Dr. Tan Yew Chong, Ketua Setiausaha, KATS; YBhg. Dato' Wan Mazlan Wan Mahmood, Setiausaha Bahagian Pengurusan Biodiversiti dan Perhutanan, KATS; Ketua Pengarah Jabatan Perhutanan Semenanjung Malaysia, YBhg. Dato' Akhiruddin Hj. Mahmood; YBhg. Prof. Tan Sri Dato' Seri Dr. Noor Azlan Ghazali, Naib Canselor, Universiti Kebangsaan Malaysia; YBerusaha Prof. Dr. Mohammad B. Kassim, Dekan, Fakulti Sains dan Teknologi (FST); YBhg. Dato' Dr. Abdul Latif Mohmod, Ketua Pengarah, Institut Penyelidikan Perhutanan Malaysia (FRIM); YBerusaha Dr. Lillian Chua Swee Lian, Pengarah, Bahagian Biodiversiti Hutan, FRIM; dan akhir sekali En. Postar Miun, Pusat Penyelidikan Perhutanan, Sepilok, Sabah di atas pertolongan mengesahkan spesies bakau yang dimuatkan di dalam buku ini. Percetakan buku ini telah dibiayai sepenuhnya oleh Kementerian Air, Tanah dan Sumber Asli.

Wan Juliana Wan Ahmad
Norhayati Ahmad
Abdul Latiff Mohamed

This book on the richness of mangrove species in Malaysia is a suitable read for all levels of local and foreign communities. Mangrove forest is one of the most productive tropical rainforests and pertinent to the survival of all organisms. However, not many know about the actual functions and uses of mangrove forests. Therefore, this book is published to raise public awareness on the beauty and importance of our mangrove forests.

This book contains updated information on selected species of mangrove flora in Malaysia presented in an interesting way. In accordance with the title of this book, the best pictures have been selected to highlight the pages of the book, complete with QR codes. Readers can get more detailed information for each species in the MyBIS database via this QR code on websites that can be accessed online for free.

The information contained in this book actually have taken a very long research time and photography efforts. Many people have helped in our efforts to conduct field studies and works and cannot be acknowledged enough. However, for the publication of this book we would like to thank His Honourable YB. Dr. Xavier Jayakumar, Minister of Water, Land and Natural Resources (KATS); YBhg. Dato' Dr. Tan Yew Chong, Secretary General , KATS; YBhg. Dato' Wan Mazlan Wan Mahmood, Under Secretary, Biodiversity and Forestry Management, KATS; Director General of the Forestry Department of Peninsula Malaysia, YBhg. Dato' Akhiruddin Hj. Mahmood; YBhg. Prof. Tan Sri Datuk Sri Dr. Noor Azlan Ghazali, Vice Chancellor of Universiti Kebangsaan Malaysia; Prof. Dr. Mohammad B. Kassim, Dean of the Faculty of Science and Technology (FST); YBhg. Dato' Dr. Abdul Latif Mohmod, Director General of Forestry Research Institute Malaysia (FRIM); Dr. Lillian Chua Swee Lian, Director of Forest Biodiversity Division, FRIM; and last but not least, Mr. Postar Miun from the Forest Research Centre, Sepilok for his help in confirming the identification of the mangrove species featured in this book. The printing of this book is funded by the Ministry of Water, Land and Natural Resources.

Wan Juliana Wan Ahmad
Norhayati Ahmad
Abdul Latiff Mohamed

01

HUTAN BAKAU DI MALAYSIA

MANGROVE FORESTS IN MALAYSIA

HUTAN PAYA BAKAU

Hutan paya bakau ditakrifkan sebagai kawasan yang dikuasai oleh tumbuh-tumbuhan bakau dengan saiz minimum kira-kira 0.01 km^2 (1ha). Taburan hutan paya bakau dihadkan terutamanya oleh latitud, suhu, dan kelembapan. Oleh itu, hutan jenis ini ditemui di kawasan tropika dan subtropika dan adalah antara ekosistem yang paling produktif di dunia. Jumlah liputan hutan paya bakau di seluruh dunia ialah 15.62 juta hektar, dan daripada jumlah ini 3.7% terletak di Malaysia, atau 577,940 hektar. Walaupun peratus ini adalah kecil, hutan paya bakau adalah di antara jenis hutan yang amat penting di Malaysia. Luas kawasan hutan paya bakau di Semenanjung Malaysia ialah 17% daripada jumlah keseluruhan iaitu 98,249.8 ha. Sabah pula mempunyai luas kawasan hutan paya bakau yang terbesar di Malaysia iaitu seluas 58.6% daripada jumlah kawasan atau 338,672.8 hektar, dan Sarawak meliputi seluas 24.4% atau 141,017.4 hektar.

Hutan paya bakau biasanya dikuasai oleh pokok bakau yang biasanya rendah, namun ada sesetengah spesies kadang-kadang boleh tumbuh sehingga 50 ke 60 m. Tumbuhan bakau biasanya tumbuh hanya beberapa kilometer ke dalam sahaja daripada kawasan pantai atau muara sungai. Bukan seperti jenis hutan lain, hutan paya bakau kurang tumbuhan tahan redup yang hidup di bawah lapisan silara. Di lapisan tanah pula, terlalu banyak akar, air dan lumpur untuk tumbuhan lain tumbuh.

Tumbuhan bakau hidup sepanjang masa atau sebahagian besar masa dengan akarnya terendam di dalam air masin, yang berubah parasnya mengikut air pasang-surut. Tambahan pula, akar tumbuhan bakau tumbuh ke dalam lumpur yang hanya mempunyai oksigen di beberapa milimeter lapisan teratas sahaja. Namun demikian, ada banyak spesies khusus yang mampu hidup di persekitaran yang sangat sukar dan mencabar ini dan kebanyakannya tergolong dalam beberapa famili. Jadi, bagaimanakah tumbuhan bakau berjaya mengatasai cabaran kehidupan begitu?

Secara fisiologi, akar bakau mempunyai mekanisme ultrafiltrasi yang cekap melalui tisu yang membentuk sarung sekitar xilem di dalam akar, menghalang garam daripada memasuki saluran pengangkutan air ini, supaya tidak mencemari bahagian lain tumbuhan. Keupayaan spesies bakau yang berlainan untuk melakukan penapisan ini berbeza-beza, tetapi bakau merah (*Rhizophora* spp.) adalah yang paling cekap. Spesies lain yang kurang cekap, seperti *Avicennia* spp. mempunyai cara lain untuk mengeluarkan garam iaitu secara aktif yang melibatkan penggunaan tenaga oleh kelenjar khas di dalam daun. Air garam yang terkeluar akhirnya akan tersejat kering sebagai kristal garam. Akar pokok bakau juga berbagai rupa daripada bentuk akar udara, jangkang, dan pneumatofor yang menyerupai bentuk lutut atau pensil. Permukaan akar mempunyai banyak lentisel atau lubang seni yang digunakan untuk bernafas. Pneumatofor ini bertindak seperti snorkel supaya tumbuhan bakau dapat bernafas.

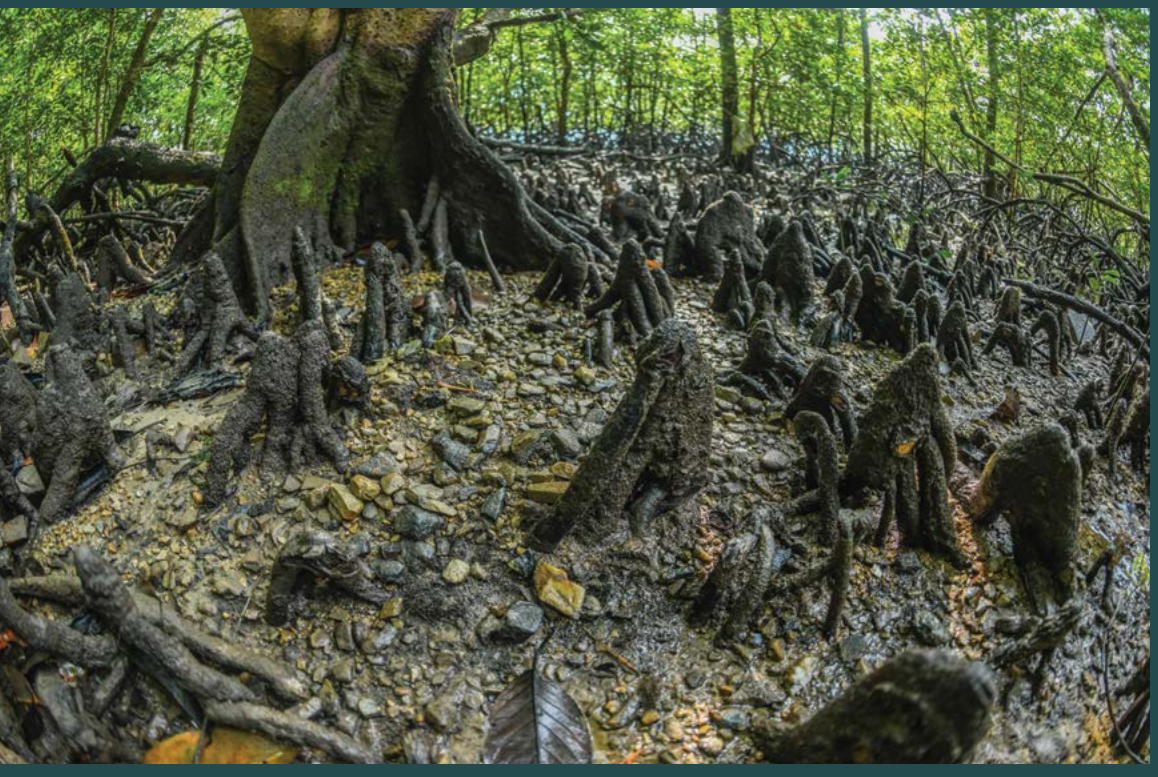
MANGROVE FORESTS

Mangrove forest is defined as a vegetation area dominated by mangrove plants with a minimum patch size of about 0.01 km^2 (1 ha). Mangrove distribution is constrained primarily by latitude, temperature, and to a lesser extent, aridity. Thus, mangrove forests are found in tropical and subtropical regions and are among the most productive ecosystems in the world. The total number of mangrove forest coverage worldwide is 15.62 million hectares, of which 3.7% is located in Malaysia, or 577,940 hectares. Although, the percentage is small, mangrove forests are among the most important types of forest in Malaysia. The area of mangrove forest in Peninsular Malaysia is 17% of the total area in Malaysia, or 98,249.8 ha. Sabah has the largest mangrove area in Malaysia with 58.6% of the total area or 338,672.8 hectares, and Sarawak covers 24.4% or 141,017.4 hectares.

The mangrove forest is typically dominated by low trees, but some species sometimes can grow to a height of about 50 to 60 m. The mangroves generally extend only a few kilometres inland from the coastline or river estuarines. Unlike other forest types, there is a lack of shade-tolerant understorey plants in mangrove forests. At ground level, there are just too many roots, water, and mud for other plants to grow.

Mangroves spend all or much of their time with their roots in seawater, which changes following the tides. Additionally, plant roots often grow into mud that is starved of oxygen, except for the top few millimetres. Nevertheless, there are many specialist plants that can withstand the harsh and challenging environment, and most of these plant species come from several families. Therefore, how can mangrove plants survive the challenges of life?

Physiologically, mangrove roots have evolved efficient ultrafiltration mechanism via tissues that form a sheath around the xylem of the roots, preventing salt from entering the water conducting vessels, and polluting the rest of the plant. There are many variation in the capability of different mangrove species to perform this filtration, but the red mangroves (Rhizophora spp.) are particularly good at it. Those that are less efficient, such as Avicennia spp. have other means of extracting salt out by excreting it out actively using energy in the process from special glands in their leaves. Salt water that is excreted out will eventually dry out during evaporation as salt crystals. The roots of mangrove plants are also varied ranging in form from aerial roots, stilt, and pneumatophores that could be knee-like or pencil-like. The surfaces of these roots are perforated with lenticels or fine holes used for breathing. These pneumatophores act like a snorkel for the plants to breathe.



The roots of mangrove plants clockwise from top left: plank roots of *Xylocarpus granatum,* pencil-like pneumatophores of *Avicennia alba,* stilt roots of *Rhizophota apiculata,* and knee-roots of *Bruguiera gymnorhiza.*

FUNGSI BAKAU

Hutan paya bakau menawarkan pelbagai bahan dan perkhidmatan kepada komuniti setempat. Di antara peranan penting yang dimainkan ialah perikanan dalam dan luar pantai, tapak semaian dan perlindungan bagi anak-anak ikan, habitat dan sumber makanan kepada banyak fauna, influks nutrien, dan sumber balak dan kayu api bagi sesetengah penduduk berdekatan. Selain daripada itu, hutan paya bakau mempunyai keupayaan yang sangat tinggi untuk menyimpan karbon, dan yang paling penting sekali ialah melindungi pantai daripada hakisan tanah akibat kuasa ombak dan arus kuat, serta tsunami.

Keunikan ekosistem hutan paya bakau ini mampu menarik minat ramai orang untuk tujuan pendidikan, rekreasi dan ekopelancongan. Sebahagian besar perkhidmatan paya bakau tidak mempunyai harga pasaran yang ditetapkan. Oleh itu, nilai ekosistem yang unik ini secara amnya diremehkan. Nilai ekonomi pelbagai fungsi yang ekosistem paya bakau berikan seperti perlindungan pantai, habitat tapak semaian, dan sinki karbon tidak diambil kira oleh pembuat keputusan.

FUNCTIONS OF MANGROVES

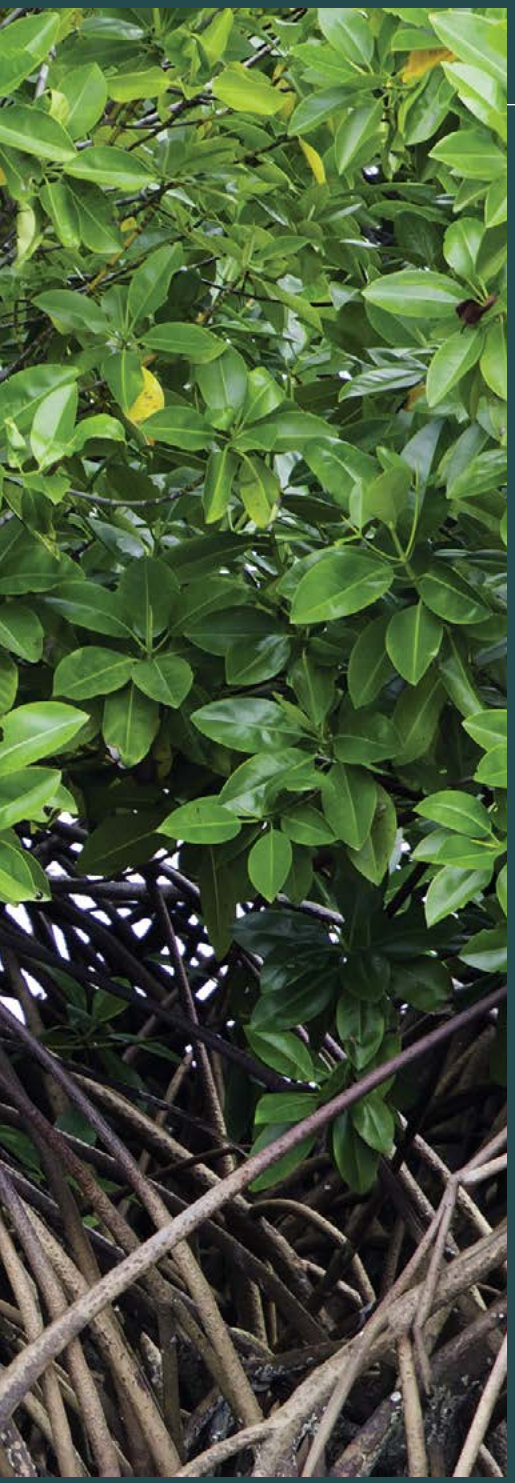
Mangroves offer a broad array of goods and services to the local community. Among the important roles played are on- and offshore fishery, nursery habitats and shelter for juvenile fish, habitats and food resources for a host of fauna, nutrient influx, and a source of timber and fuel wood for some people. Besides that, mangrove forests have the capability to sequester a significant amount of carbon, and most importantly, protect the shoreline from soil erosion due to strong waves and currents, as well as tsunamis.

The uniqueness of mangrove forest ecosystems can attract many people for education, recreation and ecotourism purposes. A large apart of the mangrove services does not have assigned market prices. Thus, the value of this unique ecosystem is generally underestimated. The economic value of the diverse functions they provide such as shoreline protection, nursery habitats and carbon storage are not accounted for by decision-makers.

02

FLORA BAKAU

MANGROVE FLORA



FLORA BAKAU DI MALAYSIA

Komuniti tumbuhan bakau adalah tulang belakang kepada ekosistem bakau. Tumbuh-tumbuhan bakau boleh dibahagikan kepada tiga kategori, iaitu, bakau eksklusif, tidak eksklusif dan bersekutu. Beberapa penulis (Wyatt-Smith 1960; Liew 1980; Chai 1982) mendokumenkan kira-kira 31 spesies tumbuhan yang hanya dijumpai di hutan paya bakau, sementara sejumlah 51 spesies dianggap spesies tidak eksklusif atau bersekutu. Pada awal abad yang lalu, Watson (1928) telah mengelaskan tumbuhan bakau di Semenanjung Malaysia kepada lima jenis berdasarkan komposisi spesies dan dominasi, manakala klasifikasi yang lebih baik dan lebih komprehensif telah dilaporkan oleh Chai (1982) termasuk bakau hutan di sebelah daratan. Bakau eksklusif adalah tumbuhan yang hanya boleh hidup di kawasan bakau, dibanjiri oleh pasang surut dan sangat penting dalam ekosistem bakau.

Spesies bakau tidak eksklusif adalah tumbuhan bakau yang tidak memainkan peranan penting berbanding spesies bakau eksklusif dan tumbuhan ini tidak semestinya hanya terdapat di kawasan bakau. Bakau bersekutu adalah tumbuhan yang boleh tumbuh di mana-mana dan tumbuhan ini tidak terhad kepada hutan bakau sahaja (Wan Juliana et al. 2008, Japar 1994). Di seluruh dunia, jumlah spesies tumbuhan bakau adalah 114 (Tomlinson 1986) dan Malaysia mempunyai 104 spesies (Japar 1994). Malaysia mempunyai 38 spesies bakau eksklusif, 57 tidak eksklusif dan sembilan flora bakau bersekutu. Dalam senarai spesies merah IUCN, Polidoro et al. (2010) menamakan spesies bakau berdasarkan senarai asal bakau utama dan minor Tomlinson (Tomlinson 1986), ditambah dengan beberapa spesies menerusi definisi yang diperluaskan oleh Duke (1992) dan penambahan taksonomi baru lainnya (Sheue et al. 2009).

MANGROVE FLORA IN MALAYSIA

Mangrove plant community is the backbone of a mangrove ecosystem. Mangrove plants can be divided into three categories, i.e. exclusive, non-exclusive, and associate mangroves. Several authors (Wyatt-smith 1960; Liew 1980; Chai 1982) documentated about 31 plant species which are exclusively found in the mangrove swamp forest, while a total of 51 species are considered non-exclusive or associate species. Early in the last century, Watson (1928) had classified the mangroves in Peninsular Malaysia into five vegetation types based on species composition and dominance whilst a better and more comprehensive classification is given by Chai (1982) which included the inland mangroves. Exclusive mangroves are plants that can live only in the mangrove area, inundated by the tides and are very important to the mangrove ecosystem.

The non-exclusive mangrove species are mangrove plants that do not play such an important role compared to the exclusive mangrove species in the mangrove area and these plants are also not necessarily found only in the mangrove area. Associate mangroves are plants which can occur anywhere and these plants are not limited to mangrove forests only (Wan Juliana et al. 2008, Japar 1994). Worldwide, the total number of mangrove plant species is 114 (Tomlinson 1986). Malaysia has 104 species (Japar 1994) and Malaysia has 38 exclusive, 57 non-exclusive and nine associated mangrove flora. In these IUCN species Red List assessments, Polidoro et al. (2010) defined a mangrove species based on Tomlinson's original list of major and minor mangroves (Tomlinson 1986), supplemented by a few additional species through the expanded definition provided by Duke (1992) and other new taxonomic additions (Sheue et al. 2009).

Acanthus ebracteatus
Family: Acanthaceae
White sea holly
Jeruju putih
©Muhammad Razali Salam

Acanthus ilicifolius
Family: Acanthaceae
Black sea holly
Jeruju hitam
©Norhayati Ahmad

©Muhammad Razali Salam

Aegiceras corniculatum
Family: Primulaceae
Black mangrove, river mangrove or khalsi
Kacang-kacang, kuku helang
©Norhayati Ahmad

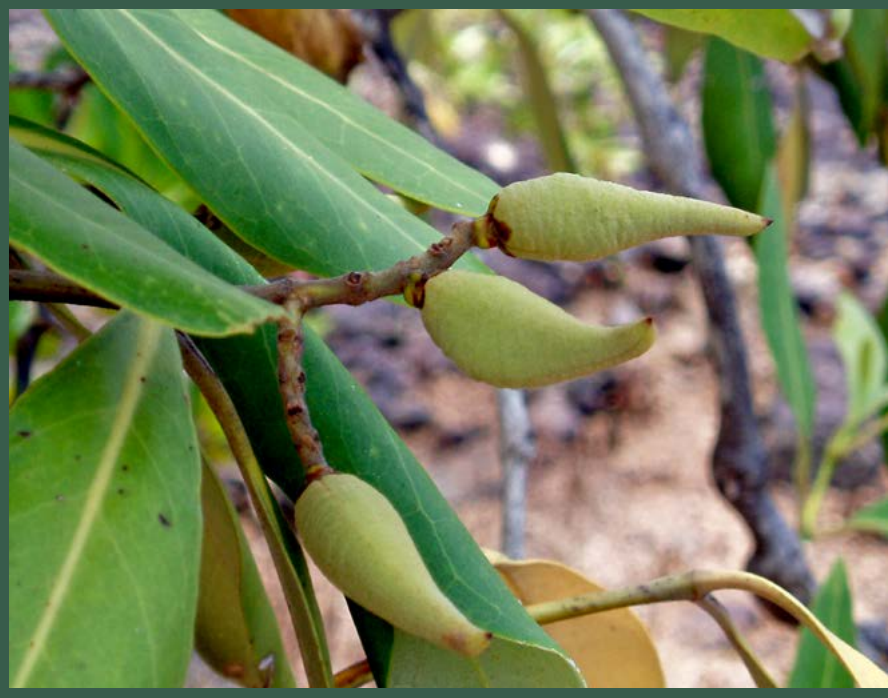
Aegiceras floridum
Family: Primulaceae
Black mangrove, river mangrove or khalsi
Kacang-kacang, kuku helang

Aganope heptaphylla
Family: Fabaceae
Sevenleaf *aganope*
Omis-omis
©Muhammad Razali Salam

Allophylus cobbe
Family: Sapindaceae
Titberry
Congkol, cungkil, tumbit kayu

Ardisia elliptica
Family: Primulaceae
Shoebutton *ardisia*, duck's eyes, coralberry
Cempenai, jangkang, lutus, mata ayam, mata itik, mata pelanduk

Atalantia monophylla
Family: Rutaceae
Indian atalantia
Congkol, cungkil, tumbit kayu



Avicennia alba
Family: Acanthaceae
White firefly mangrove tree
Api-api putih

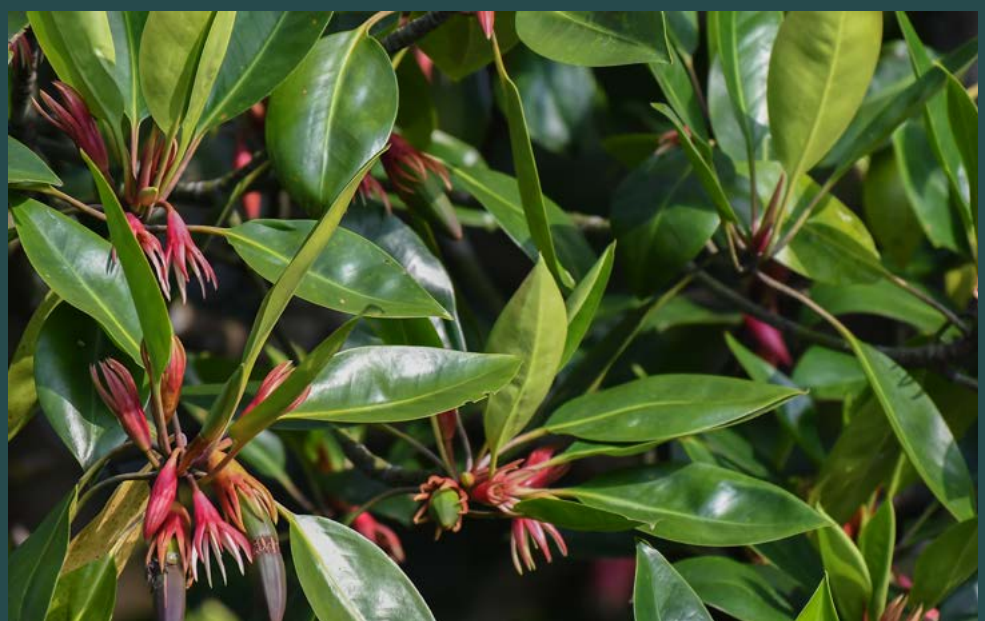
Avicennia marina
Family: Acanthaceae
Firefly mangrove tree
Api-api jambu
©Norhayati Ahmad

Avicennia officinalis
Family: Acanthaceae
Indian mangrove
Api-api ludat

Breynia racemosa
Family: Phyllanthaceae
Coffee bush
Ambin kera, hujan panas, peringat, sembor

Bruguiera cylindrica
Family: Rhizophoraceae
White mangrove
Berus

Bruguiera gymnorhiza
Family: Rhizophoraceae
Black mangrove
Tumu merah
©Norhayati Ahmad



Bruguiera hainesii
Family: Rhizophoraceae
Eye of the crocodile
Bakau mata buaya

Bruguiera parviflora
Family: Rhizophoraceae
Small flower *Bruguiera*
Lenggadai
©Norhayati Ahmad

Bruguiera sexangula
Family: Rhizophoraceae
Oriental mangrove
Tumu putih

Buchanania arborescens
Family: Anacardiaceae
Sparrows' mango
Otak udang, katak udang, ketak udang, puah pipit, puan, terentang tikus

Top and bottom left
Guilandina bonduc
Family: Fabaceae
Grey nicker, nicker bean
Bondok, kelici, kelubu, ulang
©Norhayati Ahmad

Top and bottom right
Caesalpinia crista
Family: Fabaceae
Yellow nicker
Kuku tupai
©Muhammad Razali Salam

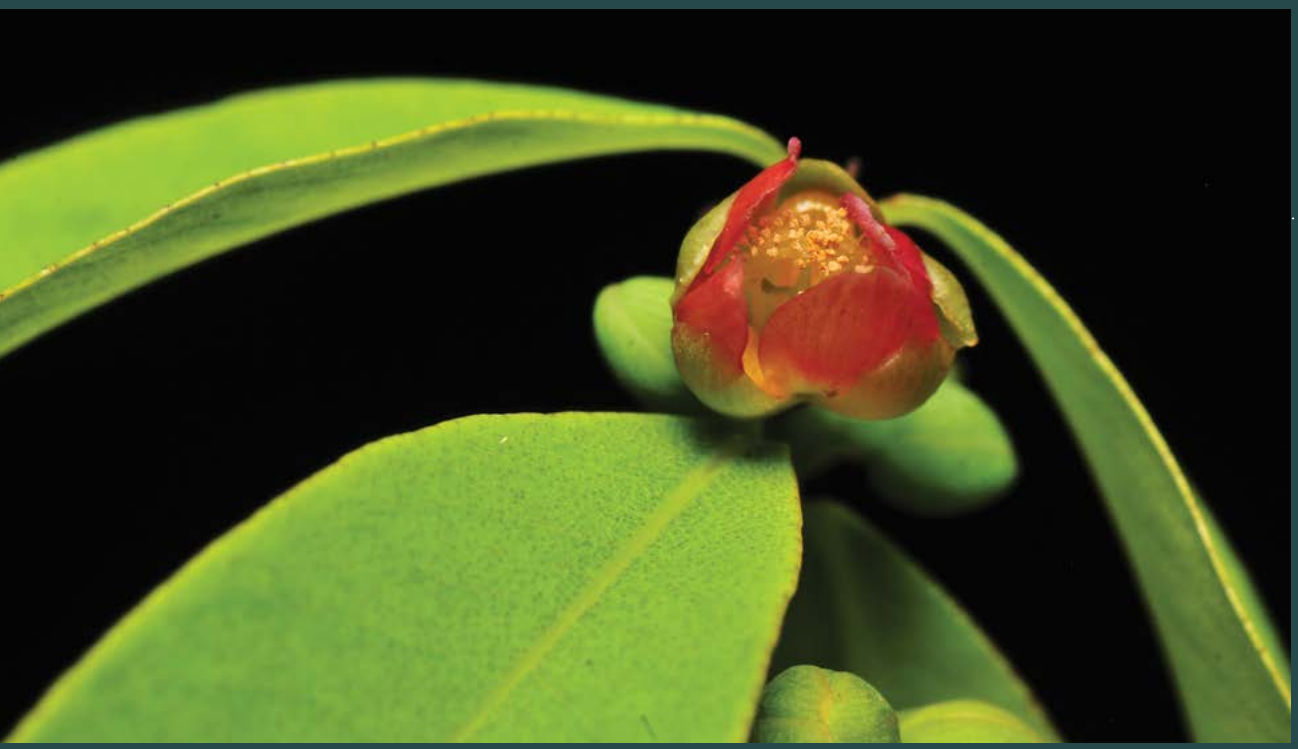
Camptostemon philippinense
Family: Malvaceae
Gapas-gapas

Cassine viburnifolia
Family: Celastraceae
Grey nicker
Barat-barat, kempudang baran, mata pelanduk, mempenai
©Norhayati Ahmad

Cerbera manghas
Family: Apocynaceae
Sea mango
Pong-pong, buta-buta, nyan

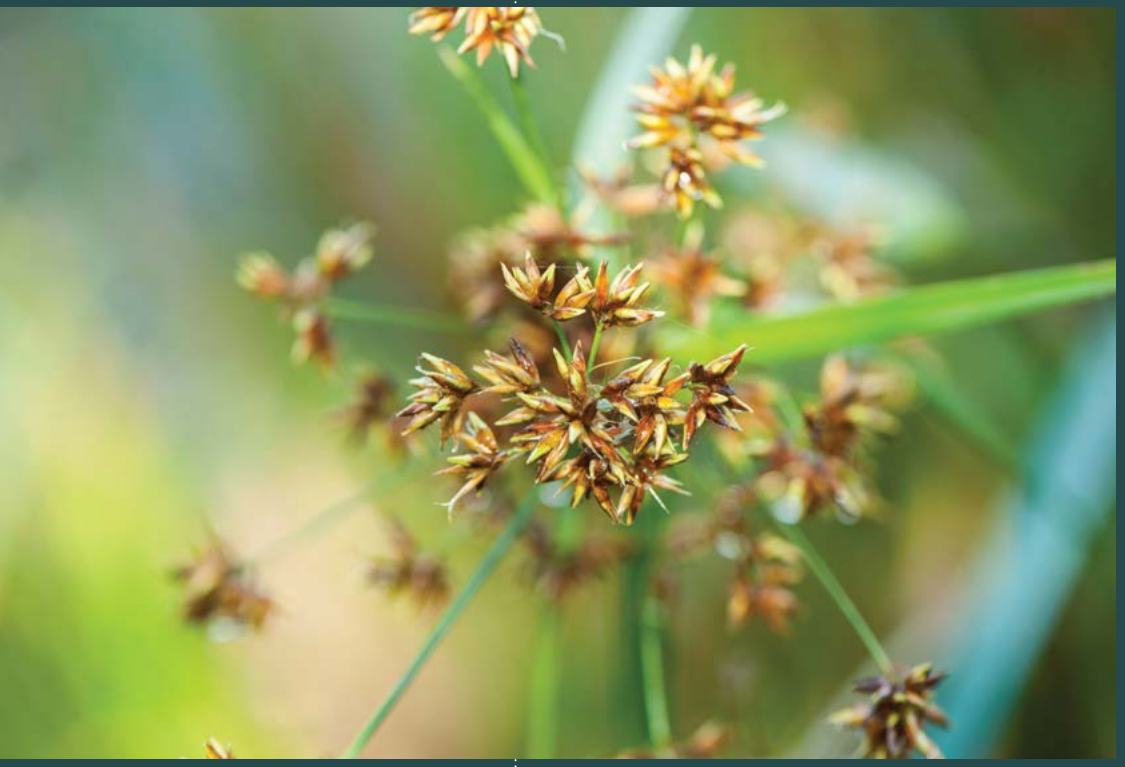
Cerbera odollam
Family: Apocynaceae
Suicide tree, sea pong-pong, Yellow-eyed *cerbera*
Pong-pong, buta-buta

Ceriops tagal
Family: Rhizophoraceae
Yellow mangrove, Indian mangrove, spurred mangrove
Tengar



Cratoxylum cochinchinense
Family: Hypericaceae
Yellow cow wood, tree-avens
Kayu arang, derum selunchor, kemutong

Crinum asiaticum
Family: Amaryllidaceae
Spider lily, poison bulb
Tembaga suasa



Cyperus compactus
Family: Cyperaceae
Rusiga

Dalbergia candenatensis
Family: Fabaceae
Firefly mangrove tree
Api-api jambu
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Dendrolobium umbellatum
Family: Fabaceae
Sea *Dendrolobium*
Dedulang, petai belalang, petai laut
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Derris trifoliata
Family: Fabaceae
Common *Derris*
Ketui, salang, selang, setui

Top and bottom left
Diospyros pilosanthera
Family: Ebenaceae
Black ebony
Kayu arang, semetik

Top and bottom right
Dolichandrone spathacea
Family: Bignoniaceae
Mangrove tumpet tree
Tui, kulok

Excoecaria agallocha
Family: Euphorbiaceae
Blind-your-eye mangrove
Buta-buta, bebuta, betak-betak

Ficus microcarpa
Family: Moraceae
Chinese banyan
Ara jejawi

Ficus sundaica
Family: Moraceae
Sunda fg
Ara bertih, ara punai

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Finlaysonia obovata
Family: Apocynaceae
Finlayson's creeper
Kalak kambing
©Norhayati Ahmad

©Norhayati Ahmad

Flagellaria indica
Family: Flagellariaceae
False rattan, common *Flagellaria*
Rotan dini, rotan tikus
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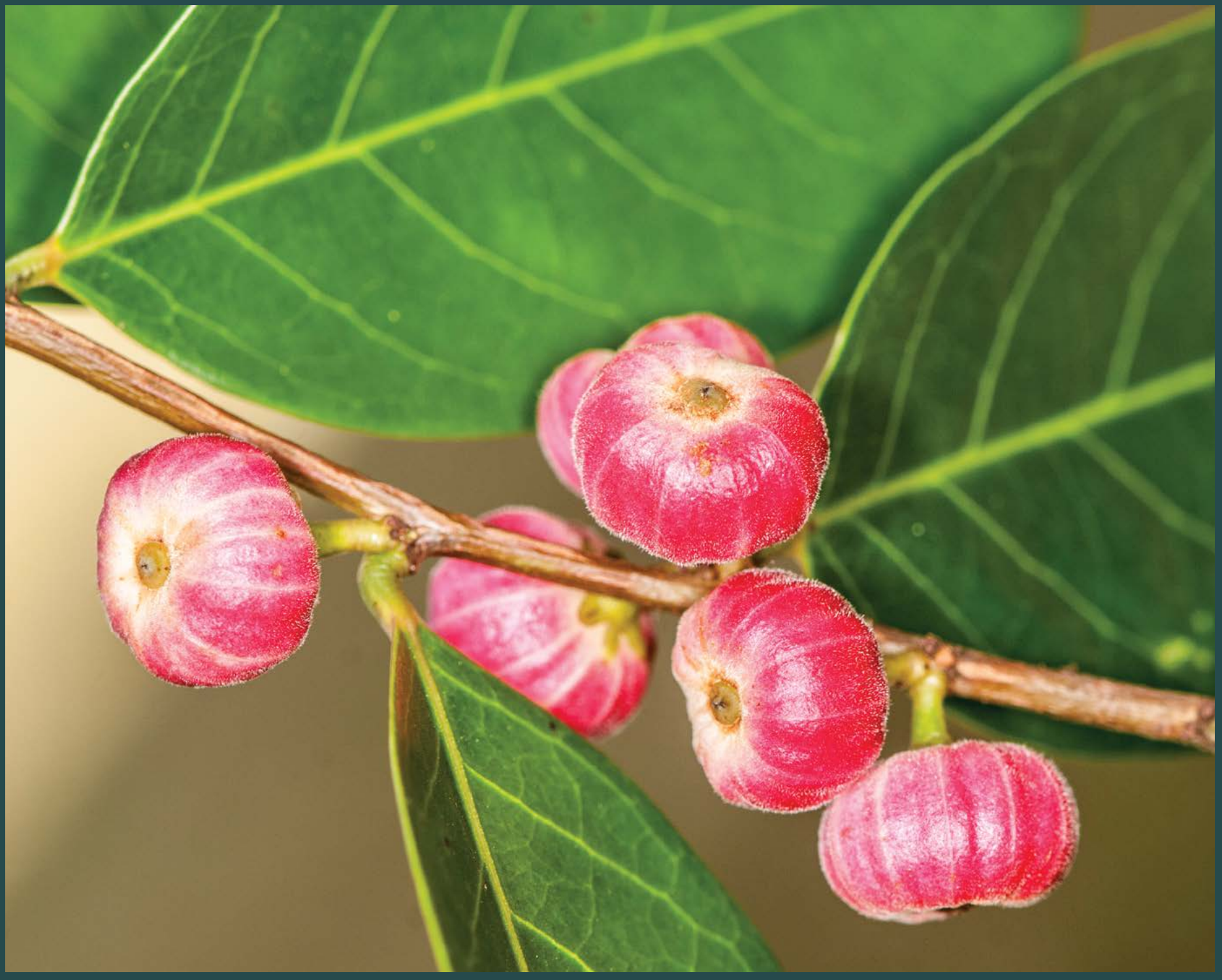

Glochidion littorale
Family: Phyllanthaceae
Monkey apple
Jambu kera, hujan panas

Guettarda speciosa
Family: Rubiaceae
Sea randa
Ketapang pasir, bebaru laut


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Heritiera littoralis
Family: Malvaceae
Keeled-pod mangrove, looking-glass tree
Dungun, bayur laut, atun laut, buah pelir kambing
©Norhayati Ahmad

Hoya coronaria
Family: Apocynaceae
Wax flower
Akar setebal
©Norhayati Ahmad

Intsia bijuga
Family: Fabaceae
Borneo teak, Johnstone river teak, Moluccan ironwood, Pacific teak, scrub mahogany
Merbau changkat, merbau ipil, merbau laut

Lumnitzera littorea
Family: Combretaceae
Red-flowered black mangrove
Teruntum merah

Lumnitzera racemosa
Family: Combretaceae
White-flowered black mangrove
Teruntum bunga putih

Melanthera biflora
Family: Asteraceae
Sea daisy, sea ox-eye
Seremai, serenai laut, serenah, sunai laut

Nypa fruticans
Family: Arecaceae
Nipah palm, mangrove palm, water coconut
Nipah

Oncosperma tigillarium
Family: Arecaceae
Nibung palm
Ibas, linau, nibung

Osbornia octodonta
Family: Myrtaceae
Myrtle mangrove

Oxyceros longiflorus
Family: Rubiaceae
Sharp-horned vine
Akar berdara laut, akar duri

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Pandanus tectorius
Family: Pandanaceae
Pandanus palm, screw pine
Mengkuang laut, mengkuang duri, pandan darat, pandan
©Norhayati Ahmad

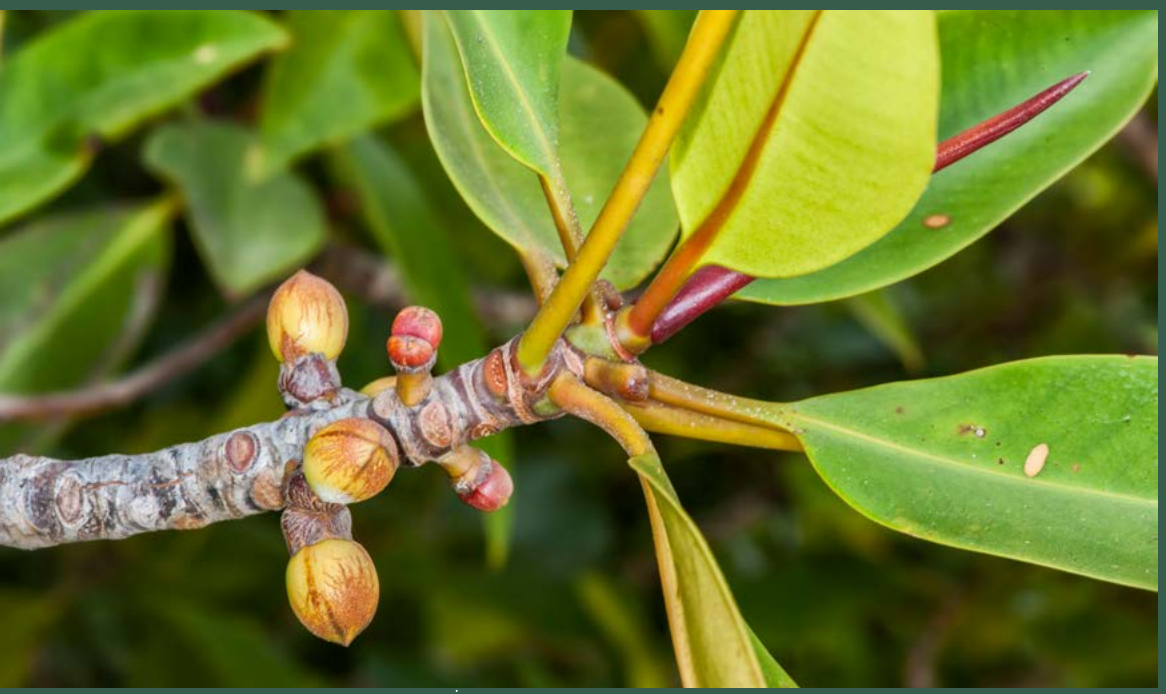
Pemphis acidula
Family: Lythraceae
Shrubby coral *pemphis*, small-leaved mangrove
Mentigi, mentigi laut, kabantigi

Pouteria obovata
Family: Sapotaceae
Northern yellow boxwood, yellow teak, black ash
Nyatoh laut

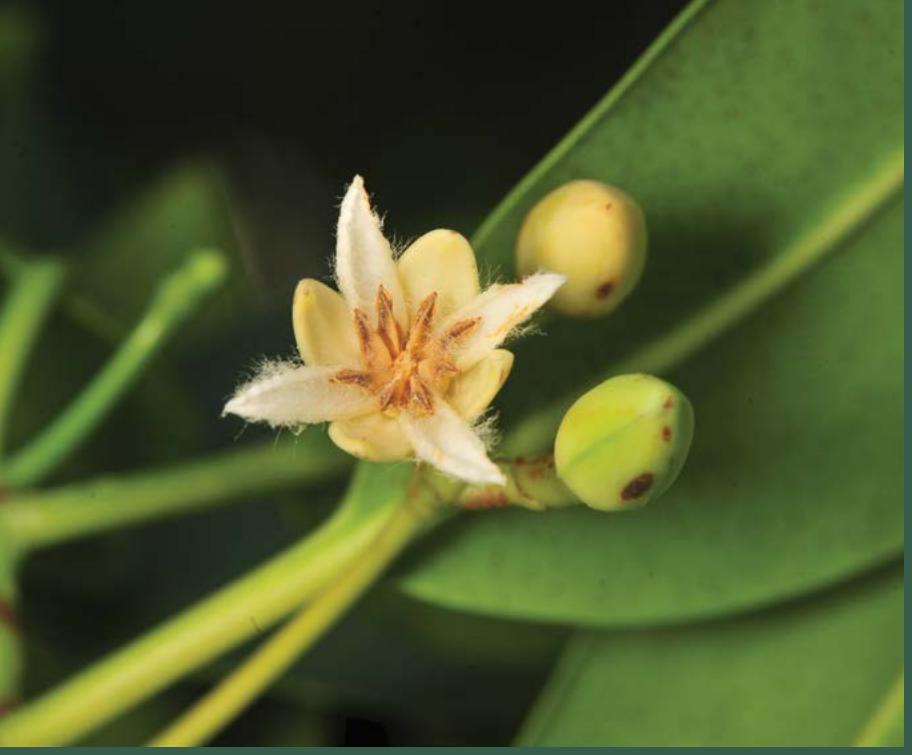
Pluchea indica
Family: Asteraceae
Indian camphorweed, Indian fleabane, Indian *Pluchea*
Beluntas

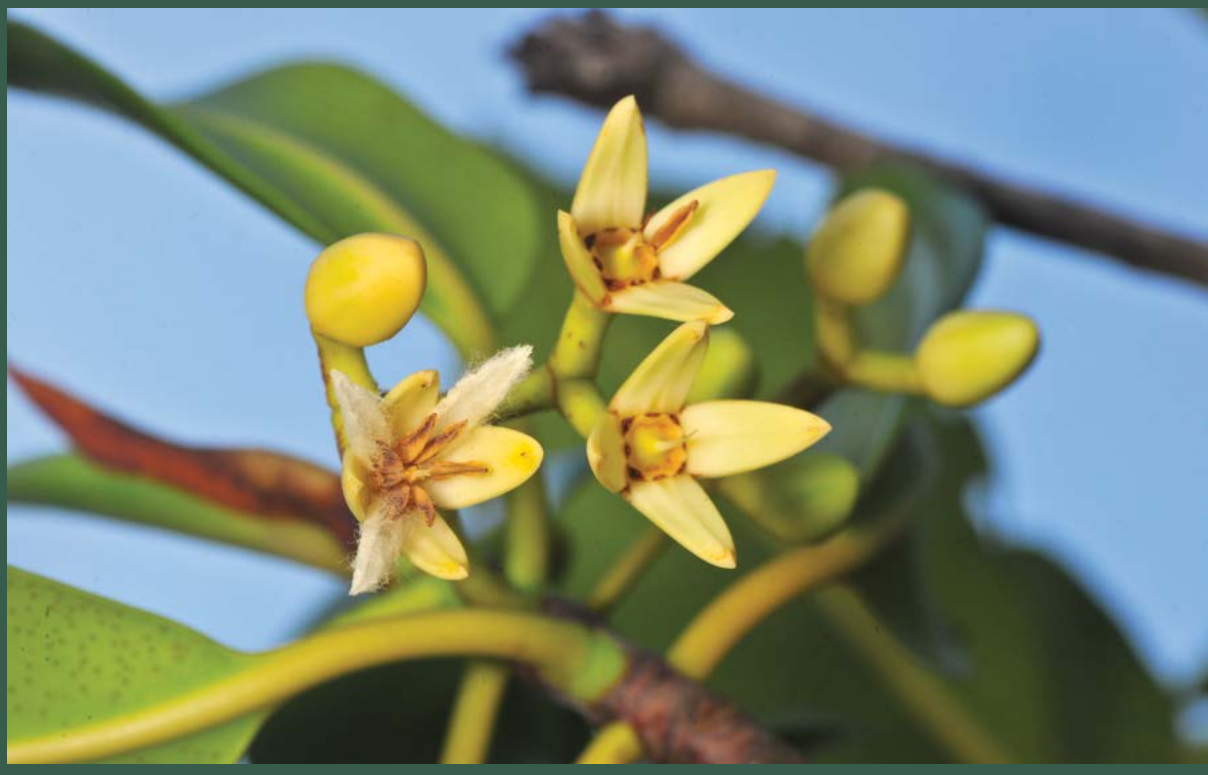
Millettia pinnata
Family: Fabaceae
Indian beech, pongam oiltree
Mempari

Premna serratifolia
Family: Lamiaceae
Bastard guelder
Buas-buas, bangkung kayu, sarunai, singkel, jambu kera, hujan panas



Rhizophora apiculata
Family: Rhizophoraceae
Red mangrove
Bakau minyak, bakau tandok, bakau akik





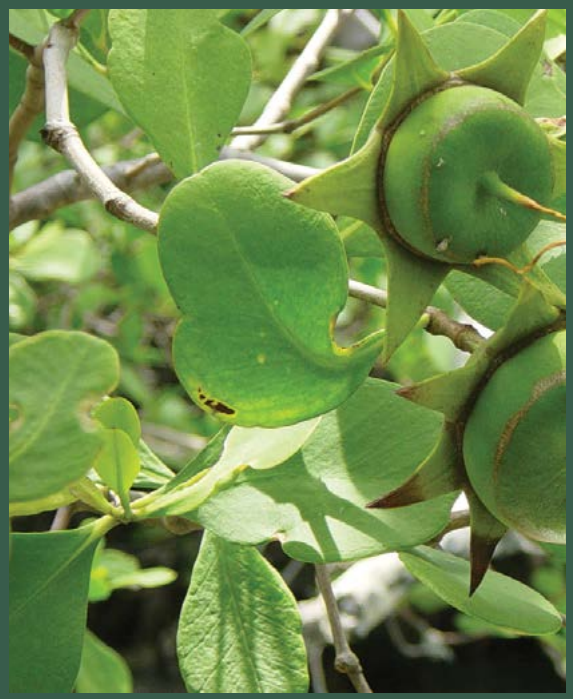
Rhizophora mucronata
Family: Rhizophoraceae
Red mangrove
Bakau kurap, bakau belukap, bakau gelukap, bakau jankar

Rhizophora stylosa
Family: Rhizophoraceae
Spotted mangrove
Bakau pasir

Rhizophora x ***lamarckii***
Family: Rhizophoraceae

Scyphiphora hydrophyllacea
Family: Rubiaceae
Chengam, sebasah, singam

Sesuvium portulacastrum
Family: Aizoaceae
Sea purslane
Gelang laut, gelang pasir, saruni air



Sonneratia alba
Family: Lythraceae
Mangrove apple
Perepat, pedada, pidada
©Norhayati Ahmad

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Sonneratia caseolaris
Family: Lythraceae
Crabapple mangrove, mangrove apple, firefly mangrove
Berembang
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Sonneratia griffithii
Family: Lythraceae
Griffith's mangrove apple

Sonneratia ovata
Family: Lythraceae
Mangrove apple
Gedabu, kedabu

Stachytarpheta indica
Family: Verbenaceae
Indian snakeweed, blue snakeweed, nettle-leaved vervain
Selasih dandi, selasih hutan

Talipariti tiliaceum
Family: Malvaceae
Sea hibiscus
Baru-baru, bebaru, baru laut, bebaru bulu, bayur laut

Thespesia populnea
Family: Malvaceae
Indian tulip tree, bendy tree, milo, portia tree, Pacific rosewood
Baru, baru-baru, baru laut, bebaru, waru
©Muhammad Razali Salam

Volkameria inermis
Family: Lamiaceae
Glory bower
Pawan, tulang-tulang

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Xylocarpus granatum
Family: Meliaceae
Mangrove cannonball tree, cannonball mangrove, cedar mangrove
Nyireh bunga
©Norhayati Ahmad

Xylocarpus moluccensis
Family: Meliaceae
Mangrove apple, Moluccas tree
Nyireh batu
©Norhayati Ahmad

Xylocarpus rumphii
Family: Meliaceae
Rumphius' mangrove apple
Nyireh

03

PEMULIHARAAN HUTAN BAKAU

CONSERVATION OF MANGROVE FORESTS

Ekosistem hutan paya bakau adalah salah satu ekosistem yang jarang diberi perhatian, sehinggalah kejadian menyayat hati tsunami yang berlaku di Acheh, Pulau Sumatera, Indonesia pada 26 Disember 2004. Sejak itu, ribuan hektar kawasan pantai telah ditanam semula dengan pokok bakau di Indonesia, dan tidak ketinggalan juga di Malaysia. Di Acheh, hampir 2 juta pokok telah ditanam, termasuk pokok bakau di dataran berlumpur dan pokok Rhu di pantai berpasir di sekitar 70 perkampungan. Jelas sekali ini menunjukkan betapa pentingnya kawasan hutan bakau untuk keselamatan penduduk kawasan pinggir pantai.

Pendidikan mengenai alam tabii adalah perkara asas yang dititikberatkan oleh ramai pihak termasuk Kementerian Pendidikan. Kurikulum sekolah telah diadun untuk tujuan ini, bengkel, seminar, projek, program dijalankan dari semasa ke semasa untuk mendidik, meningkatkan kesedaran awam, dan memahsyurkan ekosistem bakau dalam kalangan semua warganegara. Sekiranya tunjang keselamatan pinggir pantai dijaga dan diperkukuhkan, nescaya kesan bencana besar dapat dikurangkan pada masa akan datang.

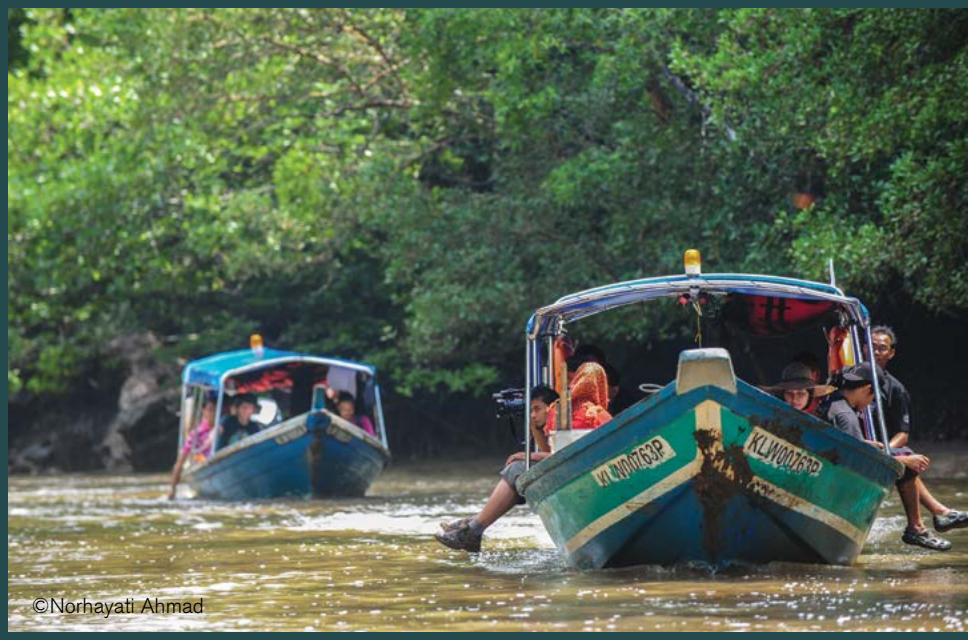
Mengenali spesies flora bakau daripada spesimen yang dikumpul di lapangan

Pengusaha kolam ikan terapung memberi taklimat mengenai spesies ikan yang dibiak kepada pelajar dari dalam dan luar negara

Mangrove ecosystem is one of most ignored ecosystems around, until the most devastating tsunami took place in Acheh, Sumatra Island, Indonesia on December 26, 2004. Since then, thousands of hectares of coastal areas have been replanted with mangroves in Indonesia, and so has Malaysia too. In Indonesia, almost 2 million trees have been planted, including mangrove trees in mudflats and Casuarina trees on sandy beaches around 70 villages. This obviously shows how vital the mangrove areas are for the safety of the people living around coastal area.

Education about nature is a fundamental item that is being highlighted by many parties, including the Ministry of Education. The school curriculum has been reformed for this purpose, while workshops, seminars, projects, programmes run from time to time to educate, raise public awareness, and promote mangrove ecosystem among all citizens. As the backbone of coastal areas, if the mangroves were maintained and reinforced, major catastrophic effects can be mitigated in the future.

Pelajar universiti mengambil bahagian di dalam aktiviti penanaman semula pokok bakau di Kilim Karst Geoforest Park, Langkawi UNESCO Global Geopark



Pelawat menghayati keindahan alam di hutan bakau dengan menaiki bot yang diusahakan oleh kaum nelayan di Kampung Kilim, Langkawi

Pelajar sekolah rendah menanam biji benih pokok bakau untuk tujuan penanaman semula hutan bakau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BIBLIOGRAFI

BIBLIOGRAPHY

Abd. Shukor, A.H. 2004. The use of mangroves in Malaysia. In: *Promotion of Mangrove-friendly Shrimp Aquaculture in Southeast Asia*. Tigbauan, Iloilo, Philippines: Aquaculture Department, Southeast Asian Fisheries Development Center. pp. 136-144.

Clough, B.F. 1982. *Mangrove ecosystems in Australia: Structure, function and management*. Australian Institute of Marine Science, ANU Press. pp. 302.

Duke, N.C. 1992. *Mangrove Floristics and Biogeography*. American Geophysical Union. pp. 63-100.

Japar, S. 1994. Mangrove Plant Resources in the Asean Region. In *Proceedings Third ASEAN-Australia Symposium on Living Coastal Resources, Vol.1, Status Reviews*. eds. C.R. Wilkinson, S. Sudara & L.M. Chou. Bangkok, Thailand: Chulalongkorn University.

Kasturi Devi, K., Afsaneh, S., Cracknell, A.P., Hong, C.G., Kian, P.T., Chin, S.H. & Fateen Nabilla, R. 2015. Satellite images for monitoring mangrove cover changes in a fast growing economic region in southern Peninsular Malaysia. *Remote Sensing* 7: 14360-14385.

Komoo, I. 2005. *Bencana Tsunami 26.12.04 di Malaysia* (Pytg.). Bangi: Institut Pembangunan dan Alam Sekitar (LESTARI), Universiti Kebangsaan Malaysia.

Latiff, A. 1994. Species and habitat diversity of Langkawi Archipelago, Malaysia. In. *Biodiversity and Terrestrial Ecosystems*. Peng, C. I. & Chou, C. H. (eds.). Monograph Series No. 14, 111-122. Taipei: Institute of Botany, Academia Sinica.

Mat-Salleh, K. & A. Latiff. (Pytg.). 2002. *Tumbuhan Ubatan Malaysia*. Universiti Kebangsaan Malaysia & Kementerian Sains, Teknologi & Alam Sekitar Malaysia.

Mihalic, T. 2000. Environmental management of a tourist destination-A factor of tourism competitiveness. *Tourism Management* 21: 65-78.

MNS-Bird Conservation Council. 2005. *A Checklist of the Birds of Malaysia*. Conservation Publication No. 2. Kuala Lumpur: Malayan Nature Society, Malaysia.

Mohd Nizam, M.S., Fera Fizani, A.F., Norhayati, A. & Latiff, A. 2004. Community structure and biomass estimation of trees at two mangrove forests in Pulau Langkawi. In. Mohd Shafeea, L.., Komoo, I., Latiff, A. & Hood, S. *Lembangan Kilim, Kilim Basin. Warisan Budaya dan Sumber Asli Langkawi*. pp. 243-249.

Muda, Y., Abdul Manaf, M.B., Norhayati, A. & Latiff, A. 2013. *Selangor Mangroves. Black Jewel of the Islands*. Selangor: Jabatan Perhutanan Negeri Selangor. pp. 107.

Norhayati, A. & Latiff, A. 2002, Biomass and species composition of a mangrove forest in Pulau Langkawi, Malaysia. *Journal of Malaysian Applied Biology* 30(1&2): 75-80.

Norhayati, A. & Maimon, A. 2012. *Biodiversity of Sungai Santi Mangrove*. Bangi: Penerbit UKM & Jabatan Alam Sekitar.

Norhayati, A., Nizam, M.S., Juliana, W.A., Shukor, M.N., Fera Fizani, A.F., Hafizah, F., Sariah, H., Jamaliah, J., Intan Nordira, A.K. & Latiff, A. 2004. Comparison of Mangrove tree species composition at selected locations in Peninsular Malaysia. In. Shaharuddin, M.I., Azahar Muda, R.U., Kamaruzaman, A.B., Lim, K.L., Suhaili, R. & Latiff.A. *Sustainable Management of Matang mangroves: 100 Years and Beyond*. Forestry Department of Peninsular Malaysia. pp. 254-264.

Norhayati, A., Shukor, M.N., Juliana, S. & Wan Juliana, W.A. 2009. Mangrove flora and fauna of Klang Islands Mangrove Forest Reserves, Selangor, Malaysia. *Malaysian Journal of Science* 28(3): 275-288.

Norhayati, A., Shukor, M.N., Wan Juliana, W.A., Mohd. Nizam, M.S. & Saiful, A.A. 2007. Forest composition and biomass estimation of mangrove at West Port, Klang, Selangor. In. Abd. Jamal, M., Ab. Rahim G.Y., Ramlan, O., Norhayati, A., Gires U., Kamal Roslan, M. & Fathul Karim, S. (Eds.). *Proceedings of the Conference on Marine Ecosystems of Malaysia* 2007, pp. 407-416. Putrajaya, Malaysia: Department of Marine Park.

Saenger, P. & Bilham, K. 1996. Sustainable management of mangrove ecosystems. In: Khemnark, C. (Ed.). *Proceedings of Ecotone IV: Ecology and management of mangrove restoration and regeneration in east and southeast Asia*. Surat Thani, Thailand, pp. 171-176.

Shaharuddin, M. I., Azman, A. R. & Leman, M. S. 2005. Perancangan Pembangunan Hutan-Hutan Simpanan di Sekitar Kilim dalam Konteks Pembangunan Taman Georimba. (Dlm.). *Lembangan Kilim – Warisan Budaya dan Sumber Asli Langkawi*. Leman, M. S., Komoo, I., Latiff, A. & Hood, S. (eds.). 13-29. Bangi: LESTARI UKM.

Shaharuddin, M. I., Komoo, I., Leman, M. S., Mohamed, K. R., Ali, C. A., A Latiff, Norhayati, A., Wan Yusof W. A. & Azman, A. R. (Eds.) 2005. *Geoforest Parks – Hanging Gardens of Langkawi*. Institut for Environment and Development (LESTARI, Universiti Kebangsaan Malaysia and Forestry Department of Peninsular Malaysia. pp. 117.

Tomlinson, P.B. 1986. *The Botany of Mangroves*. Cambridge: Cambridge University Press. 413 pp.

Wan Juliana, W. A., Norhayati, A., Nizam, M. S., Latiff, A., Ahmad Farid, A. F. & Mohd Razali, S. 2005. Mangrove Flora of Sungai Kilim, Pulau Langkawi. (Dlm.). Leman, M. S., Komoo, I., Latiff, A. & Hood, S. (Pytg.). *Lembangan Kilim. Warisan Budaya dan Sumber Asli Langkawi.* Bangi: LESTARI UKM. pp. 289-297.

Wan Juliana, W.A., Damanhuri, A., Muhammad Razali, S., Norhayati, A. & A. Latiff. 2008. *Mangrove Flora of Langkawi.* Langkawi Research Centre, Institute for Environment & Development (LESTARI), UKM, Langkawi Development Authority (LADA) & Department of Forestry Peninsular Malaysia.

Wan Juliana, W.A., Razali Salam, Ehwan Ngadi, Faizi Zulkifli, Azmil Razak, Mohd-Arrabe, Abdul Ghani Hussain, Norhayati Ahmad & A. Latiff. 2014. Langkawi Geopark is Home to Rare Mangrove Flora. *Malaysian Naturalist* 67(3): 50-53.

Watson, J.G. 1928. Mangrove forests of the Malay Peninsula. *Malayan Forest Records* 6: 1-275.

INDEKS

INDEX

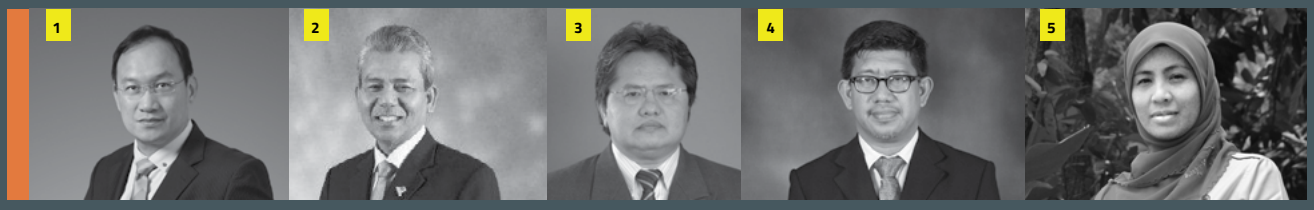
Acanthus ebracteatus 20
Acanthus illicifolius 20
Aegiceras corniculatum 21
Aegiceras floridum 22
Aganope heptaphylla 23
Akar berdara laut 66
Akar duri 66
Akar setebal 58
Allophylus cobbe 24
Ambin kera 30
Api-api jambu 28,, 46
Api-api ludat 29
Api-api putih 27
Ara bertih 52
Ara jejawi 51
Ara punai 52
Ardisia elliptica 25
Atalantia monophyla 26
Atun laut 57
Avicennia alba 14,, 27
Avicennia marina 28
Avicennia officinalis 29
Bakau akik 73
Bakau belukap 74
Bakau gelukap 74
Bakau jankar 74
Bakau kurap 74
Bakau mata buaya 33
Bakau minyak 73
Bakau pasir 75
Bakau Putih 31
Bakau tandok 73
Bangkung kayu 72
Barat-barat 39
Baru 2,, 84,, 85
Baru-baru 84,, 85
Baru laut 84,, 85
Bastard guelder 72
Bayur laut 57,, 84
Bebaru 56,, 84,, 85
Bebaru bulu 84
Bebaru laut 56
Bebuta 50
Beluntas 70
Bendy tree 85
Berembang 80
Betak-betak 50
Black ash 69
Black ebony 49
Black mangrove 21,, 22,, 32,, 60
Blind-your-eye mangrove 50
Blue snakeweed 83
Bondok 37
Breynia racemosa 30
Bruguiera cylindrica 31
Bruguiera gymnorhiza 14,, 32
Bruguiera hanesii 33
Bruguiera parviflora 34
Bruguiera sexangula 35
Buah pelir kambing 57
Buas-buas 72
Buchanania arborescens 36
Buta buta 40
Buta-buta 50
Caesalpinia crista 37
Cannonball mangrove 87
Cassine viburnifolia 39
Cempenai 25
Cerbera manghas 40
Cerbera odollam 41
Ceriops tagal 42
Chengam 77
Chinese banyan 51,, 52
Coffee bush 30,, 31,, 32,, 33,, 34,, 35,, 36
Common Derris 48
Common Flagellaria 54
Congkol 24,, 26
Crabapple mangrove 80,, 81,, 82
Crinum asiaticum 44
Cungkil 24,, 26
Cyperus compactus 45
Dalbergia candenatensis 46
Dedulang 47
Dendrolobium umbellatum 47
Derris trifoliata 48
Derum selunchor 43
Diospyros pilosanthera 49
Dolichandrone spathacea 49
Dungun 57
Excoecaria agallocha 50
Eye of the crocodile 33
False rattan 54
Ficus microcarpa 51
Ficus sundaica 52
Finlaysonia obovata 53
Finlayson's creeper 53
Firefly mangrove 27,, 28,, 46,, 80
Firefly mangrove tree 27,, 28,, 46
Flagellaria indica 54
Gapas-gapas 38
Gedabu 82
Gelang laut 78
Gelang pasir 78
Glochidion littorale 55
Glory bower 86
Grey nicker 37,, 39
Griffith's mangrove apple 81,, 82
Guettarda speciosa 56
Heritiera littoralis 57
Holly-leaved Acanthus 20
Hoya coronaria 58
Hujan panas 30,, 55,, 72
Ibas 64
Indian Atalantia 26
Indian camphorweed 70
Indian fleabane 70
Indian mangrove 29
Indian Pluchea 70
Indian snakeweed 83
Intsia bijuga 59
Jambu kera 55,, 72
Jangkang 25
Jeruju 20
Jeruju hitam 20
Jeruju putih 20
Kabantigi 68
Kacang-kacang 21,, 22
Kalak kambing 53
Katak udang 36
Kayu arang 43,, 49
Kedabu 82
Keeled-pod mangrove 57
Kelici 37
Kelubu 37
Kempudang baran 39
Kemutong 43
Ketak udang 36
Ketapang pasir 56
Ketui 48
Kuku helang 21,, 22
Kuku tupai 37
Kulok 49
Lenggadai 34
Linau 64
Looking-glass tree 57
Lumnitzera littorea 60
Lumnitzera racemosa 61
Lutus 25
Mangrove apple 79,, 80,, 81,, 82,, 88,, 89
Mangrove cannonball tree 87
Mangrove palm 63
Mangrove trumpet tree 49
Mata ayam 25
Mata Itik 25
Mata pelanduk 25,, 39
Melanthera biflora 62
Memparii 71
Mempenai 39
Mengkuang duri 67
Mengkuang laut 67
Mentigi 68
Mentigi laut 68
Merbau changkat 59
Merbau ipil 59
Merbau laut 59
Milo 85
Monkey apple 55
Myrtle mangrove 65
Nettle-leaved vervain 83
Nibong 64

Nibung palm 64
Nipah 63
Nipah palm 63
Nyan 40
Nyatoh laut 69
Nyireh 87, 88, 89
Nyireh batu 88
Nyireh bunga 87
Nypa fruticans 63
Omis-omis 23
Oncosperma tigillarium 64
Oriental mangrove 35, 36
Osbornia octadonta 65
Otak udang 36
Oxyceros longiflorus 66
Pacific rosewood 85
Pandan 67
Pandan darat 67
Pandanus palm 67
Pandanus tectorius 67
Pawan 86
Pedada 79
Pemphis acidula 68
Perepat 79
Peringat 30
Petai belalang 47
Petai laut 47
Pidada 79
Pluchea indica 70
Pong-pong 40
Portia tree 85
Premna serratifolia 72
Puah pipit 36
Puan 36
Pulau dammar 69
Red-flowered black mangrove 60
Rhizophora apiculata 73
Rhizophora mucronata 74
Rhizophora stylosa 75
Rhizophora x *lamarckii* 76
River mangrove 21, 22
Rotan dini 54
Rotan tikus 54
Rumphius' mangrove apple 89
Rusiga 45
Salang 48
Sand mangrove 75, 76
Sarunai 72
Saruni air 78
Screw pine 67
Scyphiphora hydrophyllacea 77
Sea daisy 62
Sea Dendrolobium 47, 48
Sea Gutta 69
Sea Hibiscus 84
Sea holly 20
Sea ox-eye 62
Sea pong pong 40, 41
Sea purslane 78
Sea randa 56
Sebasah 77
Selang 48
Selasih dandi 83
Selasih hutan 83
Sembor 30
Semetik 49
Seremai 62
Serenah 62
Serenai laut 62
Sesuvium portulacastrum 78
Setui 48
Sharp-horned vine 66
Shoebutton ardisia 25
Shrubby coral pemphis 68
Singam 77
Singkel 72
Small flower Bruguiera 34
Small-leaved mangrove 68
Sonneratia alba 79
Sonneratia caseolaris 80
Sonneratia griffithii 81
Sonneratia ovata 82
Sparrows' mango 36
Spider lily 44
Squirrel's claws climber 37
Stachytarpheta indica 83
Suicide tree 41
Sunai laut 62
Sunda fig 52
Taliparitі tiliaceus 84
Tembaga suasa 44
Tengar 42
Terentang tikus 36
Teruntum bunga putih 61
Teruntum merah 60
Thespesia populnea 85
Titberry 24
Tree-avens 43
Tui 49
Tulang-tulang 86
Tumbit kayu 24, 26
Tumu putih 35
Ulang 37
Volkameria inermis 86
Waru 85
Water coconut 63
White firefly mangrove tree 27, 28, 29
White mangrove 31, 32, 33, 34, 35, 36
Xylocarpus granatum 14, 87
Xylocarpus moluccensis 88
Xylocarpus rumphii 89
Yellow cow wood 43
Yellow-eyed Cerbera 41
Yellow mangrove 42
Yellow Teak 69

KUMPULAN PENGURUSAN PROJEK

PROJECT MANAGEMENT TEAM

Penasihat Projek
Project Advisors



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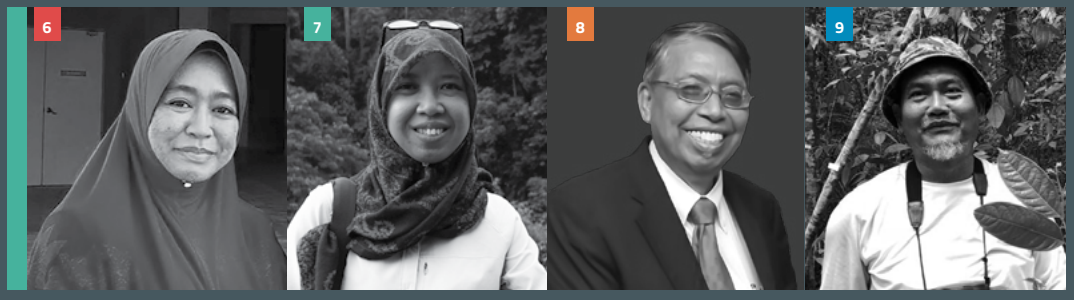

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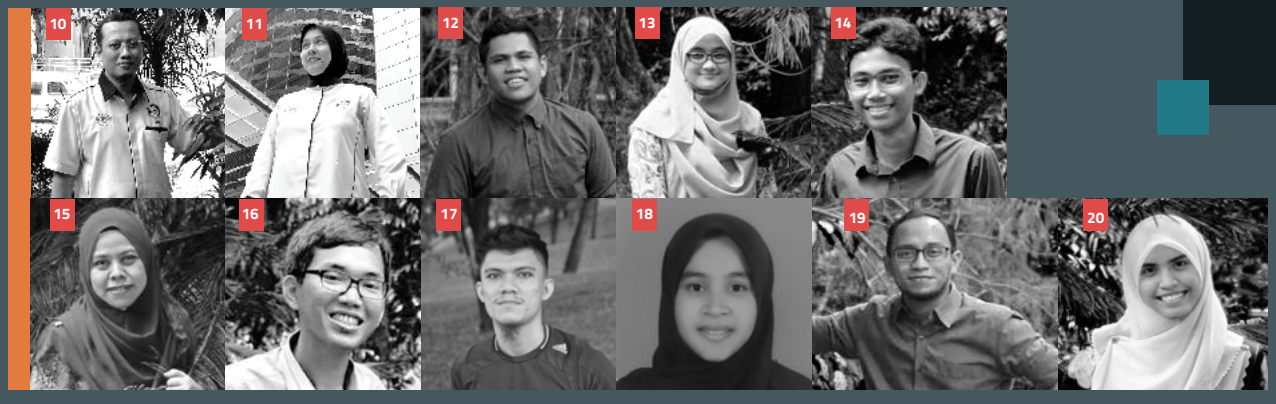

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Buku ini mengandungi data dan maklumat yang terkini tentang kekayaan spesies flora bakau di Malaysia yang dipersembahkan secara jelas dan menarik. Gambar-gambar yang terbaik telah dipilih untuk menyerikan halaman buku ini, lengkap dengan kod QR maklumat tambahan di laman sesawang *Malaysia Biodiversity Information System* (MyBIS). Tujuan laman sesawang ini adalah untuk menjadikan pusat repositori yang merangkumi maklumat kepelbagaian biologi di Malaysia.

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