

FRIM in FOCUS

JUNE 2018



MS ISO 9001:2015 • ISSN 1394-5467

Mangroves



Content of this Issue

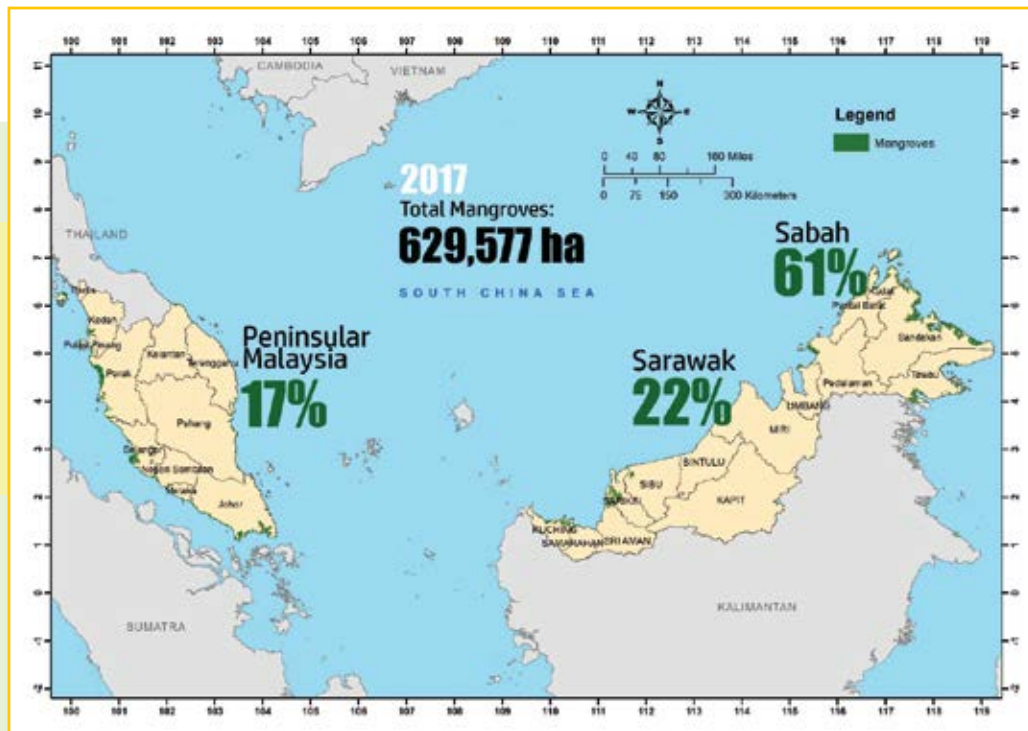
- Are We Losing The Mangroves? 2
- Tanah Hutan Paya Laut: Dulu dan Kini 4
- Kepentingan Ekosistem Pesisir Pantai 6
- Can We Control Mangrove and Casuarina Pests? 7
- Mangrove Research at Pulau Kukup 8
- Khasiat Ubatan Tumbuhan Pesisir Pantai 10
- Program Kesedaran Herba FRIM 11
- Bakau Furniture 12
- Beremi 13
- Rare Durians with Unique Fruiting Habit 14
- News 16

ARE WE LOSING THE MANGROVES?

Adakah Kita Kehilangan Hutan Bakau?

Dr Hamdan Omar
hamdanomar@frim.gov.my

Mohamad Afizzul Misman & Dr Samsudin Musa



Distribution of mangroves in Malaysia in the year 2017

Malaysia is one of the few South East Asian countries with large tracts of mangroves. They provide ecosystem goods and services to the environment and the surroundings regarding shoreline stabilisation, storm protection, water quality maintenance, micro-climate stabilisation, recreation, tourism, fishing and supply of various forest products. Despite extensive distribution of the mangroves, threats posed by different land use activities are inevitable. Effective mangrove management is vital via acquiring knowledge on forest distribution and changes to establish proper protection policies.

EDITORIAL BOARD

Advisors

Dato' Dr Abd Latif Mohmod
Dr Ismail Harun

Technical Editor

Mohamad Zaki Mohd Isa

Editor & Writer

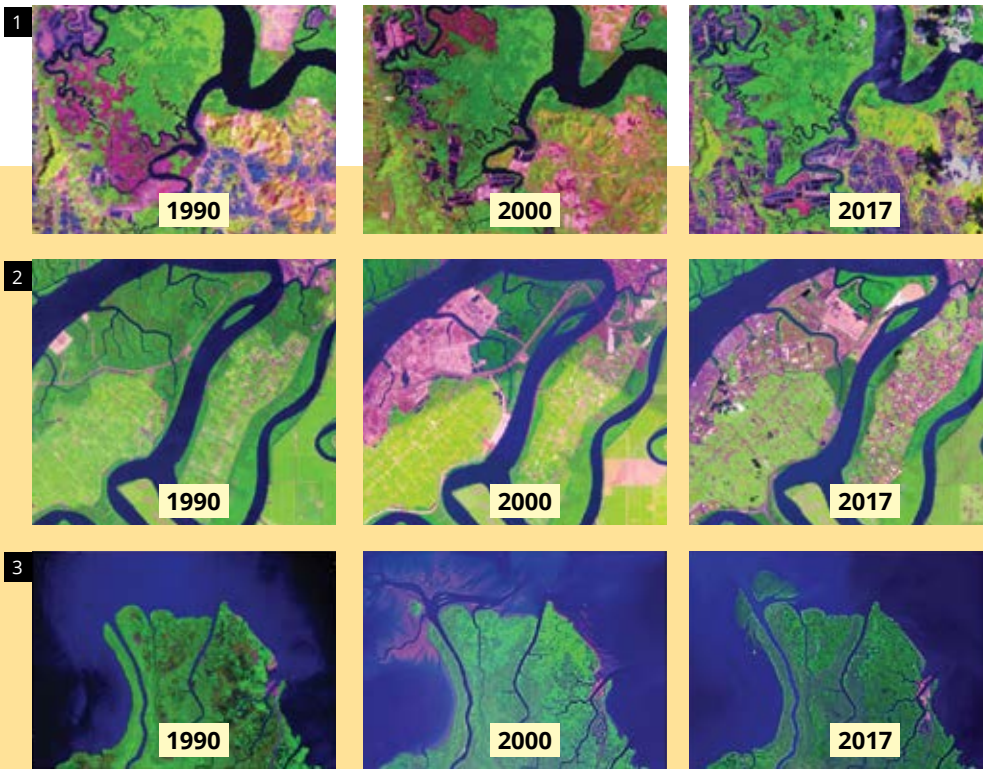
Ida Suraini Abd Shukor

FRIM in Focus (FIF) is distributed free of charge upon request. We welcome feedback on any of the FIF articles. Address comments and enquiries to:

The Editor & Writer of FRIM In Focus
Forest Research Institute Malaysia (FRIM)
52109 Kepong, Selangor DE, Malaysia

Telephone: +603-6279 7501 | **Facsimile:** +603-6273 1076
E-mail: idasuraini@frim.gov.my | **Website:** www.frim.gov.my
Design & Printing: Cetak Jitu Sdn Bhd

Cover photo: Aerial view of Pulau Kukup mangrove with boardwalk cutting through



1. Expansion of aquaculture industries on mangroves: dark blue patches are newly-opened aquaculture ponds on mangrove areas (dark green)
2. Land development on mangroves: Magenta patches are newly-opened areas for development from mangrove areas (dark green)
3. Positive accretion of mangroves at estuaries: New formation at river mouths is the naturally generating mangroves forming a forest

The mangroves in Malaysia are mostly in Sabah, which is 61% of the total 630,000 ha followed by Sarawak (22%) and Peninsular Malaysia (17%). The entire extent of mangroves, however, has decreased throughout the monitoring period from 1990–2017. In 2017, mangroves are mainly found along the west coast of Peninsular Malaysia and Sarawak, and the east coast of Sabah.

Since 1990 a total of 19,894 ha or about 3.1% of mangrove cover was lost. Most of the areas were outside the permanent forest reserves or within state-land regions. The areas comprised land bank for state development which is detailed in the state’s structural planning. The annual rate of mangroves reduction since 1990 was about 737 ha per year or 0.12% per annum. The primary factor that contributed to the changes was direct conversion to other land uses in the form of permanent crops, aquaculture, and developments of infrastructure, settlements, and industry. Other contributing factors such as coastal erosion, and pollution

also affect the mangroves but to a lesser degree.

Loss of mangroves due to coastal erosion is usually coupled with accretions in other areas. Erosion and accretion are natural processes occurring along dynamic coastlines. Eroded coastlines are a result of a combination of factors such as waves hitting perpendicularly to the shore coupled with the swift flow of sea currents washing away soil and sand particles. The height and frequency of waves thrashing the shores contribute to the severity of the erosion.

The presence of coastal vegetation, especially mangroves significantly reduces soil erosion. A succession of species particularly in areas facing the sea also occurs naturally where existing plants die and are replaced by new species. Mangrove roots help reduce the flow and intensity of sea currents. The network of roots promote flocculation and sedimentation on the soil surface and eventually allow positive accretion.

Malaysia has reserved about 85% (~535,000 ha) of the total area of mangroves as permanent forest reserves and state or national parks. The remaining 15% remains as state- and alienated lands. By far, the most effective way to preserve mangroves is through gazetting into permanent forest reserves.

ABOUT THE MAIN AUTHOR

Dr Hamdan Omar is a research officer at the Geoinformation Programme, Forestry and Environment Division, FRIM. He is involved in research and development conducted for the mangrove and coastal forest replanting project, which was initiated after the tsunami disaster in 2004.

TANAH HUTAN PAYA LAUT: DULU DAN KINI

Mangrove Soil: Then and Now



Dataran lumpur pada 2009 di peringkat awal penanaman bakau (atas), dan dirian bakau yang menghijau pada 2015 (kiri)

Mohamad Fakhri Ishak
mohamadfakhri@frim.gov.my

Tanah lumpur pesisir pantai merupakan habitat pelbagai jenis pokok bakau. Keadaan tanah yang tidak berstruktur dan dipengaruhi lanar laut disebut sebagai masif. Sifat masif tanah bermula di laut dan menjadi semakin berstruktur di daratan. Tanah masif dalam laut berbentuk lumpur cair dan berubah mengikut tekanan ombak, mengakibatkan penambakan ataupun hakisan permukaan lumpur.

Tanah masif amat sensitif dengan perubahan persekitaran dan guna tanah yang mengakibatkan perubahan fizikal dan kimia. Apabila diganggu, tanah bakau yang lembut, tidak berstruktur, dan beralkali berubah menjadi tanah berstruktur yang keras. Tanah ini berpotensi menjadi tanah asid sulfat yang kurang sesuai untuk dirian semula jadi bakau. Selain itu, pertukaran tekstur tanah berlumpur kepada campuran pasir boleh berlaku disebabkan pelbagai

faktor semula jadi yang memberi kesan terhadap pokok bakau.

Sungai Haji Dorani, Kuala Selangor merupakan satu daripada lokasi kajian penanaman bakau. Kawasan ini dilengkapi sistem pemecah ombak yang dikenali sebagai *geotube*. Penanaman bakau dijalankan di dataran berlumpur yang dipengaruhi tekanan ombak. Pada awalnya, tanah di kawasan ini bersifat lumpur cair yang tidak sesuai bagi





Hakisan tebing akibat tekanan ombak memusnahkan sebahagian dirian bakau asal



Keadaan tanah lumpur atau masif di kawasan penanaman tidak dapat menyokong beban

pertumbuhan semula jadi pokok bakau. Justeru, bakau hanya dilihat tumbuh di tebing pantai sahaja. Pada peringkat awal pemasangan *geotube*, ketidakstabilan tanah berlumpur menyebabkan pergerakan, dan penambakan serta hakisan permukaan tanah. Aktiviti penanaman menjadi sukar kerana lumpur yang terlalu cair tidak dapat memegang akar mengakibatkan pokok tercabut dibawa arus. Penambakan lumpur yang tinggi sehingga menutupi akar pernafasan pokok bakau seperti *Avicennia sp.* pula mengakibatkan pokok mati secara mengejut. Setelah beberapa tahun, keadaan tanah menjadi semakin stabil dengan kadar pergerakan lumpur

yang rendah. Tekstur tanah yang semakin baik membolehkan pokok bakau yang ditanam hidup semakin subur. Kini, para pengunjung ke Sg Hj Dorani dapat menyaksikan deretan pokok bakau yang menghijau.

TENTANG PENULIS

Mohamad Fakhri Ishak ialah pegawai penyelidik di Cawangan Pengurusan Tanah, Program Hutan Ladang, Bahagian Bioteknologi Perhutanan FRIM. Beliau terlibat dalam kajian berkaitan pedologi dan survei tanah, yang merangkumi kesesuaian tanah dengan spesies pokok.



Tanah masif yang terlalu lembut pada 2010 (hujung kiri) bertukar menjadi lembut pada 2015 (kiri)

KEPENTINGAN EKOSISTEM PESISIR PANTAI *Importance of Coastal Ecosystem*

Mukrimah Abdullah
mukrimah@frim.gov.my
& Mohd Parid Mamat

Pesisir pantai Malaysia sepanjang 4800 kilometer mempunyai pelbagai jenis ekosistem termasuk hutan paya bakau. Hutan ini memainkan peranan penting kepada penduduk setempat dari segi sosioekonomi, dan penjana pendapatan khususnya daripada sumber-sumber bukan kayu. Pendapatan tidak ketara daripada hutan adalah dalam bentuk jaminan kesejahteraan hidup penduduk tempatan, hasil perkhidmatan ekosistem hutan.

Sumber bukan kayu terdiri daripada hidupan akuatik seperti ikan, ketam, udang dan siput; pelbagai produk tempatan seperti air nira, gula kabung dan buah berembang; serta barangan kraftangan. Perkhidmatan ekosistem hutan juga merangkumi peranan paya bakau sebagai koridor kepelbagaian biologi yang memperkayakan sumber hasil pantai. Koridor hutan menjadi zon penampungan ancaman tiupan angin kencang dan hakisan pantai. Paya bakau juga meningkatkan kualiti dan nilai estetika alam sekitar yang menjadi daya tarikan pelancong.

FRIM mendapati purata penjana pendapatan daripada sumber paya bakau mencapai sehingga RM560 sebulan di Perlis, Selangor, Pahang, Terengganu, Kelantan, Kedah dan Sarawak. Jumlah wang yang dijana menunjukkan pentingnya ekosistem pesisir pantai kepada penduduk setempat. Pemuliharaan dan perlindungan perlu diberi perhatian bagi menjamin kelestarian ekologi sekaligus meningkatkan taraf sosio-ekonomi penduduk setempat.



Selain impak sosioekonomi, pengaplikasian penilaian ekonomi juga penting dalam menentukan penggunaan terbaik ekosistem pesisir pantai. Pendekatan ekonomi mengupas potensi mekanisme kewangan baharu bagi membantu mengurangkan beban kos pemuliharaan, pengurusan dan penyelenggaraan sumber pesisir pantai. FRIM mendapati purata kesanggupan menyumbang dalam pemuliharaan pesisir pantai adalah RM15 sehingga RM85 setahun di Kelantan, Perak dan Sarawak. Nilai ini boleh digunakan pihak berkuasa bagi menentukan yuran pemuliharaan sekiranya terdapat cadangan mengenakan bayaran atau cukai bagi tabung pemuliharaan pesisir pantai.



Usaha pemuliharaan ekosistem pesisir pantai mampu ditingkatkan lagi dengan kesanggupan masyarakat menyumbang serta komitmen kedua-dua kerajaan persekutuan dan negeri.

TENTANG PENULIS

Mukrimah Abdullah ialah pegawai penyelidik Program Perhutanan Sosial, Bahagian Perancangan Penyelidikan, FRIM. Bidang kepakaran beliau ialah ekonomi alam sekitar dan perhutanan sosial.

1. Ugang galah yang ditangkap di paya bakau
2. Deretan bot pelancong berlatarbelakangkan kawasan bakau
3. Nelayan pesisir pantai menggunakan pento, iaitu alat menangkap ketam
4. Air nira yang dikutip daripada pokok nipah
5. Produk tempatan hasil daripada pokok berembang yang diusahakan komuniti Kuala Gula, Perak

CAN WE CONTROL MANGROVE AND CASUARINA PESTS?

Mampukah Kita Mengawal Serangga Perosak Pokok Bakau dan Rhu?

Ong Su Ping

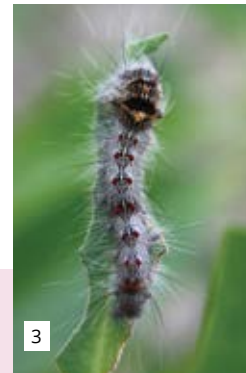
ongsuping@frim.gov.my



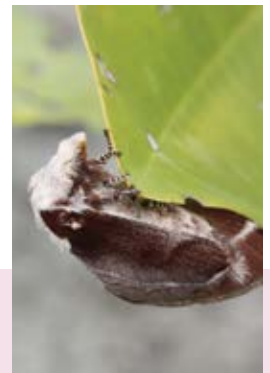
1



2



3



The number of insect species in total is estimated to be at least 5.5 million. In the Indo-Malayan region alone there are about 700,000 described species. Thankfully, from the vast number of species, only a handful have the potential to damage plants and crops and considered as pests. Many kinds of literature in a variety of topics and scope are available on insects, but little is known about them in the natural mangrove forests of Peninsular Malaysia.

After the tsunami disaster in 2004, a large-scale mangrove and non-mangrove (*Casuarina*) replanting was conducted along the Malaysian coastlines to increase the natural buffer zones. Since the initiation of the coastline rehabilitation project, insect pest problems have become increasingly more evident.

Various types of pests were seen to cause varying degrees of damages on the planted mangrove and *Casuarina* trees. Leaf-chewing and wood-feeding insects are among the common pests.

An example of a leaf-chewing pest is the larvae form of the *Pagodiella* sp. moth. The pagoda bagworm feeds on mangrove leaves by creating signature circular holes. Pagoda bagworms may cause an episode of heavy defoliation in infested trees. Another pest in the leaf-chewing pest group is the *Streblote lipara* moth. The huge appetite of young caterpillars devouring leaves can cause rapid damage and later defoliation of mangrove trees.

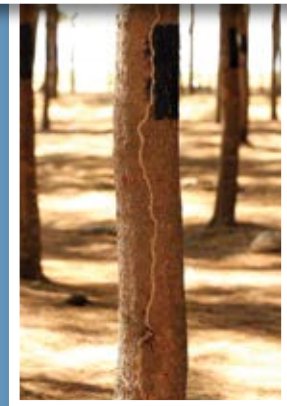
The Asian subterranean termite *Coptotermes gestroi* is an important pest of wooden structures. The termites were found in association

with *Casuarina* trees and their presence can be detected by the presence of mud tubes. The trunk of affected trees is usually hollowed out thus rendering it vulnerable to breaking or snapping during strong wind.

Generally, some form of damage by native pests to parts of plants is a common occurrence, including the occasional outbreak of moth caterpillars in the planted mangrove areas. Essentially, regular monitoring and early detection of potential pest problems reduce the damages by the moth caterpillars on the mangrove seedlings. With better documentation and understanding on the biology and ecology of pests, effective pest management techniques such as termite baiting on the *Casuarina* trees can be implemented. Proper and timely diagnosis will facilitate appropriate treatments to maintain a healthy forest of replanted mangrove trees.



4



1. Trees planted at the landward side of the mangrove forest
2. Circular holes on mangrove leaves eaten by the pagoda bagworm
3. A young *Streblote lipara* caterpillar on a mangrove leaf (left) and the moth/adult form (right)
4. Asian subterranean termites on an infected *Casuarina* tree (above) and an infected trunk showing the characteristic lighter-coloured mud tube (below)

ABOUT THE AUTHOR

Ong Su Ping is a research officer at the Biodiversity Division, FRIM. She is involved in research and development for the mangrove and coastal forest replanting project initiated after the tsunami disaster in 2004.



MANGROVE RESEARCH AT PULAU KUKUP

Penyelidikan Bakau di Pulau Kukup

Tariq Mubarak Husin
tariq@frim.gov.my

The district of Pontian, Johor is home to the FRIM Kukup Research Station. Tanjung Piai which is the southernmost tip of mainland Asia is also located at the district. Kukup is the latest addition to existing FRIM research stations, which shares office with the Johor National Parks Corporation (JNPC).

Kukup is a 150 year-old fishing village connected to Tanjung Piai by a 12 km road. Pulau Kukup on the other hand, is a stone's throw away from the mainland Kukup and the largest uninhabited mangrove island in Malaysia. The island covers both land and mudflat areas of 647 ha and 800 ha respectively. During high tide, as much as 80 percent of the island is inundated and submerged underwater. Pulau Kukup, Tanjung Piai

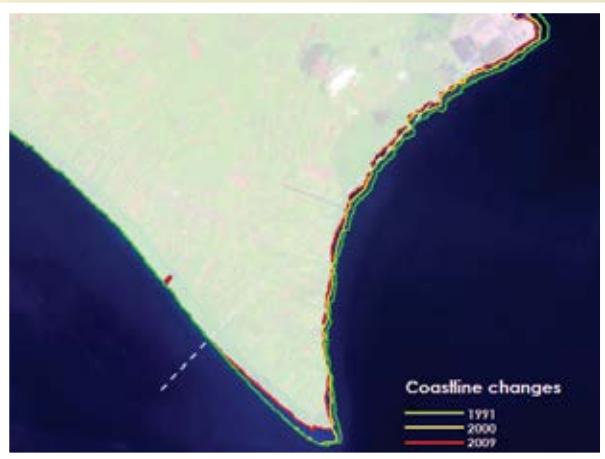
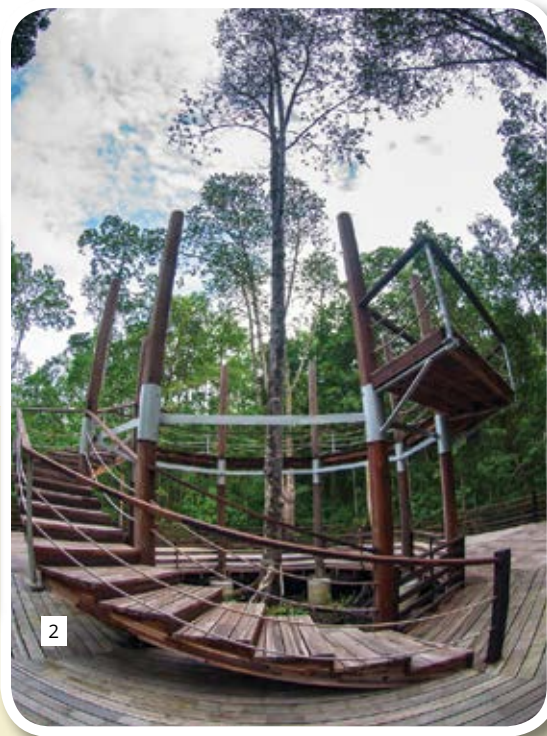
and Sg Pulai were declared as Ramsar sites on 31 January 2003 in recognition of their international importance as wetland areas. The island is presently one of the most preferred tourist attractions for mangrove and nature enthusiasts, and managed by the Johor National Parks Corporation.

Collaboration between FRIM and JNPC was mainly to implement R&D activities for both mutual and public benefits.



Survey on mangrove stands by FRIM and JNPC researchers

Research and activities conducted in the Johor Ramsar site include the establishment of permanent research plots and a mini weather station, and assessment of water quality, erosion rate, and carbon stock of the mangroves. FRIM is currently studying the potential of mangrove species for medicinal use and the carrying capacity of Pulau Kukup as a tourist area.



1. Kukup research station and the Johor National Parks Corporation's office at Pulau Kukup
2. Kukup is a haven for nature lovers especially mangrove enthusiasts
3. The iconic globe marking the southernmost tip of mainland Asia was moved further landward from the original location (bottom) to a smaller platform, near the boardwalk (top)
4. Tanjung Piai coastline showing changes from 1991–2009
5. Mini weather station at Pulau Kukup

Hamdan Omar

Among the main concerns of Tanjung Piai is the alarming rate of erosion, mostly from strong waves triggered by movement of large trade and commercial ships. The 14.2 km coastline of Tanjung Piai is eroding at the rates of 3.2–12.5 m/year in a period of 18 years from 1991 to 2009. Due to severe erosion, the iconic globe marking the southernmost tip of mainland Asia was moved landward to the boardwalk from the original site which is on the verge of collapse. Agencies such as the Department of Irrigation and Drainage (JPS) and the National Hydraulic Research Institute

of Malaysia (NAHRIM) are studying the issue and conducting mitigation efforts. Since mangroves are continually in decline, more research efforts are required besides increasing public awareness to enhance conservation efforts thus keeping the vulnerable ecosystem intact.

ABOUT THE AUTHOR

Tariq Mubarak Husin is a researcher at the Natural Forest Programme, Forestry and Environment Division and coordinator of the FRIM Kukup Research Station. He is a graduate from Universiti Putra Malaysia in forestry science and his research areas are on mangrove inventory and silviculture.

KHASIAT UBATAN TUMBUHAN PESISIR PANTAI

Medicinal Benefits of Coastal Plants

Dr Nor Azah Mohamad Ali
norazah@frim.gov.my

Noor Rasyila Mohd Noor & Saidatul Husni Saidin

Hutan bakau merupakan satu daripada ekosistem pesisir pantai Malaysia yang penting lagi dinamik. Pokok-pokoknya bukan sahaja melindungi pantai daripada hakisan dan menstabilkan alam, malah memberi manfaat sebagai sumber makanan dan pendapatan masyarakat setempat.

Pelbagai spesies flora di hutan bakau digunakan seharian sebagai kayu api, arang, dan dalam produk makanan, dan minuman. Penghasilan produk-produk sedemikian dijalankan secara kecil-kecilan oleh penduduk sekitar.

Apa yang kurang diketahui adalah nilai dan khasiat tumbuhan ubatan dan beraroma yang diamalkan secara tradisi oleh kaum nelayan dan orang asli yang tinggal berhampiran. Pelbagai tumbuhan yang biasa dimakan telah diperkenalkan untuk tujuan penjagaan kesihatan. Jenis-jenis tumbuhan yang telah dan sedang dijalankan kajian kegunaan perubatannya oleh FRIM antaranya termasuklah jeruju putih, jeruju hitam, api-api putih, api-api jambu, pi ai lasa, tumu putih, berembang dan perepat.

Foto	Spesies	Nama Tempatan	Kegunaan secara tradisi
	<i>Acanthus ilicifolius</i>	Jeruju putih	<ul style="list-style-type: none"> Merawat luka, lelah, gastrik, kudis, sakit perut dan sembelit Melegakan dan melembutkan kulit
	<i>Acanthus ebracteatus</i>	Jeruju hitam	<ul style="list-style-type: none"> Merawat sakit kulit, demam panas kronik, mengekalkan tubuh badan sihat, batuk, bisul, kesihatan rambut dan kulit kepala, lelah, batuk, lenguh badan, keputihan dan menghalau nyamuk
	<i>Avicennia alba</i>	Api-api putih	<ul style="list-style-type: none"> Merawat kudis, sakit sendi, lelah, gigitan ular, penyakit kulit dan ulser. Berpotensi sebagai analgesik, antipiretik, antiradang, antiulser dan antibakteria
	<i>Avicennia marina</i>	Api-api jambu	<ul style="list-style-type: none"> Merawat sakit sendi, ulser, cacar, sakit kulit dan luka-luka
	<i>Sonneratia caseolaris</i>	Berembang	<ul style="list-style-type: none"> Batuk, cacar kecil Buah dijadikan jus
	<i>Sonneratia alba</i>	Perepat	<ul style="list-style-type: none"> Merawat batuk dan jangkitan parasit
	<i>Acrosticum speciosum</i>	Piai lasa	<ul style="list-style-type: none"> Penyakit kulit (ekzema, nanah, jerawat, bisul, kudis, kegatalan, ruam, melecet, parut) Perangsang, tonik (untuk kelesuan)
	<i>Bruguiera sexangula</i>	Tumu putih	<ul style="list-style-type: none"> Jus daripada daun digunakan untuk membuat salap, mengurangkan pendarahan dan menyembuhkan kecederaan terbakar

PROGRAM KESEDARAN HERBA FRIM BERSAMA MASYARAKAT JOHOR DAN PULAU PINANG

FRIM Herbal Awareness Program with Johor and Penang Communities

Dr Nor Azah Mohamad Ali
norazah@frim.gov.my

Mailina Jamil & Abdul Majid Jalil

Khasiat tumbuhan hutan bakau dan paya laut telah lama diketahui penduduk tempatan. Walau bagaimanapun, kajian perlu dijalankan agar mutu produk yang dihasilkan daripada tumbuhan ini dapat ditingkatkan. Makanan kesihatan umpamanya, memerlukan nilai saintifik agar keberkesanan dan keselamatannya terjamin.

Bagi meningkatkan kesedaran orang ramai terhadap kepentingan jaminan kualiti produk, FRIM menganjurkan Program Kesedaran Herba untuk masyarakat Tanjung Piai, Kukup Johor, dan Sg Aceh, Pulau Pinang. Penganjuran kursus seumpama ini merupakan sebahagian aktiviti rutin FRIM bagi membantu membangun dan memperkasakan industri herba negara melalui perkongsian teknologi pemrosesan dan penghasilan produk herba.

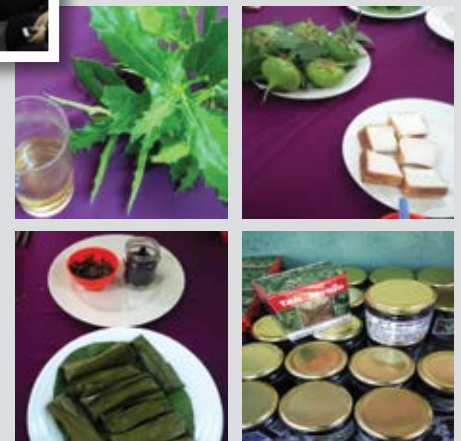
Program yang dijalankan memberi pendedahan tentang penggunaan tumbuhan tepi pantai, proses kawalan kualiti produk herba, pemrosesan minyak pati, dan formulasi produk kosmetik. Peserta program berpeluang mengikuti amali penyulingan minyak pati tumbuhan sekitar pantai. Selain itu, mereka juga mempelajari dan menghasilkan sendiri formulasi produk kosmetik berasaskan herba dan minyak pati, dalam pelbagai bentuk iaitu krim, gel dan minyak urut.



Program kesedaran herba



FRIM kini bekerjasama dengan Persatuan Kebajikan Nelayan-Nelayan Pantai Pulau Pinang (PIFWA) bagi meningkatkan mutu produk makanan dan minuman seperti teh jeruju dan jem buah berembang serta meninjau kegunaan pokok-pokok lain untuk perubatan dan pembangunan produk. Program kerjasama seperti ini diharapkan berupaya meningkatkan ekonomi penduduk setempat.



Produk daripada jeruju dan berembang

TENTANG PENULIS UTAMA

Dr Nor Azah Mohamad Ali memulakan kerjayanya di Bahagian Kimia pada tahun 1987 dan kini bertugas sebagai Pengarah Bahagian Hasil Semula Jadi FRIM. Beliau memegang ijazah kedoktoran dalam bidang Kimia Produk Semula Jadi daripada Universiti Putra Malaysia. Kepakaran beliau ialah penyelidikan tumbuhan ubatan dan beraroma serta pembangunan produk. Kumpulan penyelidikan tumbuhan paya laut juga dianggotai Sahrim Lias, Mohd Shafik Yuzman Tolmanan, Shalini Markandan, Syahida Emiza Suhaimi, Dr Mastura Mohtar dan Mohd Faridz Zoll Patah.

BAKAU FURNITURE

Perabot Bakau

Dr Wan Tarmeze Wan Ariffin
tarmeze@frim.gov.my

Nik Adlin Nik Mohamed Sukri &
Tariq Mubarak Husin

Mangrove is a major supplier of wood to the conventional charcoal-making industry. Bakau, as discovered by FRIM also has potential for making wood products particularly indoor furniture. Studies on *Rhizophora apiculata* (bakau minyak) and *R. mucronata* (bakau kurap) from the Matang mangrove forest were carried under the 9th Malaysia Plan for the NRE Bakau project.

Bakau wood is high in quality and comparable (in terms of physical and mechanical properties) with heavy hardwoods such as cengal, balau, resak, and bitis. The wood is suitable for making indoor and outdoor (under shade) products. Using the technology developed by FRIM, drying of bakau wood can be maximised without inflicting obvious defects. Bakau residues from furniture manufacturing are also useful for making souvenirs and decorations.



One of the potential bakau products which attracted stakeholders was the modular seating system. The modular furniture concept is an industrial design protected under the MyIPO. After a series of discussions for adding value to bakau products in 2013 with the Perak Forestry Department (JPNP), the Larut and Matang District Forest Offices and the Kuala Sepetang Charcoal Manufacturers Association, the parties agreed on acquiring JPNP's approval for the purchase of bakau from charcoal manufacturers to avoid cutting trees beyond the provided concession. Bakau will be sustainably used for making charcoal and products to maintain the Matang global status as a well-maintained mangrove forest.

Economic studies conducted in 2013–2014 by FRIM discovered from 120,000 tons of mangrove logs harvested annually, RM250 million can be generated from products such as furniture, decor, pellets, and briquette, in comparison to RM30 million a year in the form of charcoal.

Under the 11th Malaysia Plan, a study was conducted to develop bakau into more furniture designs such as dining table and chairs, modular sofa, armchair, side table and TV cabinet.

The bakau furniture was well-received by the public particularly due to the unique wood appearance. Other possibilities include using charcoal residues as air purifier by incorporating in household products such as table lamp, towel hanger, coffee table, and shoe cabinet (FRIM ID 22/16).

Making bakau products instead of burning as charcoal may help reduce greenhouse gas emission since the carbon is locked and not released to the environment.

Bakau furniture:

1. Dining table and chairs,
2. Modular sofa,
3. Armchair,
4. TV cabinet

Products incorporated with air purifier:

5. Coffee table,
6. Table lamp,
7. Towel hanger

ABOUT THE MAIN AUTHOR

Dr Wan Tarmeze Wan Ariffin started working at FRIM in 1989 as a senior research officer with the Forest Products Division. His quest for balance between utilisation of timber and conservation of natural forests was the driving factor for his many inventions and innovative products. The bakau modular seating system is one of such products which he co-invented in 2010.

BEREMI

Bacopa monnieri

Dr Vimala Subramaniam
vimala@frim.gov.my

Beremi, also known as Brahmi, is a small, creepy, succulent herb, about 8–15 cm tall. The oval-shaped leaves are smooth-edged and grow on long stalks. Beremi grows well in wet places and is found all over the tropics. In Malaysia, it is found growing wild in moist areas and also cultivated in small plantations.

For more than 3000 years, beremi has been cited for its medicinal properties, especially for memory-enhancing capacity. In the Ayurvedic system of traditional medicine, beremi is reputed to play a significant role in increasing the ability to learn and memorise.

Beremi is claimed to have therapeutic uses for the brain. In scientific experiments, rats given beremi showed remarkable learning and memory enhancement. The facilitating effect of beremi is seen in all three learning responses, cognitive functions and mental retention capacity. One can learn faster, retain more of what is learned and remember it longer.

Beremi significantly improves the three learning processes, enhances memory and lessens amnesia. Bacosides, the active ingredients of beremi, improves vital protein synthesis and activity in the hippocampus, a part of the brain that is important for long-term memory. The herb was found to increase the level of serotonin content in brain tissue. Serotonin, a neurochemical,



Beremi: A powerful brain tonic for memory enhancement

has been identified with improved memory, as well as anti-anxiety benefits.

Beremi has various other therapeutic effects due to its many active substances, and is recommended for nervous problems. Beremi reduces anxiety, stress and blood pressure. It relieves symptoms such as insomnia, headache, irritability, lack of concentration, anorexia, tremors, palpitation, and nervousness.

Beremi is a potent natural antioxidant. Its role in memory enhancement is due to its ability to increase brain circulation by inhibiting oxidative damage in the brain. Beremi possesses high antioxidant properties and acts as an excellent source of antioxidants for anti-aging and age-dependent symptoms.

Beremi is an edible plant which is cooked into a vegetable dish that is served together with rice. It is sometimes dipped in hot water and served raw as ulam, with chilly paste. It is also used as an ingredient in dishes such as kerabu.



Beremi: A natural antioxidant for anti-aging

ABOUT THE AUTHOR

Dr Vimala Subramaniam is a research officer at the FRIM Publications Branch. She is the recipient of various national and international awards for her findings in herbal research.



Beremi vegetable dish:

Clean and wash beremi thoroughly with salt and turmeric powder. In a little oil, stir fry beremi with chopped onions, garlic and red chillies. Add salt and black pepper powder. Serve with rice.

RARE DURIANS WITH UNIQUE FRUITING HABIT

Durian Jarang Ditemui dengan Tabiat Pembuahan yang Unik

Nadiah Idris

nadahidris@frim.gov.my

& Ummul Nazrah Abdul Rahman

A rare durian tree was discovered fruiting profoundly during season several years ago. Tortoise durian or *Durio testudinarum* bears fruits at the base of the trunk unlike on branches like the other famously commercial durians. News on the discovery of the unique durian became widespread after it was reported in the mass media. Tourists from all over the world came to Malaysia to observe and find out more about the durian.

Tortoise durian or durian kura-kura in Malay often grows on hill slopes in primary forests and swamps of up to 1050 m high. Tortoise durian is found in Borneo (Sabah, Sarawak, Brunei, and Kalimantan) and was probably named because natives believe the fruiting habit enables even tortoises to eat the ripe fruits. The young and matured tortoise durian fruits are similar to ordinary durian. Beneath the thorny skin, the pale yellow flesh is dry, soft and smooth with a sweetish taste, and a strong onion fragrant that may be unpleasant to many people. Durian kura-kura grows in the wild usually on brown soil. Over the last few years due to the attention given to its uniquely edible fruits, many young trees were planted in orchards.

Another type of durian that shows a similar fruiting habit to tortoise durian is *Durio malaccensis*. Several Malay names are attributed to the durian including durian batang, durian daun and durian tong. *Durio malaccensis* usually grows beside rocky streams, on ridges and hill slopes that reach up to 1200 m high. The lowland forests of Peninsular Malaysia, particularly Johor, Pahang, Selangor, and Terengganu are the natural habitats of the durian. Similar to other durians the young green fruit of durian batang matures to a dull grey-green. However, underneath the skin, the white and non-fleshy aril is mostly inedible.



Cauliflorous habit of *D. malaccensis*

Engkilik Soepadmo

Vilma Bodos



Postar, Jawit, Miun



Cauliflorous habit of *D. testudinarum* (left) and yellowish brown-coloured fruits at the base of the tree trunk (right)

The existence of these rare and strange-fruited members of the durian family has equally fascinated both botanists and durian lovers. Their fruiting habit is termed as cauliflorous, which describes trees that bear flowers and fruits on the trunk or near the buttress. Cauliflorous is a Latin word combining *caulis* meaning trunk or stem and *floris* meaning flower. Ramiflorous, on the other hand, is the characteristic of most durian trees in Malaysia that produce flowers and fruits on branches.

Botanists from many generations have studied possible reasons and created several theories on why trees evolve into cauliflorous. Cauliflory is uncommon for majority types of plants. The underlying reason in the case of the durian family is probably as an adaptive advantage. Many cauliflorous trees occur in the tropics.

It concurred that the windless tropical rainforest environment increases the dependence of plants on the movement of animals, birds, and insects to pollinate and disperse their seeds. Producing fruit at the base of the tree or on the trunk facilitates access to the flowers and the heavily spined fruits for non-climbing or flying animals that might face difficulty reaching the weak tips of the young branches.

Cauliflory is essential for certain plants including a few rare durians. Having flowers or fruits more accessible to a variety of animals is a good strategy for ensuring survival of the plant species.

ABOUT THE MAIN AUTHOR

Nadiyah Idris is a research officer at the Floral Biodiversity Programme, Forest Biodiversity Division, FRIM. She obtained her BSc in Biology (Botany) from Universiti Kebangsaan Malaysia. She is a team member of the Tree Flora of Sabah and Sarawak Project and her research area is mainly on plant taxonomy, particularly for trees in Sabah and Sarawak.

PENYELIDIK FRIM TERIMA ANUGERAH ITEX'18 DAN I-INOVA

12 Mei 2018—FRIM menangi empat pingat emas di Pameran Rekaan, Inovasi dan Teknologi 2018 (ITEX'18) pada 10-12 Mei di Kuala Lumpur bagi projek:

- 'Sustainable production of tongkat ali bioactive compounds from hairy roots culture using bioreactor technology' yang diketuai Dr Nor Hasnida Hassan
- 'Elite clone of *Labisia pumila* (kacip fatimah) and rapid mass production technique for sustainable supply of high quality planting materials' yang diketuai Dr Farah Fazwa Md Ariff
- 'MyWood-ID' yang diketuai Dr Nordahlia Abdullah Siam
- 'Ciéra ecofriendly multi-purpose disinfectant' yang diketuai Dr Mastura Mohtar. Projek Ciéra turut memenangi anugerah Reka Cipta Terbaik bagi kategori Produk Isi Rumah.

Bagi kategori sekolah menengah, SMK Palong Timur Segamat yang merupakan sekolah kerjasama pintar dengan FRIM, memenangi Anugerah Reka Cipta Terbaik di Pameran Rekaan, Inovasi dan Teknologi Antarabangsa ke-29 yang diadakan bersempena ITEX 2018 bagi inovasi 'Pata Gos'.



Ahli kumpulan projek 'Pata Gos' dengan sijil dan pingat ITEX'18



Pemenang dengan pingat dan sijil anugerah ITEX'18: (dari kiri) Mohd Saifudullah, Mastura, Farah dan Nordahlia



Pemenang dengan pingat dan sijil i-Inova: (dari kiri) Mohd Ramdan, Saiful Azmi, Mastura, Farah Fazwa dan Syafiqah

11 Mac 2018—Penyelidik FRIM memenangi satu pingat perak dan gangsa masing-masing pada i-Inova yang diadakan sempena 'Islamic Global Innovation Festival and Talent' (i-GIFT). Projek tersebut ialah:

- 'PDM3: Nature Inspired Active Ingredient for an Ecofriendly Multipurpose Disinfectant' oleh Dr Mastura Mohtar, Dr Saiful Azmi Johari dan Mohd Ramdan Parman (pingat perak)
- 'CompAcc: Compost for Acclimatisation' oleh Dr Farah Fazwa Md Ariff, Dato' Dr Marzalina Mansor, Syafiqah Nabilah dan Norhayati Saffie (pingat gangsa).